Chapter One

Introduction

1.1 Background to the Study

Globally, breast cancer remains one of the most frequently diagnosed cancers among women, accounting for approximately 2.3 million new cases and 685,000 deaths in 2020 alone, making early detection vital for improving survival rates[1]. Breast Self-Examination (BSE) ranks among the other early detection approaches but is highly marketed as a non-invasive technique that is readily available to women and does not demand any financial investment. Nonetheless, rates of regular BSE practice are not very high among various populations. In developed nations greater rates are as a consequence of knowledge and accessibility of healthcare services whereas the factor of inconsistent practice remains in force particularly in postnatal women who are often more concerned about their children than their own health states[2]. BSE remains a pivotal tool in regions where advanced screening modalities such as mammography are scarce or unaffordable, particularly in low- and middle-income countries.

In Africa, the practice of BSE among nursing mothers is hindered by poor health literacy, cultural beliefs, and inadequate access to health information. Studies have shown that only about 25% to 30% of women in sub-Saharan Africa regularly perform BSE[3]. In Nigeria, BSE awareness is moderately high, but its consistent practice remains limited. According to a recent survey, only 34% of nursing mothers in urban areas reported practicing BSE monthly, with lower rates observed in rural settings[4]. In Osun State specifically, the prevalence of regular BSE among nursing mothers is notably lower, reportedly less than 30%, owing to factors such as limited access to postnatal care services, low perception of personal risk, and

inadequate health education during antenatal and postnatal visits[5]. This highlights the urgent need for targeted awareness campaigns and maternal health interventions to improve BSE practice, especially at the grassroots level.

The prevalence of breast cancer differs significantly among nations and regions. The incidence of breast cancer is lower in developing nations compared to industrialised countries; nevertheless, the death rate is greater, resulting in poorer survival outcomes in developing countries and Sub-Saharan Africa, including Nigeria[5]. The high rate of incidence and fatalities of breast cancer, coupled with the high cost of treating breast cancer, creates the need to make this one of the top priority items in the scope of health authorities and policymakers. This means that routine breast self-examination is required. Breast cancer remains one of the leading causes of morbidity and mortality among women, and its treatment places a heavy financial burden on individuals and health systems. Early detection through cost-effective methods such as routine breast self-examination significantly increases survival chances by enabling timely intervention. Therefore, prioritising breast cancer prevention and encouraging regular self-examination is a crucial strategy for health authorities and policymakers to reduce both incidence and fatalities.

Breast self- examination is the practice of detecting abnormalities of the breast. This technique involves using the fingers to seek any masses and the eyes to seek and observe any colour change/enlargement/change in shape. This method is simple, inexpensive and not invasive. The presence of breast lumps, fibroadenomas, breast cysts, discharge of the nipples, mastitis, and mastalgia are abnormalities that can be traced in the breast through self-examination[6]. Breast self-examination for awareness is a secure method to familiarise oneself with the usual characteristics, including colour, size, shape, and texture of the breasts, perhaps

facilitating early cancer diagnosis. Breast cancer is a malignant neoplasm resulting from the unregulated proliferation of cells in the breast, leading to the formation of a tissue mass[7].

Knowledge of breast self-examination refers to the awareness, understanding, and information women have about the process, importance, and benefits of regularly checking their breasts for unusual changes. It involves knowing the right time to perform the examination, usually a few days after the menstrual cycle when breast tissues are less tender, and being aware of warning signs such as lumps, skin dimpling, nipple discharge, or changes in size and shape. Having adequate knowledge empowers women to take responsibility for their health by recognising that early detection of abnormalities can improve treatment outcomes and reduce fatalities. This knowledge also includes the awareness that BSE is not a substitute for professional screening methods such as mammography but rather a complementary practice that enhances personal health monitoring.

The skills of breast self-examination, on the other hand, go beyond awareness and focus on the practical ability to correctly carry out the procedure. This includes mastering the techniques of using the pads of the fingers to feel for lumps or irregularities in both a standing and lying position, as well as visually inspecting the breasts in front of a mirror for any physical changes. Skills also encompass the ability to use consistent, systematic patterns such as circular, vertical, or wedge motions to ensure the entire breast area and armpit are examined thoroughly. Regular practice of these skills helps women gain confidence, accuracy, and consistency in self-examination, thereby improving the chances of detecting abnormalities early. Ultimately, having the right skills ensures that the knowledge of BSE is effectively translated into preventive action.

These cells possess the ability to invade neighbouring structures or disseminate to remote locations in the body, where they can proliferate uncontrolled, resulting in illness and mortality[8]. Breast self-examination is a crucial component of any adult woman's health regimen. A woman's routine breast self-examination facilitates the prompt identification of any alterations that may arise. Numerous women inherently exhibit lumpiness and asymmetrical variations between the right and left breasts. The fundamental aspect of breast self-examination is to identify alterations in the breast, serving as the foundation for all early detection initiatives.

Breast self-examination enhances women's awareness of their breast health, resulting in early and increased likelihood of recognising changes in breast tissue. Breast Self-Examination (BSE) is thus advised for increasing awareness among at-risk women, rather than serving as a screening technique[9,10]. Every woman can conduct a breast self-examination if properly instructed, as it is straightforward to execute and can be performed independently at no expense. It enables the lady to acclimatise to the appearance and texture of her breast, facilitating the prompt detection of any alterations that may arise. This enables prompt communication with the physician to report such alterations. Furthermore, it facilitates prompt hospital presentation, diagnosis, and treatment of the disease within the environment[11]. Health practices like breast self-examination (BSE) can empower women to assume control and responsibility for their health.

Breast self-examination is a low-cost, simple, and non-invasive method that empowers women to detect breast anomalies early. However, studies have consistently shown that despite awareness, the actual practice of BSE remains inadequate, particularly among postpartum and nursing mothers who often prioritise child care over personal health[12].

Educational-based interventions have been identified as a critical strategy to bridge the gap between knowledge and practice. Such interventions are designed to improve both cognitive and psychomotor skills required for accurate and consistent BSE. Research indicates that structured health education programmes delivered through multimedia tools, demonstrations, counselling sessions, and printed materials significantly enhance women's understanding and capacity to perform BSE[13]. A study conducted in Ethiopia demonstrated that nursing mothers who participated in an educational intervention showed a significant improvement in their BSE skills and frequency of practice compared to those who did not[14]. These findings underscore the importance of tailored health education strategies in promoting maternal health behaviours, especially among populations with limited access to routine screening facilities.

Educational interventions focusing on BSE have shown promising results in other developing countries with similar socio-economic and healthcare characteristics. For example, a quasi-experimental study in Pakistan demonstrated that a structured BSE training programme significantly improved the participants' knowledge, attitudes, and practical skills[15]. Likewise, in Ghana, another study found that educational interventions led to improved self-efficacy among women regarding their ability to detect breast abnormalities early[16]. The transferability of these outcomes to the Nigerian context, particularly Osun State, suggests that similar interventions could be instrumental in improving BSE practice among nursing mothers.

The persistent low rates of BSE knowledge and practice among nursing mothers in Osun State, despite regular interaction with healthcare facilities, highlight a critical gap in maternal health education. Empirical evidence from both local and international studies supports the effectiveness of educational-based interventions in improving BSE knowledge and skills.

Given the high burden of late breast cancer presentation in Nigeria and the unique opportunity that nursing mothers represent in terms of accessibility and health receptivity, this study is timely and essential. It assessed the effect of a structured educational-based intervention on the knowledge and skills of BSE among nursing mothers in selected secondary healthcare facilities in Osun State, thereby contributing to early detection efforts and the reduction of breast cancer-related morbidity and mortality.

1.2 Statement of the Problem

As a health researcher and health advocate in promoting well-being among nursing mothers, the researcher has been repeatedly faced with the challenge of nursing mothers without proper knowledge on the importance of breast self-examination (BSE) or skill on the right way to do it. Most women in Osun State seems to have little knowledge on how to screen early signs of breast cancer, via self-examination despite being exposed to the healthcare system regularly during their ante and postpartum visits. In the course of the researcher's professional engagement with nursing mothers, the researcher has observed that their primary focus is often on infant care, with personal health relegated to the background. This deprioritisation, combined with inadequate or ineffective health communication strategies, exacerbates their vulnerability to undetected breast anomalies. Several women have expressed surprise or anxiety when BSE is mentioned during outreach or counselling sessions, indicating that it is either unfamiliar to them or not regularly emphasised in their healthcare interactions[17]. The researcher's experience has shown that without a deliberate, skill-based educational intervention, these mothers may continue to neglect an important tool in early breast cancer detection. The absence of practical demonstrations, follow-up, and reinforcement mechanisms makes it difficult for them to gain confidence and competence in performing BSE.

Given the evidence from similar contexts indicating that well-structured, educational-based interventions can significantly improve knowledge and skill acquisition among women[18,19], the researcher is compelled to explore the effectiveness of such interventions among nursing mothers in Osun State. There is a pressing need to empirically investigate whether targeted health education programmes can enhance the knowledge and proficiency of BSE in this population. This study is, therefore, not only a scholarly endeavour but also a passionate response to a health need that, if unaddressed, could continue to lead to avoidable suffering and loss of life among women in Osun State.

1.3 Justification of Study

Breast cancer remains one of the leading causes of mortality among women globally, and its impact is more severe in low- and middle-income countries due to late presentation and limited access to diagnostic facilities. In Nigeria, particularly in Osun State, majority of breast cancer cases are detected at advanced stages when treatment outcomes are poor and mortality rates are high, despite the integration of maternal health education into antenatal and postnatal services, many nursing mothers still lack adequate knowledge and practical skills on breast self-examination (BSE), a simple, cost-effective technique for early detection. The existing gap between awareness and actual practice underscores a critical flaw in current health education strategies. This study is therefore justified as it introduced and evaluated an educational-based intervention that will not only increase knowledge but also enhance the practical skills of BSE among nursing mothers, an often-overlooked group in breast cancer prevention strategies.

Moreover, empirical evidence from other low-resource settings suggests that structured educational interventions incorporating demonstrations, visual aids, and interactive sessions can significantly improve women's ability and willingness to practice BSE regularly. However, similar programmes are scarcely implemented or evaluated within Osun State's healthcare system. As a researcher with firsthand experience of the consequences of poor breast health literacy among women in this region, the researcher find it crucial to address this gap. Nursing mothers are already engaged with the healthcare system, making them an accessible and receptive audience for health interventions. If this study proves that educational interventions significantly improve their BSE knowledge and skills, it could inform future policy and practice, promoting early detection and potentially reducing breast cancer morbidity and mortality in the state.

1.4 Aim and Objectives of the Study

The aim of the study was to assess the effects of educational-based intervention on knowledge and skill of breast self–examination among nursing mothers in selected secondary health facilities in Osun state.

Objectives were to:

i. assess the pre- and post- intervention knowledge of breast self-examination (BSE) among the nursing mothers in selected secondary health facilities in Osun State..

ii. identify the pre- and post- intervention skills of BSE among the nursing mothers.

iii. determine the difference between pre and post intervention knowledge of BSE among the nursing mothers.

iv. identify the difference between pre and post intervention skills of BSE among nursing mothers.

v. determine the significance difference between the pre-intervention knowledge of nursing mothers in the control and experimental groups; and,

vi. determine the significance difference between the post-intervention knowledge of nursing mothers in the control and experimental groups.

1.5 Research Questions

1. What is the pre- and post- intervention knowledge of breast self-examination (BSE) among nursing mothers in selected secondary health facilities in Osun state?

2. What is the pre- and post- intervention skills of BSE among nursing mothers in selected secondary health facilities in Osun state?

3. What is the difference between pre and post intervention knowledge of BSE among nursing mothers in selected secondary health facilities in Osun state?

4. What is the difference between pre and post intervention skills of BSE among nursing mothers in selected secondary health facilities in Osun state?

1.6 Hypotheses

H_o1- There is no significant difference between the pre-intervention knowledge of nursing mothers in the control and experimental groups.

H_o2- There is no significant difference between the pre-intervention skill of BSE among nursing mothers in the control and experimental groups.

H_o3- There is no significant difference between the post-intervention knowledge of nursing mothers in the control and experimental groups.

H_o4- There is no significant difference between the post-intervention skill of BSE among nursing mothers in the control and experimental groups.

1.7 Significance of the Study

This research offers rich information on the efficacy of pedagogical-based interventions in enhancing knowledge and skills with regards to breast self-examination (BSE) among reproductive-aged females. Such evidence will inform the health policymakers in the process of formulating and implementation of specific health education strategies and policies to limit incidence and mortality rates relating to breast cancer. The information can be used to promote basic breast health education as part of the women health initiatives, which in effect would promote early detection and preventive measures. The study findings would also be beneficial to the health facilities since it could help them better understand the relevance of integrating educational interventions as part of their everyday services. It would present some practical knowledge on how a systematic health training can be administered in order to increase the ability of women to recognize early symptoms of abnormalities in breast. Employing such interventions, secondary health facilities could help take a proactive position towards ensuring better patient outcomes, minimizing the consequences of late-stage breast cancer presentation, and getting the most out of resource allocation in respect of treating cancer.

The entire healthcare workers would be benefited by this study as they get a better picture of how they contribute to empowering women through health education. The results would

emphasize on the necessity of more training of health professionals in the administration of educational interventions. Not only would this elevate their professional competence levels in the prevention of breast cancer but also enhance their interest levels in patients which would lead to collaborative approach to healthcare provision. Among the reproductive-aged women, the study could also act as a crucial component in enhancing their knowledge and expertise on the issue of breast self-examination. By endowing women with skills of conducting BSE successfully, the study gives women the responsibility of owning their breast health by enabling them detect the onset of potential anomalies in their breasts at an early stage. This, in its turn, can decrease the emotional, financial, and physical aspects of recovery of advanced breast cancer treatment.

Findings of the study would have wider social implications in that they would examine a major issue of health, cancer of the breast in women. Enhanced BSE awareness, as well as skills, among women contribute to early diagnosis and, therefore, lower the burden of advanced cases in society. It can similarly lead to a healthy cultures of prevention and awareness building among the communities, driving towards a healthier socio-lifestyle and a better population health overall. The research would be of value in future researches concerning prevention of breast cancer and educational interventions. It would provide sound data and methodological information that would be used by future researchers to enhance their studies further in relation to the effects of health education on other prevention health practices. The results of the study can further be used to conduct comparative research within various populations or medical institutions, thus adding to the accumulative knowledge in the sphere of cancer-related preventative work and health education.

1.8 Scope of the Study

The study covered nursing mothers in selected secondary health facilities in Osun State. The research study focused on nursing mothers' knowledge and skill of breast self-examination and the research took a maximum of eight weeks.

1.9 Operational Definition of Terms

Breast Self- Examination: A breast self-examination (BSE) is a method which allows an individual to examine his/her breast for any physical or visual changes.

Early detection: The action or process of identifying the presence of something concealed timely and appropriately

Nursing mothers: Mothers attending post-natal care in selected secondary health facilities in Osun State.

Knowledge of BSE: Respondents possession of specific facts about BSE and breast cancer.

Educational-based intervention: Guidelines and Instructions on BSE developed and implemented by a nurse to ensure proper disposal of knowledge to the respondents

Skills of BSE: Series of activities designed to examine the breast for any abnormality

Endnotes

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Chapter Two

Literature Review

This chapter will present a review of literatures on the effect of nurse-led intervention on knowledge and skill of breast self-examination among women of reproductive age women. The chapter will summarize the definition of breast self-examination, overview of breast self-examination, overview of breast cancer, risk factors of breast cancer, signs and symptoms of breast cancer, breast cancer screening modalities, breast self-examination, clinical breast examination, mammogram, steps in breast self-examination, challenges of performing BSE, advantages of BSE, the effectiveness of breast cancer in Nigeria, empirical review, theoretical model and conceptual framework.

2.1 Conceptual Review

2.1.1 Overview of Breast Self-Examination

Self breast examination (BSE) is a very important screening tool in the detection of abnormalities of the breast. This practice enables women to be acquainted with their breasts and consequently, making it easier to detect some possible changes that can emerge. Women are supposed to perform the breast self examination regularly. Breast self-examination (BSE) comprises the inspection and touching by the patient of their own breast in an effort to identify lumps, shape, touch and size, and curve of the breast[1]. The aim of BSE is to empower a woman to detect the changes in the breasts should they exist. The process is carried out once in every 30 days between the 7th and the 10th of the menstrual period 28. Self-Examination of the Breasts (BSE) is regarded as an effective breast cancer screening technique when used in-conjunction with Clinical Breast Examination (CBE) and mammography. In addition, it

could be used to enhance breast cancer awareness in women. BSE is preferred because it is cheaper, confidential, less unpleasant, ease of application, safety, and no specialised equipment is necessary. Research has showed displaying an improvement of breast health awareness, thus, easing early detection of breast deformities.

Breast self-examination (BSE) is a non-invasive, cost effective and uncomplicated procedure whereby women can diagnose any strange changes occurring on the breasts at an early stage. It equates to the regular and systematic palpation of the breasts by an individual to detect bumps, lumps, thickening tissues or any other form of changes that may signal possibilities of breast diseases, including cancer. BSE is one of the major plans in breast health awareness, which contributes greatly to the elimination of delays in the diagnosis of breast cancer. Although it cannot serve as a substitute to clinical breast examination or mammography, BSE gives women the opportunity to know their breast, thus, improving the chance of identifying changes at a treatable level in the earlier stages[2]. The practice of BSE is particularly vital in resource-limited settings, such as many developing countries, where access to advanced diagnostic technologies like mammography is constrained. In such settings, BSE is not only practical but also essential in promoting awareness and encouraging a proactive approach to health[3]. Studies have consistently shown that women who regularly perform BSE are more likely to detect breast abnormalities earlier than those who do not, thereby improving the chances of successful treatment and survival. Despite its importance, the adoption and regular practice of BSE remain low in many parts of the world due to inadequate awareness, cultural misconceptions, and a lack of proper education about its importance[4].

Education and awareness disturbance have been found beneficial in raising the practice and the effectiveness of BSE. Women who undergo systematic education about BSE, including demonstrations and explanation of details, exhibit better knowledge, abilities and confidence of applying their skills in making the examination correctly. This provides an argument to the need of incorporating BSE education into a wider breast health education campaign, especially within healthcare facilities and community educational efforts[5]. Additionally, incorporating educational interventions into secondary healthcare facilities can help bridge the gap in knowledge and practice among women, especially those in reproductive age groups, who are at a critical stage for preventive health behaviours. While BSE is widely acknowledged for its role in early detection, debates exist regarding its effectiveness in reducing breast cancer mortality. Some studies argue that BSE alone may not significantly lower mortality rates and recommend its use as part of a comprehensive breast cancer screening programme[6]. It is important however to note that BSE is a complementary screening method of breast cancer with other screening tools like breast examination and mammography which allows a woman to be involved in her health. This kind of co-operation between approaches would be whole-istic in prevention and treatment of breast cancer.

The factors that exist between the potential adoption of BSE and the widespread BSE adoption are cultural beliefs, low literacy, and myths about breast cancer and the methods of detecting breast cancer. An example here is that in certain communities talking about breast health is a taboo and hence women are discouraged to learn or practise BSE. To overcome these obstacles, one will need culturally sensitive educational procedures that do not contradict local beliefs but bring to significance the advantages of early stop[7]. Healthcare professionals also play a pivotal role in promoting BSE by providing accurate information,

dispelling myths, and creating an enabling environment for women to feel comfortable discussing breast health.

In recent years, technological advancements have also supported the practice of BSE. Digital platforms, mobile applications, and virtual demonstrations have emerged as innovative tools for educating women about BSE. These technologies provide accessible, user-friendly resources that enhance understanding and skill acquisition, particularly for younger women who are more tech-savvy[8]. Through the incorporation of technology in the education of breast health, the provision of inaccurate information to the masses is no longer an issue as more people come on board the BSE practice routine healthy practices bandwagon as a result.

Breast self-examination (BSE) is the only practical method that has been identified in detection of breast cancer in the developing nations. There has been perceived wide knowledge - application gap observed globally between the knowledge and skills of BSE. Such socio-demographic factors, myths, diversity of cultural beliefs, access to unavailability of health care services are identified as the reasons behind poor uptake of breast screening. The preventive health behavior that an individual, who believes he or she is healthy, engages in to prevent diseases or detect illness in its asymptomatic stage can be referred to as BSE.

The goal of a BSE is to become acquainted with the topography of the breast so that one can confirm in future that changes, which might signal the presence of masses or lumps, may be detected. Regular monthly breast self-examination, which is performed on the 7th -10th day of menstrual cycle, plays a major role in the early diagnosis of breast cancer at its early stages, at which the likelihood of metastasis is significantly low, thus improving treatment outcome[9]. The prompt identification, diagnosis, and management of breast cancer and other breast

anomalies are crucial in diminishing the morbidity and mortality linked to the condition. Diverse techniques have been proposed for the screening and early identification of breast cancer. The methods encompass breast self-examination, clinical breast examination (CBE), ultrasound, mammography, magnetic resonance imaging, and digital breast tomosynthesis[10,11,12]. Breast self-examination (BSE), clinical breast examination (CBE), and mammography are extensively utilised. It is advised that breast self-examinations (BSE) commence monthly at 20 years of age as a component of breast cancer screening, while clinical breast examinations (CBE), performed by a healthcare professional, should occur every three years for women aged 20-40 and annually afterward. Women aged 45 to 54 should get yearly mammograms, whereas those aged 55 and beyond should have biennial screenings. Women aged 40 to 44 may elect to start annual screening[13].

On the whole, BSE is an important part of breast cancer detection and prevention. Although it cannot be used as a standalone diagnostic device, its contributions towards the empowerment of the female population and early identification cannot be overemphasized. Expanded education, cultural and systemic barriers intervention, and technology use are important tools towards the improvement of BSE and practice. By encouraging routine and precise BSE, healthcare systems would be helping in the fight against breast cancer globally, and especially in resource poor countries where they do not easily access advanced methods of screening the disease in question.

2.1.2 Steps in Breast Self-Examination

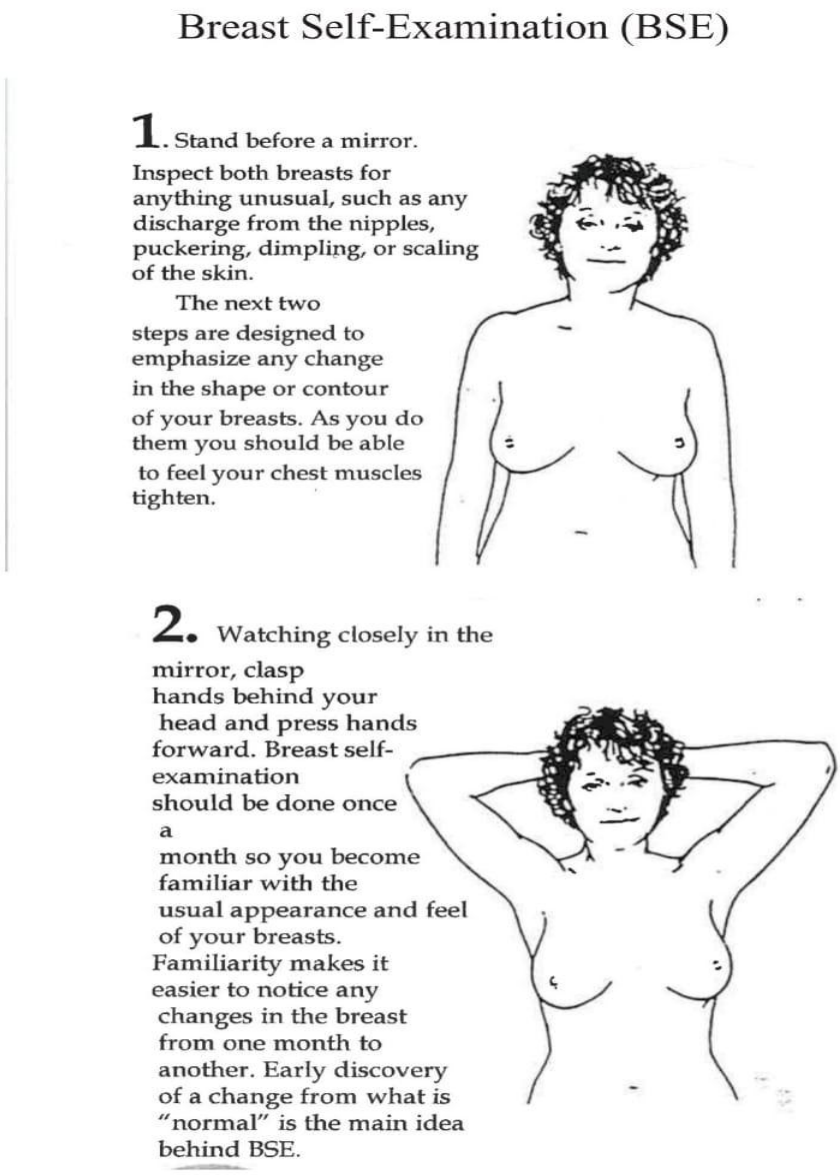
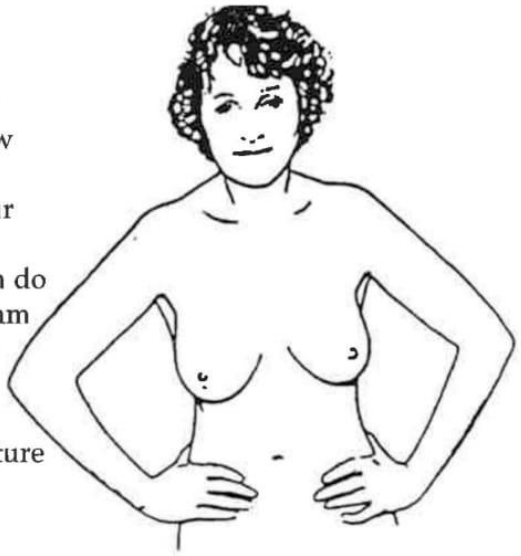


Figure 2.1: Process of Breast Examination

Source: Women's Health Specialists, The Feminists Health Center of California

Step 1: In fig 2.1 shows a woman who stands in front of a mirror, pressing her hands firmly down on her hips. This position helps to contract the chest wall muscles and enables visualization of any breast changes. She will be looking at the size, shape, colour and contour noting any dimpling, redness, scaliness of the nipple or breast skin.

3. Next, press hands firmly on hips and bow slightly toward your mirror as you pull your shoulders and elbows forward. Some women do the next part of the exam in the shower. Fingers glide over soapy skin, making it easy to concentrate on the texture underneath.



4. Raise your left arm. Use three or four fingers of your right hand to explore your left breast firmly, carefully, and thoroughly. Beginning at the outer edge, press the flat part of your fingers in small circles, moving the circles slowly around the breast. Gradually work toward the nipple. Be sure to cover the entire breast. Pay special attention to the area between the breast and the armpit, including the armpit itself. Feel for any unusual lump or mass under the skin.

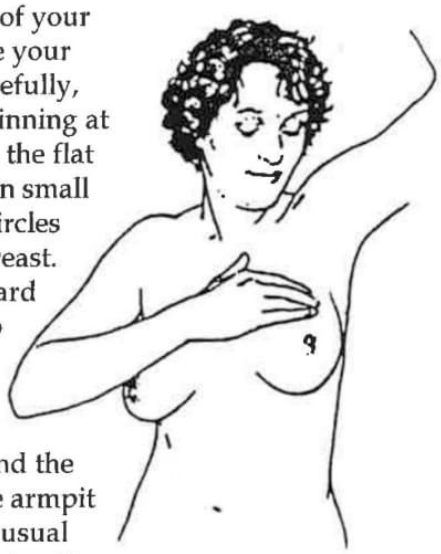


Figure 2.2: Process of Breast Examination

Source: Women's Health Specialists, The Feminists Health Center of California

Step 2: Figure 2.2 below shows a woman model who raises her arms and looks for the same changes as mentioned above. The woman must examine both underarms while sitting up or standing with her arms slightly raised

Step 3: While at the mirror, the woman looks for any discharge coming from the nipples; for example, watery, milky or yellow fluid or blood.

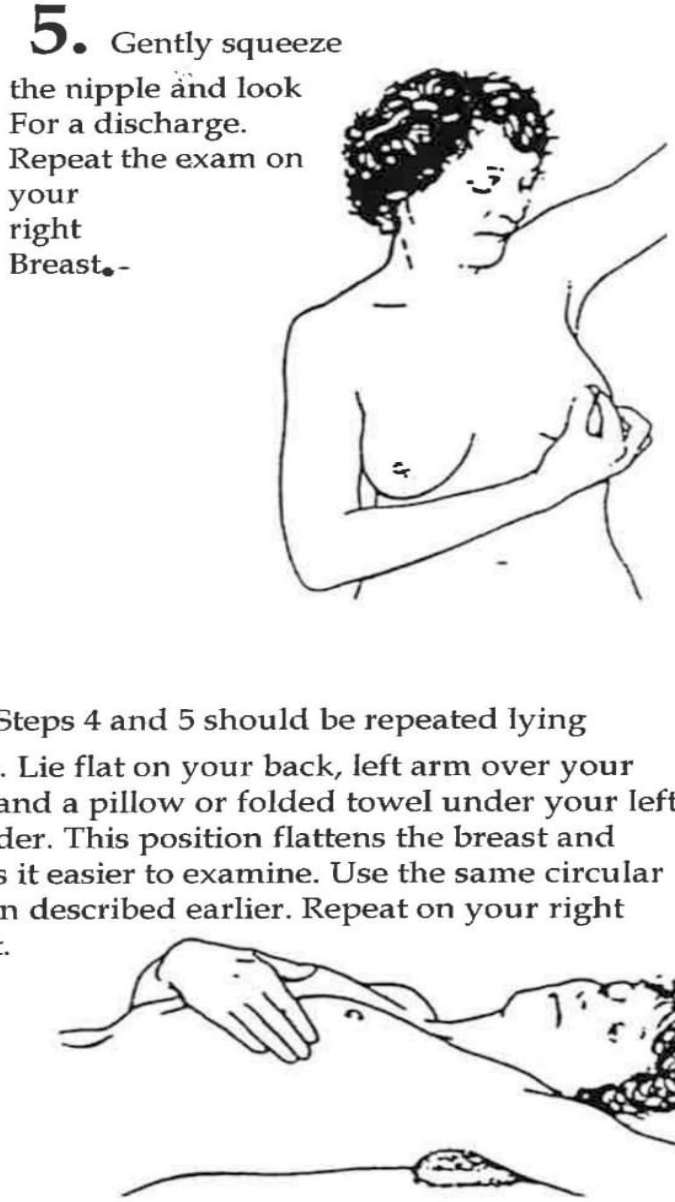


Figure 2.3: Breast Self-Examination

Source: Women's Health Specialists, The Feminists Health Center of California

Step 4: In figure 2.3 the woman lies down with her right arm behind her head. This position spreads the breast tissue evenly over the chest wall, making it easier to feel. The woman uses the three middle finger pads of her left hand to feel for any right breast lumps. The woman needs to apply light pressure to feel the tissue closest to the skin; medium pressure to feel deeper, and firm pressure to feel the tissue close to the chest and ribs. The woman examines her left breast by putting her left arm behind her head and using her right-hand finger pads to do the examination.

2.1.3 Overview of Breast Cancer

Breast cancer is defined as a malignant tumour in the breast. It is an unregulated proliferation of breast cells. Cancer arises from mutations, or atypical alterations, in the genes that govern cell development and maintain cellular health. Genes reside in the nucleus of each cell, which functions as the "control room" of the cell[14]. Typically, the cells in our bodies undergo replacement in an organized manner. This disorder, which is more prevalent in women than in males, has been characterized in many ways.

Breast cancer is a leading cause of morbidity and mortality among women globally, representing a significant public health challenge with profound socio-economic and emotional implications. It is the most commonly diagnosed cancer in women, with over 2.3 million new cases reported worldwide in 2022[15]. The disease occurs when breast cells undergo uncontrolled growth, often due to genetic mutations. These mutations may be inherited or acquired, with factors such as hormonal imbalances, environmental exposures, and lifestyle choices contributing to their development[16]. Breast cancer is primarily a women disease although men are also likely to develop the disease albeit at a very small number. The developments in medical technology and efforts in the field of public health have resulted in very considerable progress in early detection and treatment, but there remain disparities in its patrimony especially in low- and middle-income countries.

Age is one of the major risk factors of breast cancer and the risk of developing it intensifies as women age in life. Potential risk factors also include hormonal and reproductive factors which consist of early menarche, late menopause, and hormone replacement therapy. Also, breast cancer familial history or genetic mutation in BRCA1 and BRCA2 genes greatly

increases an individual risk[17]. However, the majority of breast cancer cases approximately 85% occur in women without any family history of the disease, suggesting that sporadic mutations and lifestyle-related factors play a substantial role[18]. These lifestyle factors include obesity, excessive alcohol consumption, sedentary behaviour, and exposure to ionising radiation. Furthermore, global studies have identified socio-economic status and access to healthcare as critical determinants of breast cancer outcomes, with women in lower socio-economic brackets facing significant barriers to early detection and effective treatment.

The clinical presentation of breast cancer varies widely, ranging from asymptomatic early stages to advanced cases with systemic manifestations. Early detection of breast cancer is often facilitated by regular screening through mammography, which remains the gold standard for identifying tumours before they become clinically apparent[19]. Other diagnostic methods include ultrasound, magnetic resonance imaging (MRI), and biopsies, which confirm malignancy and help classify the cancer into subtypes. Breast cancer is typically classified based on histopathological features and molecular characteristics, with the most common subtypes being hormone receptor-positive, HER2-positive, and triple-negative breast cancer (TNBC). Among these, TNBC is associated with the poorest prognosis due to its aggressive nature and limited targeted treatment options[20,21].

Treatment modalities for breast cancer have evolved significantly, with a multidisciplinary approach often employed. Surgical intervention remains a cornerstone of treatment, ranging from lumpectomy to mastectomy, depending on the stage and extent of the disease. Adjuvant therapies, including chemotherapy, radiation, and hormonal treatments, are commonly used to reduce the risk of recurrence and improve survival rates[22,23]. Targeted therapies, such as trastuzumab for HER2-positive breast cancer and CDK4/6 inhibitors for hormone receptor-

positive cases, have further revolutionised treatment paradigms by offering personalised options based on molecular profiles[24]. However, access to these advanced treatments remains uneven, particularly in resource-limited settings where affordability and availability are significant concerns.

Early prevention and management of breast cancer has become a priority issue in recent times and focus has been made on publicity, early diagnosis and lifestyle changes. Popularised by screening programmes like mammography, early-stage diseases have a better prognosis. Nevertheless, these programmes do not always work around the world because of disparity in healthcare structure and the cultural attitude towards breast health[25]. In low-income settings, late presentation is common, often due to a lack of awareness, financial constraints, and stigma. This underscores the importance of culturally tailored educational interventions that empower women with knowledge about breast cancer and self-care practices, such as breast self-examination (BSE). Studies have shown that women who are educated about the importance of early detection are more likely to seek medical care promptly, thereby improving outcomes[26, 27]. Despite advancements in breast cancer research and treatment, disparities in outcomes persist across geographical and socio-economic lines. Women in high-income countries generally experience better outcomes due to widespread access to early detection methods, advanced treatments, and comprehensive follow-up care. Conversely, women in low- and middle-income countries often face delayed diagnoses, limited treatment options, and higher mortality rates[28, 29]. To bridge this divide, the world needs to make a collective effort to ensure better access to health care, invest in research about cancer treatment and focus on health inequity. There is also potential in the approaches available to

using technology, including the use of artificial intelligence (AI) and diagnostic imaging and treatment planning in the context of breast cancer care, even where resources are limited.

The psychosocial burden caused by the breast cancer cannot be underestimated and it does not only start with the individuals diagnosed but spreads to their families and communities. Women with breast cancer feel anxiety, depression, social loneliness, which negatively influences the quality of life and the treatment compliance level[30]. Psychological support, counselling, physical rehabilitation services are an inevitable practice of comprehensive care that should help to confront the challenges and enhance the whole well-being of the patients. Moreover, survivorship care is gaining in significance because nowadays more women live past their diagnosis. It is imperative that long-term follow-up care be maintained to keep treatment side effects in check, keep an eye on recurrence and enhance quality of life.

In breast cancer, women were largely amenable to identifying abnormalities in the breasts early through the process of breast self-examination that is, an effective way of screening breast abnormalities in the breast. Breast self-exams are to take place regularly by women until the time a woman undergoes mammography and clinical examination of breasts in order to observe any lumps. That is why, breast self-examination (BSE) needs to become part of monthly women healthcare routine, especially those at higher risk including women over 40 years or those with a hereditary record. Even though there is lack of enough evidence to conclude that BSE lowers mortality rates, it is considered an outstanding approach to generate awareness about breast cancer as well as health as an individual responsibility in ensuring health[31].

Overall, breast cancer is an advanced and multidimensional cancer that creates a lot of burden on the healthcare systems of the world. Despite improvements in the survival prognosis, there are still disparities between groups, which underline a need to continue investment in health, education, and research. Cross-sectoral cooperation between governments, healthcare providers, researchers, and communities is necessary in curbing the prevalence of breast cancer and ensuring that all women receive the appropriate care in a timely fashion despite their economic status.

2.1.4 Risk Factors of Breast Cancer

Breast cancer is one of the biggest health concerns all over the world and in order to prevent or manage it, it is important to have an idea of what factors pose a risk to breast cancer. Determining risk factors of breast cancer could be grouped into modifiable and non-modifiable ones. The risk factors are divided into non-modifiable and modifiable; the former ones are mainly biological and genetic features that are not controllable, whereas the latter can be changed due to way of life and environmental contact. Recent researches have broadened the understanding of these risk factors complexity, by pointing out existing and new factors that determine breast cancer occurrence.

Studies have established that some women can develop breast cancer without any risk factor being identified. Having a risk factor does not necessarily imply that an individual will also contract the illness and that all the factors will equally play the same role. Although most women have several risk factors, most of them are not affected by breast cancer. Risk factors of note are genetic mutations, history of reproduction, breast density, individual history of breast cancer or certain pathological forms of breast condition, familial history of breast

cancer, exposure to radiotherapy, and diethylstilbestrol (DES). Other risk factors relate to environmental carcinogens or human behaviours such as tobacco use, alcohol use and dietary habits[32]. Some of the risk factors can change with age or personal habits, and others immutable as the female gender, old age and certain genetic alterations. Nevertheless, only the presence of one or more risk factors does not mean that the disease will develop. Some of the women are more at risk than others though.

Breast tissue is vulnerable to the cancerous radiation properties. A history of exposure to radiation to the chest and face at an early age (below age 30) is a great risk factor towards development of a breast cancer later in life. The most significant danger is seen during the time of breast development, and there is no risk in the post-menopausal age[33]. A sedentary lifestyle, excessive dietary fat intake, and obesity have been associated with the onset of breast cancer. A diet deficient in fruits and vegetables, along with one including 35-40% fat, is high in cholesterol (a precursor in the manufacture of oestrogens and other steroid hormones), so exposing the breast to elevated levels of oestrogen, which may promote cancer development. Conversely, the consumption of a high-fiber diet impedes the intestinal reabsorption of oestrogens, yielding a protective effect. Frequent and excessive alcohol drinking elevates a woman's chance of acquiring breast cancer. The risk is dose-dependent; increased alcohol use correlates with heightened risk[34,35,36].

One of the most significant non-modifiable risk factors for breast cancer is age. Women over the age of 50 are at a higher risk due to the accumulation of genetic mutations and hormonal changes associated with ageing[36]. Additionally, family history and genetic predisposition play a critical role, with mutations in the BRCA1 and BRCA2 genes significantly increasing the risk of breast cancer[37]. Women with a first-degree relative who has been diagnosed with

breast cancer have an elevated likelihood of developing the disease themselves. Moreover, early menarche (before age 12) and late menopause (after age 55) are associated with prolonged exposure to oestrogen and progesterone, increasing breast cancer susceptibility[38].

Reproductive history is another important factor, with nulliparity or having the first child after age 30 increasing the risk of breast cancer. Hormonal exposure during pregnancy is believed to offer a protective effect, and its absence or delay contributes to a heightened risk[39]. Hormone replacement therapy (HRT) used during menopause has also been strongly linked to breast cancer, particularly when used for prolonged periods, as it increases exposure to synthetic oestrogen and progesterone[40].

Lifestyle and environmental factors are modifiable risks that significantly impact breast cancer rates. Obesity, particularly in postmenopausal women, has been consistently associated with an increased risk of breast cancer. Adipose tissue becomes a primary source of oestrogen after menopause, and elevated levels of this hormone can stimulate the growth of oestrogen receptor-positive breast cancer[41]. Alcohol consumption has also been identified as a dose-dependent risk factor; even low levels of alcohol intake can slightly increase breast cancer risk[42, 43]. Inactivity and sedentary behaviour exacerbate this risk, as regular physical activity has been shown to reduce levels of circulating hormones and improve immune function, both of which are protective against breast cancer[44].

Dietary factors are also emerging as significant contributors. Diets high in processed and red meats, saturated fats, and sugar have been linked to an increased risk of breast cancer, whereas diets rich in fruits, vegetables, and whole grains are believed to confer a protective effect[45,46]. Additionally, exposure to environmental pollutants and endocrine-disrupting

chemicals, such as pesticides and industrial by-products, has been implicated in breast cancer development[47].

Psychosocial factors, including chronic stress and depression, have also been explored in recent studies. Stress has been hypothesised to influence breast cancer risk through hormonal pathways, including the dysregulation of cortisol and other stress hormones that may promote tumour growth[48]. While the evidence is not yet conclusive, the role of mental health in breast cancer risk is increasingly recognised.

Additional variables have been identified as potential risk factors for breast cancer, however their impact remains ambiguous. Factors contributing to an increased risk of breast cancer include smoking, exposure to carcinogenic chemicals, and hormonal alterations associated with night shift employment[49,50]. Breast cancer is not attributable to the usage of bras, implants, deodorants, antiperspirants, mammography, coffee, plastic food containers, microwaves, or mobile phones[51,52]. A comprehensive strategy that incorporates the prevention of modifiable breast cancer risk factors, such as encouraging healthy dietary habits, physical activity, moderation of alcohol consumption, and management of overweight and obesity, may ultimately influence the long-term reduction of breast cancer incidence[53]. The elevated incidence of breast cancer in women of reproductive age may be linked to heightened levels of progesterone and oestrogen during pregnancy and increased parity, whereas the decline in breast cancer cases post-reproductive age may correlate with reduced hormonal fluctuations and menopause[54,55].

The synergy between these risk factors emphasizes the need to have a multidimensional strategy to breast cancer prevention. The goals of the public health efforts should be on creating awareness on the modifiable risks as well as on the essence of regular screening and among the high-risk groups the need to seek genetic counselling. By managing these risk factors in a holistic way, the development and the burden of breast cancer can be decreased across the world.

2.1.5 Signs and Symptoms of Breast Cancer

The clinical manifestations of breast cancer include: a breast lump or thickening that differs from adjacent tissue, alterations in the size, shape, or appearance of a breast, modifications to the skin over the breast such as dimpling, a newly inverted nipple, peeling, scaling, crusting, or flaking of the pigmented area surrounding the nipple (areola) or breast skin, and redness or pitting of the skin over the breast resembling the texture of an orange[56]. An alternative scholar posited that clinical manifestations of breast cancer include a palpable, usually painless lump or thickening in the breast, most frequently in the upper outer quadrant; painless lymph node enlargement, and possibly signifying metastatasis, also in the axilla or supraclavicular regions; non-traumatic nipple discharge which may be bloodstained, clear, or serosanguinous; change in breast size or shape or contours; and retraction or scaliness of the nipple, especially in Paget disease. Miscellaneous later symptoms include soreness, possibly due to inflammation caused by fibrocystic breasts or a malignant tumour; ulceration; oedema caused by lymphatic congestion; and peau d orange which is indicative of oedema associated with metastatic breast disease.

Breast cancer remains one of the most prevalent malignancies in women across the world with early detection being essential in improving the outcomes of the treatment. The symptoms of breast cancer vary considerably among individuals with some women showing some unusual signs whilst others may not develop symptoms until later stages. A common manifestation associated with breast cancer is the presence of a lump or thickened area on the breast / or axilla that can be discrimination noticeably between the corresponding tissue. This mass is commonly painless, solid and irregular but it may be tender in some or elastic. Current studies highlight the importance of an early assessment of any lump that persists to be in the breast as early treatment greatly benefits optimal treatment[57].

Another key sign of breast cancer is a change in the size or shape of the breast. This could manifest as an unexplained swelling, shrinkage, or asymmetry between the breasts. Women may also notice alterations in the texture of the skin on their breasts, such as dimpling or puckering, which can resemble the appearance of an orange peel. Research highlights the importance of recognising these skin changes, as they are often indicative of inflammatory breast cancer, an aggressive but rare subtype of the disease[58]. Additionally, redness, scaling, or thickening of the skin on the breast or nipple may signal the presence of malignancy, particularly if accompanied by other symptoms.

Nipple-related changes are another significant indicator of breast cancer. These may include an inversion or retraction of the nipple that was previously normal, as well as unusual discharge, which may be clear, bloody, or another colour. While nipple discharge can occur for benign reasons, persistent or spontaneous discharge, particularly when it is unilateral, warrants medical attention. An author stress that such changes should not be ignored, as they could point to underlying breast pathology, including ductal carcinoma[59].

Pain or discomfort in the breast is less commonly associated with breast cancer but may still occur. Breast pain linked to cancer is often localised, persistent, and does not correspond to the menstrual cycle. While most breast pain is benign, particularly in younger women, recent guidelines recommend further evaluation of persistent pain that cannot be attributed to hormonal changes[60]. Swelling or lumps in the lymph nodes around the underarm or collarbone region may also occur in breast cancer patients, often indicating that cancer cells have spread beyond the primary tumour.

Advanced breast cancer may present with more severe symptoms, including ulceration of the breast skin, visible veins on the breast, and severe weight loss or fatigue. As noted, these symptoms often indicate metastatic disease, where the cancer has spread to other parts of the body, such as the bones, lungs, or liver[61]. These systemic symptoms highlight the importance of early detection and regular screening to identify the disease before it reaches an advanced stage.

There is an indication that the predominant symptom is a fresh, painless lump or tumour that is hard and with uneven edges, suggesting a potential malignancy[62]. Breast lumps may exhibit tenderness, softness, or a rounded shape, and can also be uncomfortable. Consequently, it is essential to get any new breast mass, lump, or alteration examined by a healthcare expert proficient in recognising breast disease or potential indicators of breast cancer[63,64]. Symptoms encompass enlargement of the entire or a portion of a breast (regardless of the presence of a palpable lump); breast or nipple discomfort; skin irritation or dimpling; nipple retraction; erythema, scaliness, or thickening of the nipple or breast epidermis; and nipple discharge not consisting of breast milk. Occasionally, breast cancer may metastasise to

lymph nodes beneath the arm or around the clavicle, resulting in a lump or swelling, even prior to the primary tumour in the breast tissue being palpable[65].

The symptoms of breast cancer are of various nature and ambiguous therefore in need of breast health education and observation. It is recommended that women should examine their breasts regularly and also seek popular medical help once they recognize some abnormalities. Early detection of signs and symptoms can have the effect of significantly improving the prognosis which is why education and awareness are important aspects of dealing with the disease.

2.1.6 Breast Cancer Screening Modalities

Breast self-examination (BSE) serves as an efficient and economical method for early diagnosis, hence decreasing death rates. There is an indication that three efficient screening methods exist: mammography, clinical breast examination (CBE), and breast self-examination (BSE)[66,67]. Among them, BSE is the most efficient and readily available screening method in Nigeria. Many underdeveloped nations lack the capacity to offer mammograms to all high-risk women, and most women cannot afford the associated expenses. Many underdeveloped nations lack the capacity to offer mammograms to all high-risk women, and most women cannot afford the associated expenses.

Another study asserted that enhancing women's awareness of the early warning signs and symptoms of breast cancer is essential for preventing late-stage presentation for treatment[68]. Breast Self-Examination (BSE) is a procedure in which women routinely inspect their breasts for abnormalities, such as swelling or lumps, to facilitate timely medical intervention[69]. The primary objective is to identify breast abnormalities and to familiarise women with their

breasts, facilitating the detection of changes over time. BSE is cost-free, easily performed at home, and handy. Breast self-examination is the sole method that is costless, confidential, and may be instructed to adolescents and younger women[70,71].

While there is no evidence on the impact of breast self-examination on breast cancer mortality, the practice of BSE encourages women to assume responsibility for their health[72]. BSE must therefore be viewed as a part and parcel of a breast awareness mission that alludes to the early recognition and detection of breast cancer. In the process of breast self-examination, changes in the structure of the breast of cancer are discovered early at a stage where they can be effectively treated with a good prognosis. It is recommended to start at age of twenty years[73]. It should be conducted monthly, two to three days following the menstrual period[74]. The American Cancer Society recommends that women aged 20 and older should be informed about the advantages and limits of doing breast self-examinations (BSE).

2.1.6.1 *Self-Examination of the Breasts*

The objective of BSE is for women to become acquainted with the typical appearance and texture of their breasts. The 81 states that familiarity with the breast's form and texture can assist women in detecting symptoms, including lumps, soreness, or alterations in size. They must promptly inform their healthcare providers of any alterations. All women are advised to start monthly breast self-examinations at the age of 20, preferably following their menstrual cycle when breast tenderness or swelling is minimal. Consultation with a healthcare expert may be pursued regarding the appropriate method for breast examination and the specific indicators to observe. Nonetheless, research indicates that there is scant evidence supporting the assertion that this test detects breast cancer earlier than a mammography[75]. Breast cancer

incidence among women of reproductive age is rather prevalent. Consequently, advocating for early breast self-examination among women of reproductive age increases their awareness, boosts their knowledge, and fosters the development of essential skills for lifelong BSE practice.

2.1.6.2 *Clinical Breast Examination (CBE)*

A Clinical breast exam is a physical examination of the breast done by a physician. The procedure includes an examination of the two breasts, axillary tissue, and supraclavicular diseases to determine any clues of breast cancer. CBE is conducted to identify cancer of the breast at an early phase before it spreads out and therefore improving survival rates. A physical examination of the breasts and the axillary area is done by a trained medical worker in the form of a clinical breast examination. CBE is a cost effective exam that could help improve detection of BC[76]. Clinical breast exams (CBE) may be incorporated into standard periodic assessments, particularly for women under 50 and beyond 69 years of age, as well as for those at moderate to high risk and for those with a history of breast cancer[77].

50 states that the National Comprehensive Cancer Network (NCCN) advises that a qualified practitioner should meticulously examine a woman's breasts, underarms, and regions behind the collarbone for alterations and abnormalities such as tumours. The lady assumes various sitting and reclining postures throughout the visual and tactile assessment of the breasts. Women are advised to seek a clinical breast examination if their healthcare professionals do not regularly conduct it during their yearly physical assessment. It was advised yearly clinical breast examinations starting at age 25, to be conducted with mammography[78]. Clinical breast examinations may identify early palpable indicators of breast cancer, perhaps facilitating

prompt treatment. An atypical clinical breast examination or false positive necessitates a further mammography to assess for breast cancer[79]. The American Cancer Society does not endorse clinical breast examinations for breast cancer screening due to a lack of sufficient scientific data supporting its efficacy as an early detection method[80].

2.1.6.3 *Mammogram*

A mammogram is an X-ray examination of breast tissue. This procedure is regarded as the most effective and dependable screening technique for breast cancer. The ACS recommends that women at elevated risk for breast cancer, including those with moms or sisters who have had the disease, commence yearly mammograms between the ages of 40 and 54. Women aged 55 and older may opt to maintain yearly mammograms or transition to biannual screenings. The test should proceed if the lady is in excellent health and anticipated to survive for a minimum of 10 years 48. Women at moderate risk for breast cancer are advised to begin yearly mammograms between the ages of 45 and 54. They should persist biennially starting at 55 years of age. A routine mammography is crucial in the early detection of breast cancer prior to the manifestation of physical signs. Early detection of breast cancer with mammography is associated with a reduced likelihood of aggressive treatment involving mastectomy and chemotherapy. The likelihood of a cure is significantly elevated[81]. The U.S. Preventive Services Task Force, an expert panel that evaluates studies, suggested that mammograms start at age 50 and continue until age 74, following the guidance of the American College of Physicians. No indication of benefit is observed in individuals aged 75 years and older[82].

Mammography employs low-dose X-rays to assess the breasts. Annual mammograms, or screening mammography, have demonstrated a substantial decrease in mortality from breast cancer among women aged 40 and older. A screening mammography typically entails obtaining two or more x-rays of each breast. X-ray pictures can reveal tumours and may also display anomalies that occasionally suggest the existence of breast cancer. Mammography is less effective for younger women because of alterations in breast tissue density and is linked to false positive results in this demographic[83]. In women under fifty years of age, mammography has a little impact on breast cancer mortality, resulting in only a 15-20% reduction in the death rate[84]. Women who get frequent mammograms are more likely to have early detection of breast cancer, resulting in a reduced necessity for severe treatments such as mastectomy and chemotherapy, and an increased likelihood of cure.

2.1.6.4 *Breast Magnetic Resonance Imaging*

Magnetic resonance imaging (MRI) of the breast employs radio waves and powerful magnets. It is frequently utilised in conjunction with mammography to check patients at elevated risk of getting breast cancer. An MRI provides a more detailed image of any problematic regions identified by a mammogram. MRI can provide valuable information on the real size of malignancy in individuals with breast cancer. MRI surpasses mammography in accuracy and may reliably identify residual tumours following neoadjuvant treatment. MRI enhances sensitivity and is economically viable for women with BRCA1 and other hereditary breast cancer risks, however it is costly, particularly for the youngest age groups. Annual MRI screening is economically viable for women aged 30 to 60 with a BRCA1 or BRCA2 gene mutation, or those with a 50% likelihood of being a carrier. MRI screening is endorsed by the United Kingdom's National Institute for Health and Care Excellence (NICE) guidelines, the

European guidelines of the European Society of Breast Imaging, the American College of Radiologists, and the American Cancer Society. The availability of MRI services in Nigeria is markedly deficient. A restricted group with access to breast cancer screening is uniformly provided mammography, despite its suboptimal efficacy, especially for younger women and those with dense breast tissue. Additionally, repeated exposure to mammography elevates the risk of breast cancer, irrespective of other variables. Recent studies indicate that MRI can identify some tiny breast abnormalities that mammography may overlook. It can also assist in identifying breast cancer in women with breast implants and in younger women with dense breast tissue. Breast MRI, utilised for screening breast alterations or anomalies, employs radio waves and a strong magnet connected to a computer that generates intricate images of the breast[85].

2.1.6.4 *Breast Ultrasound*

Breast ultrasound (or ultrasonography) uses sound waves to create images of your breast tissue. Breast ultrasound is often used to assess abnormalities that are found during mammography or a clinical breast exam. The accuracy of the technique depends greatly on the skill level and training of the technician performing it.

2.1.7 Challenges of Performing BSE

Breast issues, including lumps, soreness or tenderness, nipple discharge or inversion, and alterations in breast skin, are prevalent among women of all ages, from teens to seniors. Although encountering a new breast issue may be alarming, the majority of breast conditions are not attributable to breast cancer. Numerous factors have been identified in research involving female students about their lack of participation in BSE practice. Reasons include

insufficient understanding regarding the timing and methodology of breast self-examination (BSE), the perception of no existing breast issues, and the opinion that breast examination is unnecessary[86,87]. Additional factors encompass forgetfulness, lack of time, apprehension about the discovery of lumps, and shame[88]. Further factors included the absence of a familial history of breast cancer, lack of breast cancer symptoms, and a diminished perception of the importance of breast self-examination[89].

In a study, women in a rural community identified obstacles to breast self-examination (BSE) as the belief of being at low risk (47.6%) and a lack of information regarding the performance of BSE (47.6%)[90]. For women, breasts symbolise femininity and serve as a social identifier of womanhood; hence, engaging in Breast Self-Examination implies an association with the presence or discovery of breast cancer. Consequently, the loss of a breast may convey to society that these women are perceived as inferior and that their femininity is compromised. They would rather avoid practicing it, let alone identifying the malignancy. Recent study identifies several impediments to the practice of breast self-examination (BSE), including socio-demographic factors, attitudes, awareness, and knowledge on BSE[91].

A significant majority (88.6%) of respondents in a survey regarded breast self-examination (BSE) as a crucial method for the early identification of breast cancer; nevertheless, hardly 9% were aware of how to execute it, and only 13.9% understood what to observe during BSE. Comparable observations have been documented in other locations. The primary source of information about BSE, as reported by the respondents in this survey, was television, consistent with findings from other studies conducted in diverse contexts. This discovery indicates that media, particularly television, can effectively educate women about the significance of breast self-examination (BSE) and provide instructions on how to conduct it[92].

The National Breast Cancer Foundation (NBCF) states that up to 70% of breast cancers are detected by women conducting their own breast self-examinations (BSE). The prevalence of breast cancer among women is increasing; nevertheless, early identification and intervention have led to enhanced survival rates[93]. it was asserted that nurses collaborating with women should instruct them on the significance of being acquainted with the appearance and texture of their breasts[94]. Any observed alterations must be communicated to the healthcare provider. Premenopausal women should be informed about lumps that manifest and resolve in conjunction with the menstrual cycle. The optimal moment for breast self-examination (BSE) in premenopausal women is one week post-menstrual cycle, when hormonal effect on breast tissue diminishes, hence reducing fluid retention and soreness. It was found the primary determinants of breast self-examination (BSE) practice according to the health belief model: perceived vulnerability, perceived severity, and net benefit. Women with high perceived vulnerability tend to feel that early identification has the potential to enhance cancer outcomes and are hence more likely to participate in BSE[95]. In a comparable study including undergraduates, high perceived severity, high perceived advantages, high perceived self-efficacy, and felt obstacles were identified as superior predictors of BSE behaviour[96].

2.1.8 Advantages of BSE

A crucial aspect of maintaining breast health is conducting monthly breast self-examinations. During showering or before to sleep, one can do a few straightforward measures to examine for breast irregularities and to acclimatise oneself to the breasts, enabling the identification of potential breast issues if they arise. Self-examination should be conducted a few days following the conclusion of the menstrual cycle to ensure that the breasts are neither sensitive nor swollen[97].

Advantages include: empowering women to manage their health, enabling them to recognise the texture of their breast tissue, being a non-invasive and straightforward procedure, and facilitating earlier detection of breast cancer compared to women who do not conduct breast self-examinations[98]. The BSE process requires about 5-10 minutes and is optimally conducted in both standing and supine positions. The performance of breast self-examination in the shower is no longer advised[99].

2.1.9 The Effectiveness of Breast Cancer Screening

Early breast cancer screening in females has been recognised as the most efficient method for detecting precancerous alterations in the breast prior to malignancy[100]. Prolonged delays in early breast screening leads in elevated morbidity and death rates, as well as significant economic losses to the nation. In response to the detrimental consequences of postponed breast and cervical cancer screenings for women in the U.S., the government established the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) in 1990 to facilitate access to prompt screening and diagnostic services for low-income, uninsured, and underserved women[101]. Since its establishment, the NBCCEDP has assisted about 12.7 million women in the U.S. in screening for breast and cervical cancer. In 2016, the program delivered breast cancer screening and diagnostic services to 290,095 women. Of this total, 2,639 women were diagnosed with invasive breast cancer, whereas 829 women were identified with premalignant breast lesions[102]. Early breast cancer screening is a crucial and life-saving service that can save preventable mortality from breast cancer, particularly among women in high-risk communities. Majority of breast cancer fatalities disproportionately affect women lacking a consistent healthcare provider, those without health insurance, and immigrant women in the U.S[103].

The ACS breast cancer screening initiative emphasises early detection of breast cancer and the provision of advanced therapy to avert mortality. The significance of this approach is that breast cancer identified early, when it is tiny and localised, is more amenable to effective treatment. Consequently, obtaining frequent screening services is the most dependable method for the early diagnosis of breast cancer in ladies with ordinary and elevated risk[104]. The objective of breast cancer screening is to identify breast cancer at an early stage, prior to the palpation of symptoms such as breast lumps. The prognosis for breast cancer therapy is likely to be more favourable with screening and diagnosis than with detection of the illness when symptoms are palpable in the breast tissue. Nonetheless, the ACS endorses clinical breast examinations and breast self-examinations, despite their lack of classification as evidence-based techniques for the early diagnosis of breast cancer[105].

2.1.10 Challenges Associated with Screening for Breast Cancer in Nigeria

Screening programs are frequently employed to evaluate asymptomatic individuals, aiming to identify those who are likely to develop the condition in question. Screening tests may not definitively rule out the illness and typically need further testing to thoroughly examine suspected cases, aiming to confirm or eliminate the condition. The primary objective of breast cancer screening is to diminish the incidence of unnecessary fatalities and enhance the patients' quality of life[106]. Early detection of breast cancer allows for successful and cost-efficient treatment. From a public health perspective, screening tests should be conducted only when the anticipated benefits above the possible harms associated with the screening. Prevention and early diagnosis represent significant hurdles in breast cancer care in Nigeria and other poor nations, despite their crucial role in mitigating the prevalence and severity of other chronic illnesses, including cancer[107].

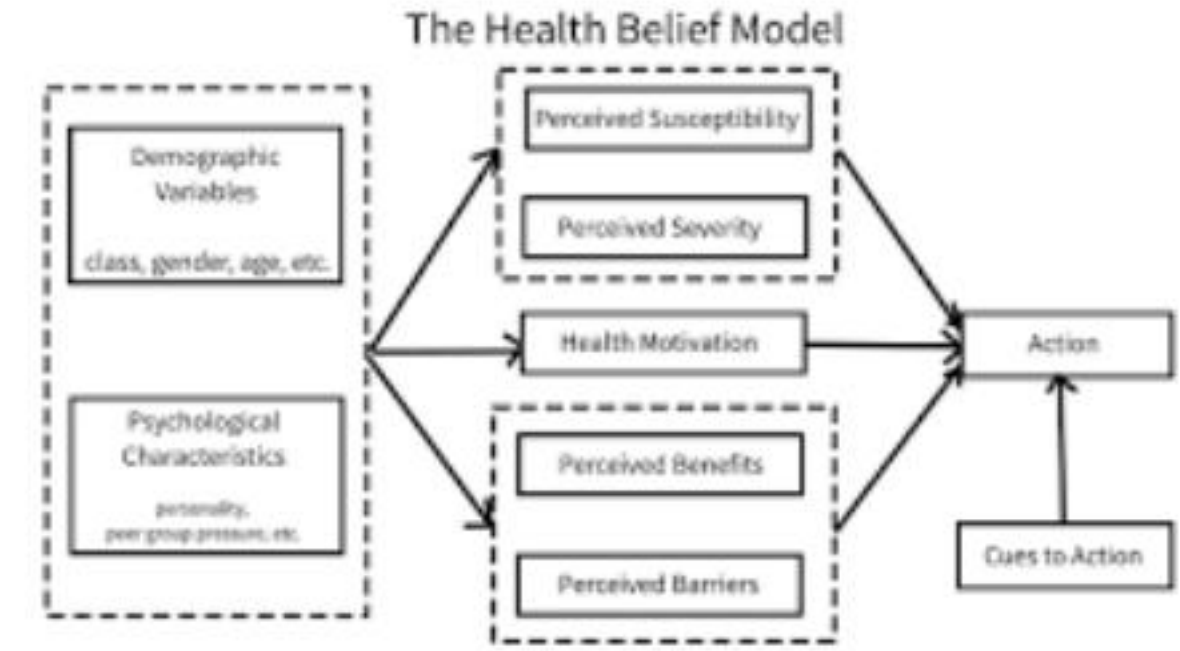
Financial constraints impede women's access, particularly among the lowest socioeconomic status group, to screening and treatment services for the early detection and management of breast cancer[108]. Enhanced national dedication to provide breast cancer screening services for all qualifying uninsured women has demonstrated a reduction in morbidity and death associated with breast cancer. Data from the United States indicates that preventive measures, such as regular cancer screenings, are essential for achieving national objectives aimed at eradicating avoidable mortality and morbidity associated with cancer. Obtaining the necessary screening tests might be difficult, especially for breast cancer, as many women with early-stage breast cancer exhibit no symptoms[109,110].

2.2 Theoretical Framework

This study's theoretical approach is founded on the health belief model (HBM). This model is a psychosocial framework established in the early 1950s by social scientists at the U.S. Public Health Service to comprehend the reluctance of individuals to embrace disease prevention strategies or screening tests for early disease detection. It posits that the probability of individuals engaging in a particular health behaviour is contingent upon their perceptions of susceptibility to the condition, its severity, the recommended course of action, the benefits of such action, and perceived efficacy[119]. The components of this model have been employed in several research to forecast breast cancer screening utilisation behaviours[120]. This theoretical framework is deemed suitable for guiding the study questions and enhancing comprehension of Nigerian women's perceptions and behaviours about breast cancer screening use.

The six HBM constructs and their relationship to the adoption of a health behaviour are as follows: Perceived susceptibility denotes that individuals are inclined to adopt a health behaviour when they recognise their vulnerability[121]. Perceived severity: This denotes the conviction on the gravity of the disease if acquired[119]. The perceived danger arises from the interplay of perceived vulnerability and severity, perhaps prompting the individual to seek a resolution. In the context of breast cancer, an individual may seek assistance if the threat of breast cancer is perceived as significant.

Perceived advantage denotes the conviction regarding the likelihood of a favourable result from the adoption of the suggested health behaviour[119]. Perceived barriers denote both concrete and abstract impediments, including expense, annoyance, and anxiety, that may hinder an individual from participating in the advised health behaviour[119]. Cues to action constructs denote the stimuli that may prompt an individual's behaviour. Cues may be internal, such as experiencing a symptom (breast lump) that heightens the perceived threat, or external, such as receiving a recommendation from a healthcare provider, consuming media coverage regarding the severity of breast cancer, or being acquainted with an individual affected by the disease (a family member diagnosed with breast cancer)[119]. Finally, self-efficacy pertains to the conviction that individual cultivates regarding the advocated health behaviour.



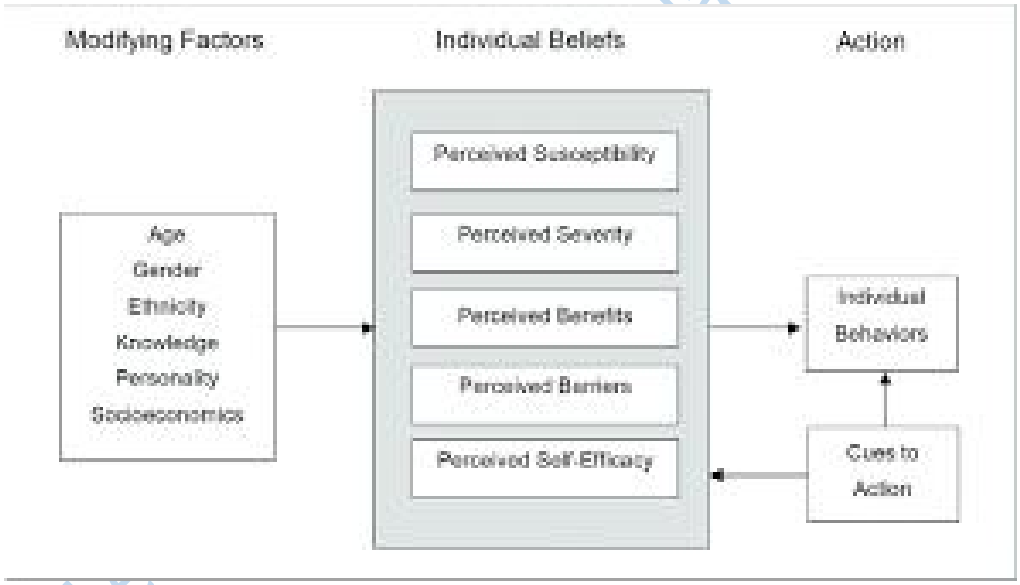


Fig 2.4: Health Belief Model (adapted from Rosenstock, 1974)

2.2.1 Application of Theory to the Study

Health Belief Model (HBM) depicted in the diagram is a powerful framework that can be used to explain the results of an intervention-based educational activity regarding increasing the knowledge and skills of breast self-examination (BSE) among nursing mothers within selected secondary health facilities in Osun State. The presence of perceived susceptibility in the model is imperative in shaping the level of awareness of nursing mothers that they might develop breast conditions like lumps or breast cancer. The desired outcome is the heightened awareness about the participants being vulnerable to breast abnormalities, which motivates adoption of a preventive behaviour such as regular BSE.

As per the first and third goals of the study, the part of the HBM construct concerning perceived severity assists in evaluating the effects of the educational intervention on the ability of the mothers to value the severity of unnoticed breast alterations. Provided that the intervention is effective in conveying the danger of not paying attention to one of the aspects of breast health that can lead to life-threatening complications, he/she will probably get a higher post-intervention knowledge score. At the same time, perceived positive aspects are supported by the education material, which should emphasize the positive results of regular BSE to promote the prevention of complications and facilitate early detection. When explicitly identified, these benefits can be expected to have a positive impact on the knowledge level and intention to practise BSE, and this aspect will intentionally become a major point of comparison between the data during a pre- and post-intervention assessment.

The components of perceived barriers are directly linked to the barriers which may have contributed to the nursing mothers not practising BSE prior to the intervention. These could be misconceptions, fear, no time or little access to health information. All of the above constitute barriers to health-seeking behaviours; therefore, the educational intervention should minimise these barriers and create a more effective environment towards health-seeking behaviours by providing effusive and straightforward information that is easily accessible. This will cover the fourth and the second objectives of the study since it will measure the changes in BSE skills pre and post the intervention. Moreover, self-efficacy is central to this behavioural change since the intervention would not only aim at teaching BSE but also instilling confidence in the mothers that they are capable of carrying out the technique correctly and at the required frequency. The better performance in this aspect should be reflected in post-intervention skill assessment.

Lastly, are the cues to action, which are the action drivers that turn information and intentions into habitual practice. These can be reminders, media messages or encouragement of health professional that might come across in the process of the intervention. The effectiveness of use of this intervention in bringing about lasting behavioural change lies in how effectively these cues are used and responded to by the nurses- mothers. The objective of the study, which is to identify the difference between the pre- and post- intervention knowledge and skill scores, purely aligns with the HBM and provides a holistic way of knowing how and why the educational-based intervention can bring improvements in the target group in terms of BSE knowledge and skills scores.

2.3 Review of Empirical Studies

In 2021, more over 252,700 new instances of invasive breast cancer were identified in American women, with approximately 9.7% of these cases occurring in women under the age of forty five[111]. The 2015–2020 U.S. Dietary Guidelines for Americans advise that if alcohol is used, it should be done so in moderation up to one drink day for women[112]. It is the most often diagnosed cancer in women, with an age-adjusted incidence rate of 28 per 100,000 women, and the second greatest cause of mortality among women in Africa. The frequency differs across the continent, ranging from 19.3 per 100,000 women annually in eastern Africa to 38.1 per 100,000 women annually in southern and western Africa.

Two authors indicated that breast self-examination (BSE) empowers women to assume responsibility for their breast health[113,114]. The absence of awareness regarding the signs and symptoms of breast cancer, as well as breast self-examination (BSE), inevitably results in the presentation of advanced illness. Another study was conducted on women in Zimbabwe, revealing a deficiency in information regarding breast cancer examinations, and consequently advocated for enhanced educational and screening intervention programs for breast cancer. The practice of breast self-examination is notably inadequate in several nations. The research in Kiewit indicated a mere 12%[115]. An eight-year research done in Nigeria revealed that the prevalence of breast self-examination was at 18.1%[116].

In Nigeria, around 100,000 new cancer cases arise annually, accompanied by a high case fatality rate. Nigeria, comprising roughly 20% of Africa's population and just over half of West Africa's, accounted for 15% of the estimated 681,000 new cancer cases in Africa. This mirrors trends observed in other developing nations. A substantial portion of the rise in cancer

incidence in Nigeria can be attributed to mortality from infectious diseases, poverty, the growing prevalence of smoking, physical inactivity, obesity, and specific dietary and lifestyle habits. Breast cancer was ranked top among all cancers in all centres in Nigeria, with the exception of Calabar and Eruwa. Additional authors have shown that the highest incidence age in Nigeria is 42.6 years, with 12% of cases occurring prior to the age of 30[117].

Another study revealed a significant prevalence of BSE practice among undergraduate students, which contradicted findings from earlier investigations[118]. All these investigations indicated a low prevalence of BSE practice among respondents from comparable academic environments. This indicates that women in the majority of rural areas lack the necessary information and hence do not engage in BSE. This was further supported in a research conducted among women in a rural community in Nigeria. Results revealed that whereas 58.2% (n=495) were aware of BSE, hardly 24.4% engaged in its practice[118].

A substantial body of studies has unequivocally demonstrated that economic factors, such as health insurance and income, influence the utilisation of health care services, including cancer screening. In the absence of coverage, women may neglect essential medical procedures, such as screenings: uninsured women are 40% less likely to have undergone a recent mammography and 26% less likely to have completed a clinical breast examination. Poverty, ignorance, and inadequate health facilities restrict access to screening for Nigerian women.

2.4 Conceptual Framework

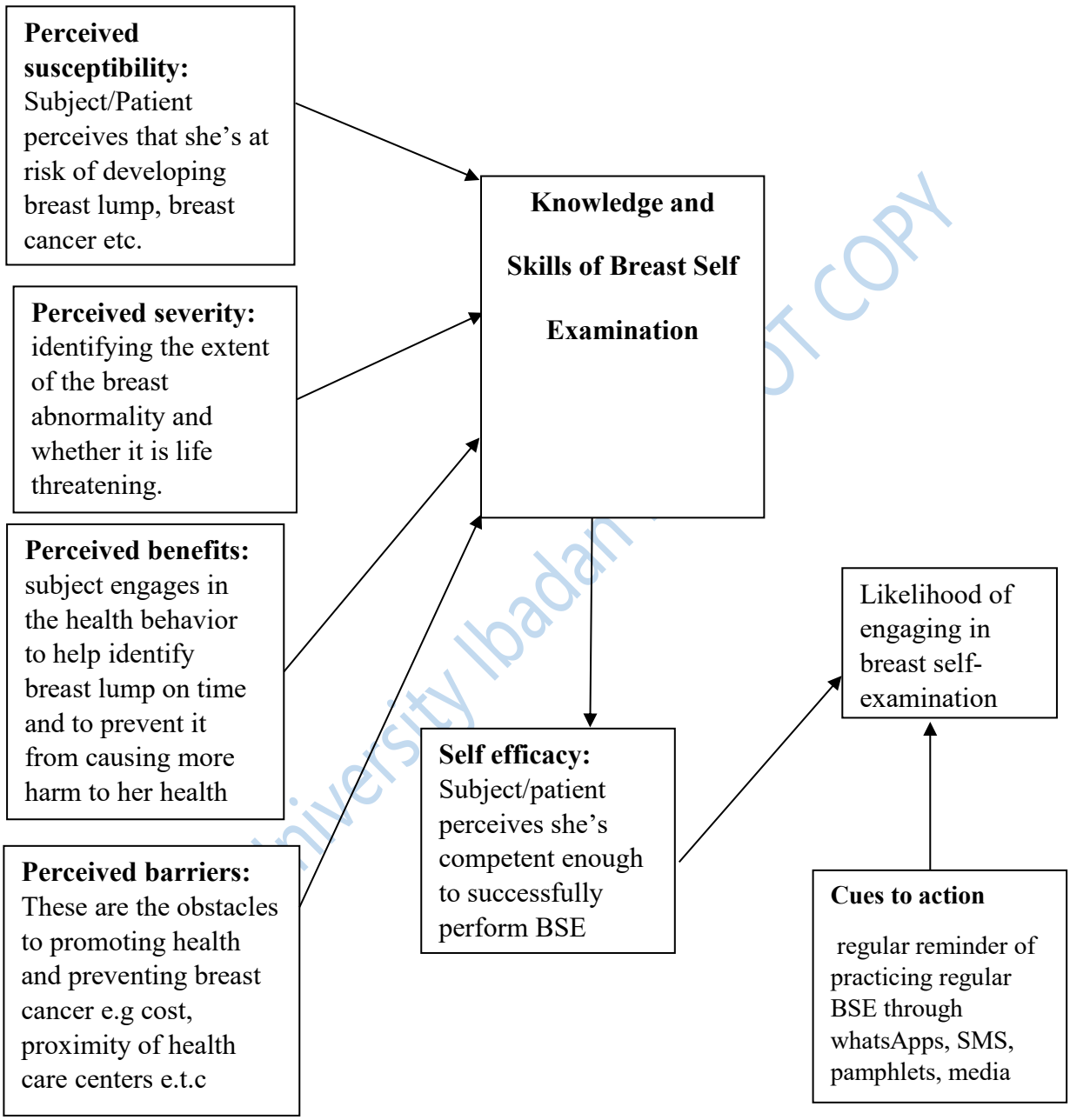


Figure 2.5: Conceptual framework of Health Belief Model Adapted to this Study

The model presented in the image is based on the Health Belief Model (HBM). At the core of the model is the belief that an individual's perception of health risks and the benefits of preventive action guide their engagement in health-promoting behaviours. The central concept here is the knowledge and skill related to BSE, which is influenced by multiple interrelated constructs such as perceived susceptibility, perceived severity, perceived benefits, perceived barriers, self-efficacy, and cues to action.

Perceived susceptibility refers to a woman's belief that she is at risk of developing breast abnormalities, such as lumps or cancer. This awareness encourages vigilance and the willingness to engage in BSE. Perceived severity focuses on the individual's understanding of how serious a breast abnormality might be, including its potential to be life-threatening if not detected early. Perceived benefits are seen in the understanding that BSE can lead to early detection and reduce the risk of severe health outcomes. Conversely, perceived barriers highlight the challenges that may prevent women from performing BSE regularly, these may include financial costs, distance to healthcare facilities, or lack of support and education.

Other critical elements of the model include self-efficacy and cues to action. Self-efficacy refers to the woman's confidence in her ability to correctly and effectively perform BSE. If she believes she can perform it without error, she is more likely to do so. Finally, cues to action such as reminders through WhatsApp, SMS, pamphlets, and media play a vital role in triggering and sustaining the behaviour. When all these components are positively aligned, they increase the likelihood of engaging in breast self-examination, thereby supporting early detection and improving breast health outcomes.

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Chapter Three

Methodology

This chapter presents the research design, population, sample size and sampling techniques, instrumentation, reliability and validity of instrument, method for data collection and analysis of the data.

3.1 Study Design

This study adopted two groups quasi-experimental design which was used to assess the effect of educational-based intervention on knowledge and skill of breast self–examination among nursing mothers in selected secondary health facilities, Osun state.

3.1.1 Research setting

The research was carried out in Osun State, located in the South-West area of Nigeria. Osun State, Nigeria, is located at roughly 7.5628° N latitude and 4.5204° E longitude. It is bordered to the north by Kwara State, to the east partially by Ekiti and Ondo States, to the south by Ondo State, and to the west by Oyo State. It spans around 14,875 km and has a total population of 4,705,589[1]. The primary occupations are of commerce and agriculture.

Osun State has thirty (30) Local Government Areas (LGAs). Osun State possesses 693 primary, 52 secondary, and 3 tertiary healthcare institutions. The chosen secondary health facilities allowed the researcher to evaluate the effect of an interactive educational intervention on the knowledge and skills of breast self-examination among nursing mothers in selected secondary health facilities in Osun State.

3.2 Population of the Study

The target population for this study comprised all nursing mothers attending postnatal clinics within selected secondary health care facilities in Osun State, Nigeria. These nursing mothers represent a critical group, as they are directly involved in child care during the early stages of a child's life and are regularly engaged with the health care system through postnatal services. According to the records obtained from the registers of these secondary health care facilities over the past three months, the estimated number of nursing mothers who have attended postnatal clinics is approximately 11,932. The selection of nursing mothers from secondary health care facilities is deliberate, as these centres serve as referral points for primary health care centres and offer a wide range of maternal and child health services[3].

Table 3.1: List of Local Government in Osun-state under Each Senatorial District

Osun East Senatorial District	Osun- West Senatorial District	Osun-Central Senatorial District
Atakumosa East	Aiyedaade	Boluwaduro
Atakumoosa West	Aiyedire	Boripe
Ilesa West	Odo-Otin	Ifedayo
Ilesa East	Ede South	Ifelodun
Ife North	Egbedore	Ila
Ife South	Ejigbo	Ede North
Ife Central	Irewole	Osogbo
Ife East	Isokan	Orolu
Obokun	Iwo	Olorunda
Oriade	Ola-Oluwa	Irepodun

3.3 Sample and Sampling Techniques

The sample size was calculated using sample size formula for detecting a difference between two proportions. The formula is known as the sample size formula for comparing a single proportion to a hypothesised value (or detecting a difference in proportions), typically used in hypothesis testing for proportions or power analysis for proportions. It is specifically applied when determining the minimum required sample size to detect a difference between an observed proportion (P1) and a hypothesised or baseline proportion (P0) at specified levels of statistical significance (Zα) and statistical power (Zβ). This study assumes a sample size that corresponds to a 95% confidence level and a power of 78.5%.

Where, Zα: The critical value of the normal distribution at 95% level of confidence = 2.96

Zβ: The critical value of the normal distribution at power of 78.5%= 0.785

σ2 (P0): Standard deviation of health literacy score in previous intervention study = 0.5

δ (P1): Estimated effect size of nurse-led intervention in previous study = 0.722[4,5]

Attrition rate of 10% was added.

The sampling size was determined using the formula;

$$n = \frac{(Z\alpha + Z\beta)\,2 \times Po\,(1 - Po)}{(P1 - P0)2}$$

Where Zα = 2.96

Zβ = 0.785

Po = 0.5

P1 = 0.722^2

$$N = \frac{(2.96 + 0.785)2 \times 0.5\,(1 - 0.5)}{(0.722 - 0.5)^2}$$

N = 14.01 x 0.25

0.0492

N = 284.8 x 0.25 = 71.2 + attrition (7) = 78

Therefore, N = 78

= 78.0 per group.

Three secondary healthcare institutions were chosen, and 78 nursing mothers were picked from two facilities. The three secondary healthcare institutions were categorised into two groups: control and intervention, as necessary for the study. This results in a total of 156 individuals across the three research groups, with two facilities designated for the experimental intervention and another for the control group.

3.3.1 Sampling Technique

This study adopted a multistage sampling procedure to ensure that the selection of participants is representative, systematic, and scientifically robust.

Stage 1: All three senatorial districts in Osun State namely Osun East, Osun West, and Osun Central were purposely included in the Study. The inclusion of these districts is purposive, as it allows the research to capture the socio-cultural, economic, and healthcare diversity that exists across the state. The use of purposive sampling technique ensures that the study's findings were generalisable across the various senatorial districts of Osun State and reflect the realities of nursing mothers in different parts of the state.

Stage 2: One local government area (LGA) was selected randomly through the use of balloting method from each of the senatorial districts. This was done using a simple random sampling method such as the balloting technique, which ensured that each LGA within a district has an equal chance of being chosen, thereby eliminating selection bias. Balloting was

carried out by placing the names of all LGAs within each senatorial district into a pool and randomly picking one, thereby giving each LGA an equal chance of selection. This ensured fairness and eliminated bias, with Ife East, Ejigbo, and Osogbo LGAs emerging from Osun East, Osun West, and Osun Central respectively. The use of random selection at this stage is crucial to prevent any undue influence or bias in the choice of LGAs while ensuring fair representation of the senatorial zones in the study.

Stage 3: This stage involved the systematic random assignment of the selected LGAs into experimental and control groups. Ife East and Ejigbo LGAs served as the experimental groups where the intervention was implemented, while Osogbo LGA served as the control group. The rationale for this assignment is grounded in both practical and scientific considerations. Ife East and Ejigbo were chosen for the intervention because they have well-established secondary health care facilities capable of supporting the structured nurse-led intervention and its follow-up components. Osogbo was selected as the control group because it is the state capital, offering a large and stable population of nursing mothers that can be easily monitored. Additionally, using LGAs from different senatorial districts for the experimental and control groups helped minimise the risk of contamination, whereby mothers in the control group might be influenced by those exposed to the intervention.

Stage 4: In this stage, specific secondary health care facilities were selected within the chosen LGAs. In Ife East and Ejigbo, one secondary health care facility each was selected using simple random sampling. This ensured that the intervention is delivered across multiple settings within the experimental group, increasing the generalizability of the findings within those LGAs. In Osogbo, one secondary health care facility was selected using simple random sampling to serve as the control site. The choice to use more than one facility in the

experimental group is based on the need to capture a broad range of experiences and contexts in which the intervention is applied, while one control facility is sufficient for comparative purposes since it is not exposed to any intervention.

Stage 5: Here, the nursing mothers who participated in the study was selected from the chosen facilities using systematic random sampling. Systematic random sampling was carried out by obtaining the sampling frame from the postnatal clinic registers of the selected health facilities. A sampling interval was determined, and every nursing mother on the register was selected until the required sample size was reached. This process ensured that all eligible mothers had an equal chance of being included while maintaining fairness and reducing selection bias. The sampling frame was the postnatal clinic registers of the selected secondary health care facilities, ensuring that all eligible mothers have an equal chance of being included in the study. From the experimental group facilities in Ife East and Ejigbo, a total of 78 nursing mothers were selected, with approximately 39 mothers per facility. From the control group facility in Osogbo, 78 nursing mothers were selected. This distribution is designed to ensure even representation within the experimental group facilities and sufficient sample size for robust statistical comparison with the control group. Systematic sampling enhance the fairness of selection while reducing bias that may arise from convenience or purposive sampling methods.

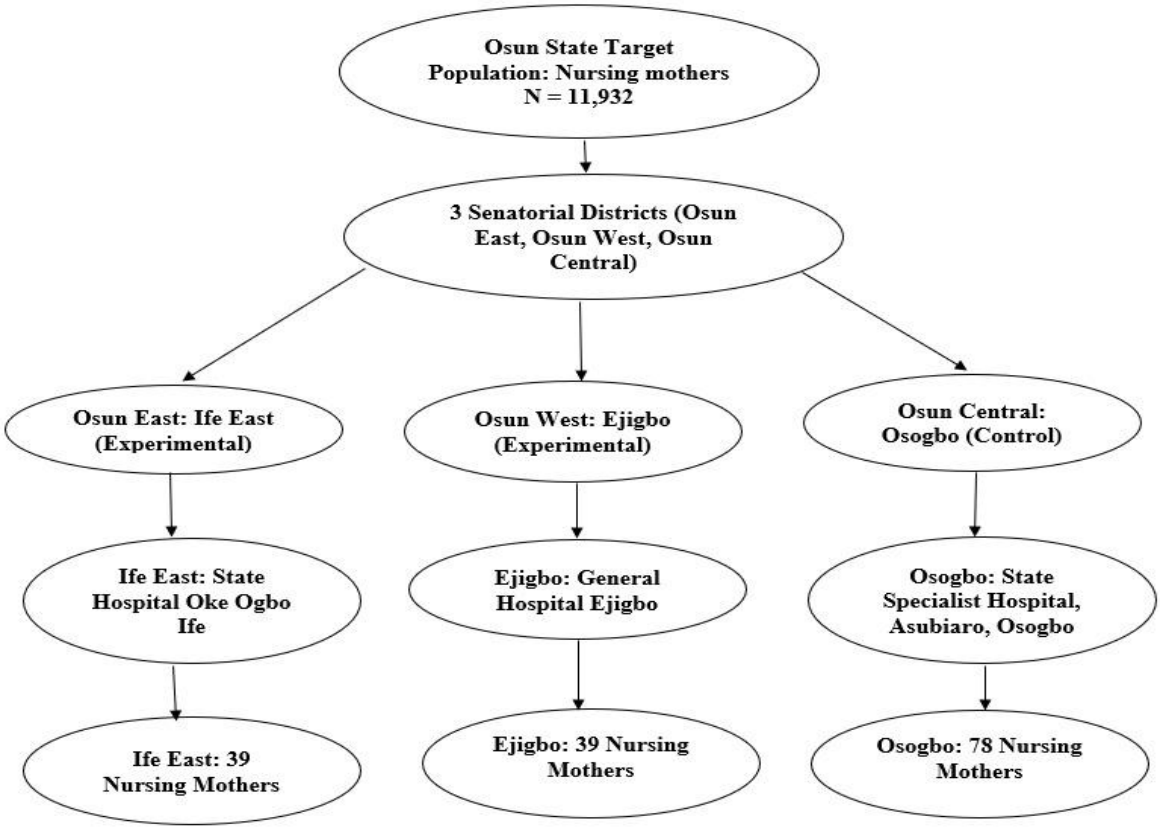

Fig 3.1: The Selected Nursing Mothers in each Secondary Health Care Facilities

Inclusion Criteria

The inclusion criteria for quantitative study were:

1. Registered nursing mothers whose infant is less than nine months of birth
2. Registered nursing mothers who are willing to participate in the study.

Exclusion criteria

The exclusion criteria for the study were

1. Registered nursing mothers whose infant is more than nine months of birth
2. Registered nursing mothers less than 18years in age.
3. Registered nursing mothers that are not willing to participate in the study.
4. Registered nursing mothers with pre-existing medical conditions

3.4 Description of the Research Instrument

3.4.1 Instrument for Data Collection

The researcher adapted a well-structured, developed test paper that was used to obtain information from respondents and self-developed manual (teaching module). The instrument was used to gather data from the study participants, the pretest and post-test test paper comprising three parts: The socio-demographic data consist of age, religion, educational status, and employment status. The knowledge part consists of Fourteen (14) close ended questions on breast cancer, and breast self-examination.

Self-administered knowledge assessment test paper was developed by the researcher in a clear English language, based on literature review and experts' opinions. The instrument for data collection was structured test paper which comprises sections A, B, and C, same was used to assess knowledge and skills of respondents prior the intervention.

Section A: Comprised 8 items on demographic assessment of respondents.

Section B: Comprised 27 questions to assess the knowledge possessed by respondents while

Section C: A structured checklist was used to determine the skilled acquired by the participants following the nurse led intervention on breast self-examination. The checklist comprised 19 items with each skills assessed on scale of 1 point, that is; Satisfactory (1 point), Unsatisfactory (0.5 point). Not done (0).

The teaching module on breast self-examination (BSE) is a structured educational tool designed by the researcher to equip nursing mothers with the knowledge and practical skills necessary for early detection of breast abnormalities. The module is delivered in two sessions, each lasting one hour, and focuses on clear and accessible instruction regarding the definition, importance, benefits, timing, and correct positioning for performing BSE. It provides detailed guidance on the steps involved, including visual inspection and tactile examination techniques, to help participants recognise signs such as lumps, nipple discharge, dimpling, or skin changes. The sessions combine theoretical explanations with demonstrations to ensure that participants can confidently identify and assess any abnormalities. The module also emphasises performing BSE consistently at the same time each month, while highlighting the complications of delayed examination such as late detection, delayed treatment, and adverse health outcomes. The teaching content, including practical demonstrations and discussions, forms an integral part of the study's instrument, as it is the means through which the intervention is administered and evaluated among the experimental group.

3.5 Validity of the Instrument

The Test Question Paper and Questionnaire was carefully examined to measure what it tends to measure. The instruments were given to 4 experts in the field of reproductive health including the researchers' supervisor for face, content and construct validity. Unclear and ambiguous items were reframed before using it for data collection.

3.6 Reliability of the Instrument

A pilot study was carried out in one of the secondary health facility in Osogbo Local Government Area and 25 nursing mothers were randomly selected. The reliability index of each construct on the instrument were calculated using cronbach's alpha statistics which yielded reliability coefficient value of 0.79 for Section B on knowledge and 0.83 for section C on skills.

3.7 Method of Data Collection

An introductory letter was collected from the HOD of the Department of Nursing Science. Approval was sought from Osun Health Research Ethical Committee with copy of proposal and permission letter. The participants were met to intimate them with the objectives and purpose of the study. Informed consent was obtained. Participants that meet the inclusion criteria were recruited.

Data were collected in four stages which include:

1. Pre-intervention phase
2. Planning phase
3. Intervention phase
4. Post-intervention

Pre-Intervention Phase

A validated instrument was employed for data collection. The data were gathered by four research assistants who got comprehensive training for one week on providing health education and completing questionnaires. The research assistants operated under the researcher's supervision in each study environment according to their post-natal clinic schedules. The researcher and research assistants conducted participant recruitment. Participants were adequately informed about the study's goal, advantages, and phases. Participants provided consent and were ensured of confidentiality, with all information utilised solely for academic purposes. Data collection occured in three phases: the baseline or pre-intervention phase lasted one week throughout designated Secondary Health institutions, involving the distribution and completion of questionnaires.

Intervention Phase

This session exposed the participants (intervention group) to teaching module for improving the breast self-examination.

Post intervention Activities

Immediate post intervention assessment of both the experimental and control groups were done to determine the difference between their pre intervention and post intervention knowledge and skill. This enabled the researcher to know the effect of the intervention

3.8 Methods of Data Analysis

The obtained data were verified for completeness, coded according to a pre-established coding guide, and thereafter loaded into SPSS version 27. The analysis encompass frequency distributions, descriptive statistics summaries, and independent t-test to analyse the obtained

data and evaluate the validity of the primary hypotheses. All statistical tests were conducted at a significance level of $p<0.05$.

3.9 Ethical Approval

Approval from the Health Research Committee was obtained prior to initiating the project. Additionally, with the approval, a letter of recommendation acquired and a prepared informed consent form was presented to the three healthcare facilities during the study. These were utilised to obtain permission and secure the assent of the respondents for the study.

Participants were guaranteed anonymity and confidentiality of their information were maintained. To do this, no identifying names were gathered from the participants. Codes were utilised throughout data processing to ensure participant anonymity throughout the study procedure. Participation in the study were completely voluntary; no individual was compelled to participate, and measures were used to safeguard the participants' human rights. Selection was limited to willing participants only. Participants were guaranteed that they may withdraw from the study at any moment without consequence.

Informed consent: This involves giving the participants in the study all information about the study from purpose of the study, data collection procedure and storage. After in-depth explanation of the research process, consent form was signed and documented. Participants were told that they have the right to refuse to participate and can withdraw at any level of the study.

Confidentiality of Data: The confidentiality of all participants were fully assured throughout the study. Every piece of information provided by participants were treated with the highest level of privacy and respect. All data collected were strictly confidential and used solely for the purposes of this research. To guarantee this, participants were clearly informed that their responses were not shared with any unauthorised persons under any circumstances. All collected data were securely stored on the researcher's password-protected laptop, accessible only to the researcher. This approach was designed to protect the mental, physical, and social integrity of participants and to ensure their trust and safety at every stage of the study.

Endnotes

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Chapter Four

Results and Discussion of Findings

Table 4.1 Showing Distribution of the Socio-demographic Characteristics of the Respondents

	Experimental Group (74)		Control Group (69)	
Variables	**Freq.**	**Percent (%)**	**Freq.**	**Percent (%)**
Parity				
1 – 3	49	66.2	43	62.3
4 – 6	16	21.6	19	27.5
6 and above	6	8.1	4	5.8
None	3	4.1	3	4.3
Age				
18 - 22 years	12	16.2	9	13.0
23 - 31 years	39	52.7	36	52.2
32 - 40 years	15	20.3	17	24.6
41 - 49 years	8	10.8	7	10.1
Religion				
Christianity	21	28.4	16	23.2
Islam	47	63.5	45	65.2
Others	6	8.1	8	11.6
Marital Status				
Married	48	64.9	50	72.5
Single	13	17.6	9	13.0
Divorced	11	14.9	8	11.6
Widow	2	2.7	2	2.9
Educational Status				
No Formal Education	4	5.4	5	7.2
Primary	10	13.5	9	13.0
Secondary	39	52.7	34	49.3
Tertiary	21	28.4	21	30.4
Occupation				
Teacher	15	20.3	11	15.9
Trader	23	31.1	20	29.0
Secretary	9	12.2	12	17.4
House keeper	13	17.6	16	23.2
Unskilled worker	11	14.9	7	10.1
Others	3	4.1	3	4.3
Total	**74**	**100.0**	**69**	**100.0**

Source: Field Survey, 2025

The socio-demographic characteristics presented in Table 4.1 show that the respondents in both the experimental and control groups share relatively similar profiles, which strengthens the comparability of the groups. In terms of parity, the majority of respondents in both groups had between one and three children (66.2% in the experimental group and 62.3% in the control group), while a smaller proportion reported having no children at all. Age distribution also reflects similarity, with most participants falling within the 23–31 years range (52.7% and 52.2% respectively), suggesting that the majority were in their reproductive and economically active years. Religious affiliation shows a predominance of Islam (63.5% in the experimental group and 65.2% in the control group), with Christianity representing the next significant proportion, which mirrors the general religious demographics of many Nigerian communities.

Marital status indicates that most respondents were married, accounting for 64.9% in the experimental group and 72.5% in the control group, while the proportions of single, divorced, and widowed respondents were relatively low. Educational status reveals that over half of the respondents in both groups had secondary education, followed by tertiary education, indicating a generally moderate to high literacy level among participants. Occupational distribution suggests that trading was the most common form of employment across both groups, followed by teaching, while a noticeable proportion were housekeepers. This socio-demographic profile portrays a sample of respondents who are largely young, married, moderately educated, and engaged in low- to middle-income occupations, providing useful context for understanding their participation and responses in the study.

4.2 Descriptive Analysis of Research Questions

Research Question 1: What is the pre- and post- intervention knowledge of breast self-examination (BSE) among nursing mothers in selected secondary health facilities in Osun state?

Test items on Knowledge of breast self-examination was a 27-item test question. Each correct response was assigned one point score and 0-point for every wrong answer; making up a 27-point knowledge scale. Scores of 19 and above were regarded as good knowledge, scores between 14 to 18 were regarded as intermediate knowledge and ≤14 as poor knowledge

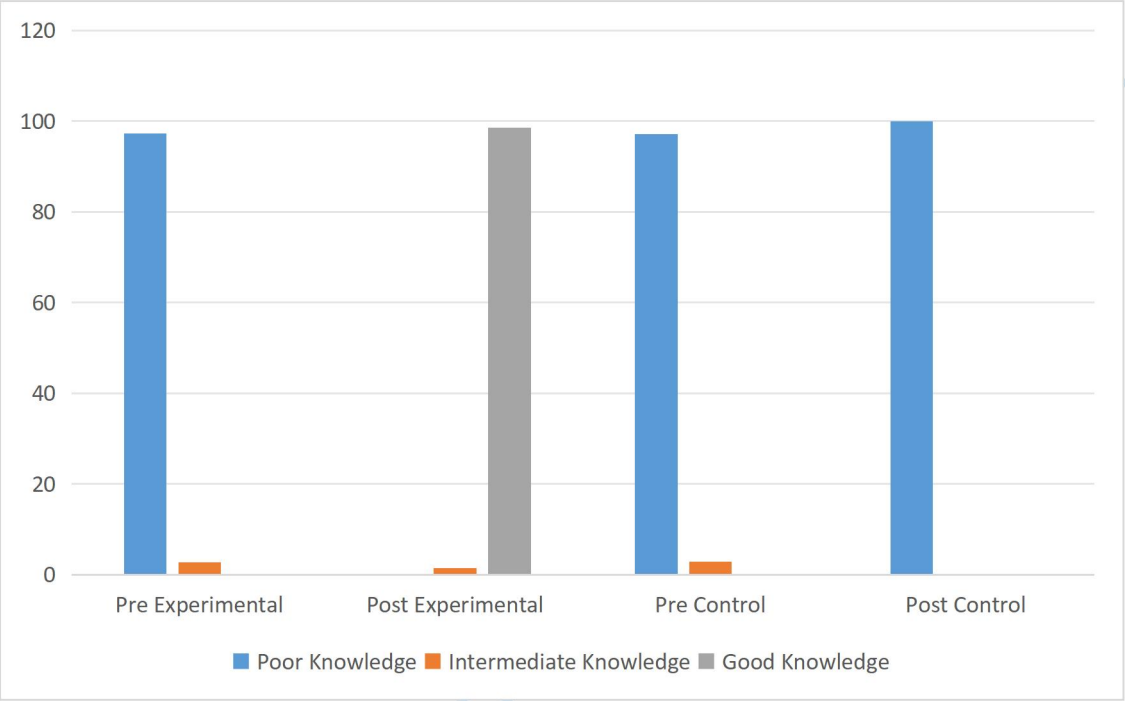
Table 4.2: Summary of Knowledge of Breast Self-Examination (BSE) among Nursing Mothers in the Intervention and Control Groups

	Experimental Group		Control Group	
Knowledge of breast self-examination	**Pre-intervention Freq. (%)**	**Post-intervention Freq. (%)**	**Pre-intervention Freq. (%)**	**Post-intervention Freq. (%)**
Poor Knowledge (0-13)	72 (97.3)	0 (0.0)	67 (97.1)	69 (100.0)
Intermediate Knowledge (14-18)	2 (2.7)	1 (1.4)	2 (2.9)	0 (0.0)
Good Knowledge (19-27)	0 (0.0)	73 (98.6)	0 (0.0)	0 (0.0)
Mean ±SD	10.08 ± 1.54	22.18 ± 2.10	9.99 ± 1.47	10.10 ± 1.31
Minimum Score	7	18	7	7
Maximum Score	14	27	14	13

Source: Field Work,2025

Table 4.2 presents the pre- and post-intervention knowledge of breast self-examination (BSE) among nursing mothers in both the experimental and control groups. Before the intervention, the overwhelming majority of respondents in both groups had poor knowledge of BSE, with 97.3% in the experimental group and 97.1% in the control group falling into this category. Only a very small proportion in each group demonstrated intermediate knowledge, while none had good knowledge of BSE. The mean knowledge scores at baseline were also very low and nearly identical between groups (10.08 ± 1.54 for the experimental group and 9.99 ± 1.47 for the control group), suggesting comparable levels of limited awareness and understanding of BSE prior to the intervention.

Following the intervention, however, there was a marked improvement in the experimental group. Almost all the respondents (98.6%) shifted to the good knowledge category, with only one participant (1.4%) remaining at the intermediate level, and none with poor knowledge. This was reflected in the significant rise in the mean score to 22.18 ± 2.10, with a minimum score of 18 and a maximum of 27. In contrast, the control group showed no improvement after the intervention, as all respondents remained within the poor knowledge category, with a mean score of 10.10 ± 1.31, and no participant attaining intermediate or good knowledge. This sharp contrast underscores the effectiveness of the intervention in significantly improving knowledge of BSE among nursing mothers in the experimental group compared to the control group.



Source: Field Survey, 2025.

Figure 4.1: Bar Chart showing knowledge of breast self-examination (BSE) among nursing mothers in the intervention and control groups

Research Question 2: What is the pre- and post- intervention skills of BSE among nursing mothers in selected secondary health facilities in Osun state?

Items on skills of breast self-examination was a 19-item skill question. Each satisfactory attempt was assigned one point score; unsatisfactory attempt was assigned 0.5 mark and 0-point for no attempt; making up a 19-point skill scale. Scores of 13.5 and above were regarded as good skill, scores between 9.5 to 13 were regarded as intermediate skill and <9.5 as poor skill

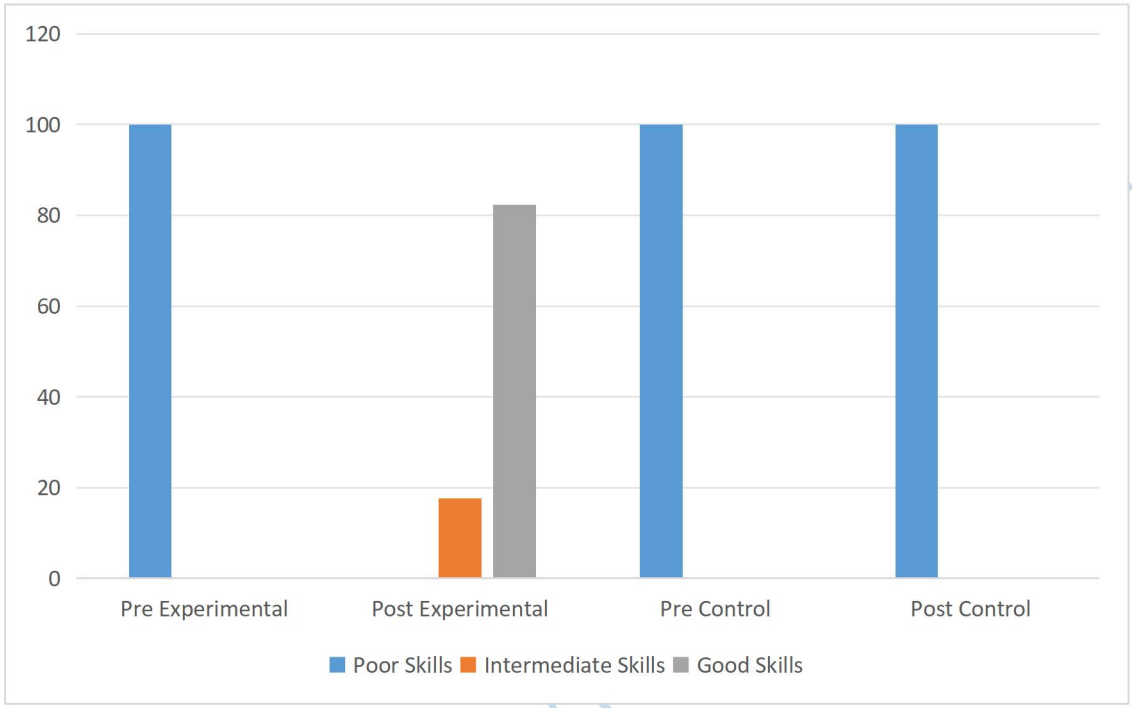
Table 4.3: Summary of Skills of Breast Self-Examination (BSE) among Nursing Mothers in the Intervention and Control Groups

	Experimental Group		Control Group	
Skills of breast self-examination	**Pre-intervention Freq. (%)**	**Post-intervention Freq. (%)**	**Pre-intervention Freq. (%)**	**Post-intervention Freq. (%)**
Poor skills (0-9)	74 (100.0)	0 (0.0)	69 (100.0)	69 (100.0)
Intermediate skills (9.5-13)	0 (0.0)	13 (17.6)	0 (0.0)	0 (0.0)
Good skills (13.5-19)	0 (0.0)	61 (82.4)	0 (0.0)	0 (0.0)
Mean ±SD	4.52 ± 1.00	14.03 ± 1.08	4.43 ± 1.00	4.52 ± 0.95
Minimum Score	2.50	12	2.50	2.50
Maximum Score	6.50	16	6	6

Source: Field Survey, 2025

Table 4.3 demonstrates a clear difference in the skills of breast self-examination (BSE) between the experimental and control groups following the intervention. At the pre-intervention stage, all respondents in both groups demonstrated poor BSE skills, as reflected in the 100% frequency of poor scores and the low mean scores (4.52 ± 1.00 for the experimental group and 4.43 ± 1.00 for the control group). This suggests that prior to the intervention, nursing mothers generally lacked the necessary skills and knowledge required to perform effective breast self-examination. Similarly, the minimum and maximum scores at baseline further confirm the low level of skills across both groups, as they fell within the poor range.

Post-intervention results, however, indicate a substantial improvement in the experimental group compared to the control group. While all respondents in the control group remained in the poor skills category (100%), the experimental group recorded a remarkable shift, with 82.4% of respondents demonstrating good BSE skills and 17.6% achieving intermediate skills. The mean score for the experimental group increased significantly to 14.03 ± 1.08, with minimum and maximum scores of 12 and 16 respectively, reflecting enhanced proficiency in BSE. This stark contrast highlights the effectiveness of the intervention in improving BSE skills among nursing mothers, while the control group's stagnant performance underscores the role of structured educational programmes in promoting practical health behaviours.



Source: Field Survey, 2025.

Figure 4.2: Bar Chart Showing Skills of Breast Self-Examination (BSE) among Nursing Mothers in the Intervention and Control Groups

Table 4.4: Difference between Pre- and Post-Intervention Knowledge Mean Scores on BSE among Nursing Mothers

Group	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Mean Difference
Experimental	10.08 ± 1.54	22.18 ± 2.10	**+12.10**
Control	9.99 ± 1.47	10.10 ± 1.31	**+0.11**

Source: Field Survey, 2025

Table 4.4 reveals a significant improvement in the knowledge of breast self-examination (BSE) among nursing mothers in the experimental group compared to the control group. The experimental group's mean knowledge score rose markedly from 10.08 ± 1.54 at pre-intervention to 22.18 ± 2.10 post-intervention, reflecting a mean difference of +12.10, which indicates the effectiveness of the intervention. In contrast, the control group showed only a negligible change, with scores moving slightly from 9.99 ± 1.47 to 10.10 ± 1.31, yielding a mean difference of +0.11, thus confirming that the intervention had a significant impact on enhancing knowledge levels.

Table 4.5: Difference between Pre- and Post-Intervention Skills Mean Scores on BSE among Nursing Mothers

Group	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Mean Difference
Experimental	4.52 ± 1.00	14.03 ± 1.08	**+9.51**
Control	4.43 ± 1.00	4.52 ± 0.95	**+0.09**

Source: Field Survey, 2025

Table 4.5 shows that the intervention had a significant impact on the experimental group, with their mean BSE skills score increasing from 4.52 ± 1.00 pre-intervention to 14.03 ± 1.08 post-intervention, reflecting a substantial mean difference of +9.51. In contrast, the control group recorded only a negligible improvement from 4.43 ± 1.00 to 4.52 ± 0.95, with a mean difference of just +0.09. This indicates that the educational intervention was highly effective in improving breast self-examination skills among nursing mothers in the experimental group compared to the control group.

Table 4.6: T-test Analysis for Difference between the Pre-Intervention Knowledge Mean Score of Nursing Mothers in the Control and Experimental Groups

Variations	N	Mean	SD	D	t_{cal}	P (Sig)	Effect Size (Cohen's D)
Control Group	69	9.99	1.47				
Experimental Group	74	10.08	1.54	**141**	**0.379**	**0.705**	**-0.063**

P>0.05
Source: Field Survey, 2025.

Table 4.6 reveals that there was no statistically significant difference in the pre-intervention knowledge mean scores of nursing mothers between the control group (M = 9.99, SD = 1.47) and the experimental group (M = 10.08, SD = 1.54), t(141) = 0.379, p = 0.705. Since the p-value is greater than 0.05, it indicates that both groups had comparable levels of knowledge before the intervention. Additionally, the effect size (Cohen's D = -0.063) is very small, further confirming that the observed difference in pre-intervention knowledge between the two groups was negligible. Hence, there was no significant difference between the pre-intervention knowledge mean score of nursing mothers in the control and experimental groups

Table 4.7: T-test Analysis for Difference between the Pre-Intervention Skills Mean Score of Nursing Mothers in the Control and Experimental Groups

Variations	N	Mean	SD	df	t_{cal}	P (Sig)	Effect Size (Cohen's D)
Control Group	69	4.43	1.00				
Experimental Group	74	4.52	1.00	**141**	**0.553**	**0.581**	**-0.093**

P>0.05
Source: Field Survey, 2025.

Table 4.7 reveals that there was no significant difference in the pre-intervention skills mean scores of nursing mothers between the control group (M = 4.43, SD = 1.00) and the experimental group (M = 4.52, SD = 1.00), with a calculated t-value of 0.553 at 141 degrees of freedom and a p-value of 0.581 ($p > 0.05$). The effect size (Cohen's d = -0.093) further indicates a negligible difference between the two groups at baseline, suggesting that both groups were comparable in their breast self-examination skills before the intervention. Hence, there was no significant difference between the pre-intervention skills of BSE among nursing mothers in the control and experimental groups.

Table 4.8: T-test Analysis for Difference between The Post-Intervention Knowledge Mean Score of Nursing Mothers in the Control and Experimental Groups

Variations	N	Mean	SD	Df	t_{cal}	P (Sig)	Effect Size (Cohen's D)
Control Group	69	10.10	1.31				
Experimental Group	74	22.18	2.10	**141**	**40.889**	**0.000***	**6.843**

*P<0.05

Source: Field Survey, 2025.

Table 4.8 reveals a statistically significant difference between the post-intervention knowledge mean scores of nursing mothers in the control and experimental groups ($t(141) = 40.889$, $p < 0.05$). The experimental group achieved a much higher mean score of 22.18 ± 2.10 compared to 10.10 ± 1.31 in the control group, indicating a marked improvement in knowledge following the intervention. The very large effect size (Cohen's $d = 6.843$) further demonstrates the strong practical impact of the intervention, confirming its effectiveness in enhancing knowledge of breast self-examination among nursing mothers. Hence, there was significant difference between the post-intervention knowledge mean score of nursing mothers in the control and experimental groups.

Table 4.9: ANCOVA Analysis of Knowledge of Nursing Mothers in the Control and Experimental Groups before and after intervention

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	5268.468[a]	2	2634.234	980.702	.000	.933
Intercept	425.719	1	425.719	158.491	.000	.531
Pre_Knowledge	62.956	1	62.956	23.438	.000	.143
Group	5163.796	1	5163.796	1922.436	.000	.932
Error	376.050	140	2.686			
Total	43870.000	143				
Corrected Total	5644.517	142				

Source: Field work,2025

The ANCOVA result in the table 4.9 indicates a statistically significant effect of the intervention on participants' post-test knowledge scores after controlling for their pre-test knowledge. The model was significant, $F(2,140) = 980.702$, $p < .001$, showing that the independent variables jointly explained a large proportion of variance in post-test knowledge (Partial Eta Squared = .933). The pre-test knowledge covariate also had a significant effect, $F(1,140) = 23.438$, $p < .001$, indicating that initial knowledge levels influenced post-test performance. Most notably, the treatment group had a highly significant main effect, $F(1,140) = 1922.436$, $p < .001$, with a very large effect size (Partial Eta Squared = .932), suggesting that the intervention produced a substantial improvement in participants' knowledge compared to the control group. Overall, the model explains about 93% of the variance in post-test knowledge, demonstrating the strong effectiveness of the intervention after adjusting for baseline differences

Table 4.10: T-test Analysis for Difference between the Post-Intervention Skills Mean Score of Nursing Mothers in the Control and Experimental Groups

Variations	N	Mean	SD	df	t_{cal}	P (Sig)	Effect Size (Cohen's D)
Control Group	69	4.52	0.95				
Experimental Group	74	14.03	1.08	**141**	**55.784**	**0.000***	**9.336**

*P<0.05
Source: Field Survey, 2025.

Table 4.10 reveals a statistically significant difference between the post-intervention skills mean scores of nursing mothers in the control and experimental groups, with the experimental group (M = 14.03, SD = 1.08) scoring much higher than the control group (M = 4.52, SD = 0.95). The calculated t-value (t = 55.784, df = 141, p = 0.000) indicates that the difference is highly significant at $p < 0.05$, while the large effect size (Cohen's d = 9.336) demonstrates a very strong practical impact of the intervention. This confirms that the educational intervention was highly effective in improving breast self-examination skills among nursing mothers in the experimental group compared to the control group. Hence, there was significant difference between the post-intervention skill of BSE among nursing mothers in the control and experimental groups.

Table 4.11: ANCOVA Analysis of Skill of Nursing Mothers in the Control and Experimental Groups before and after intervention

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3265.888[a]	2	1632.944	2056.528	.000	.967
Intercept	333.965	1	333.965	420.595	.000	.750
Pre_Skill	35.219	1	35.219	44.355	.000	.241
Group	3192.369	1	3192.369	4020.467	.000	.966
Error	111.164	140	.794			
Total	16131.250	143				
Corrected Total	3377.052	142				

Source: Field work,2025

The ANCOVA result in Table 4.11 reveals a statistically significant difference in the post-intervention skill levels of nursing mothers between the control and experimental groups after adjusting for pre-intervention skill scores. The adjusted model was highly significant, $F(2,140) = 2056.528$, $p<.001$, indicating that the combination of pre-skill and group membership significantly influenced post-test skill performance. The effect of the intervention (Group) was extremely strong and significant, $F(1,140) = 4020.467$, $p<.001$, with a very high partial eta squared value of 0.966, showing that about 96.6% of the variance in post-intervention skill scores was attributable to the intervention. The pre-test skill also contributed significantly to the model, $F(1,140) = 44.355$, $p<.001$, though with a smaller effect size (partial $\eta^2 = 0.241$), indicating that initial skill levels had some influence on the post-test results. Overall, the findings demonstrate that the intervention produced a substantial improvement in the skill levels of nursing mothers in the experimental group compared to the control group, confirming the effectiveness of the training approach used.

4.3 Discussion of Findings

4.3.1 Discussion of the Socio-Demographic Characteristics

The socio-demographic characteristics of the respondents indicated that the majority of the respondents were of young age and married, possessing moderate education qualification, and were pursuing some kind of trade/other occupation in the low- to middle-wage category. The characteristics of nursing mothers in most Nigerian communities is typified by the shuffled nature of family care and income-generating activities of women of reproductive age. The low percentage of illiterate respondents with a medium proportion of respondents studying at the secondary and tertiary levels implies the possibility of moderate literacy, which is beneficial to effective health education measures like breast self-examination training. The dominance of Islam and Christianity in the respondents also reaches the religious set up in the region and the relevance of culture sensitive approaches in health promotion. Not only do these characteristics have the potential to increase the comparability between the experimental and control whom experiments and the effectiveness of their causal relations, but also indicate how important it is to develop maternal health interventions in accordance with socio-demographic conditions, which is also viewed as a core factor in enhancing maternal and child health outcomes[1].

4.3.2 Discussion of Knowledge of Breast-Self Examination

The findings revealed that both experimental and control groups of nursing mothers demonstrated poor baseline levels of knowledge of breast self-examination (BSE) representing low awareness and understanding of such a key prophylactic practice. This concurs with the available literature, which indicates that poor information on BSE is not unique to low- and middle-income countries since it typically leads to delayed breast abnormality discovery by women[2]. The significant change shown by the experimental group after undergoing the educational intervention on health points to systematic health education as a key agent to empower women with the knowledge to practice preventive health habits. This represents an improvement showing that nurse-led education initiatives can close the knowledge gap and create a culture of early-detection in at-risk groups.

The much higher post-intervention knowledge among the experimental group, as compared to the control, further proves that health promotion has been affected by targeted educational strategies. This is similar to findings regarding teaching women about BSE and improving their knowledge and attitudes toward the same in Nigeria[3]. The insignificant improvement in the control group indicates that it is critical to continue educational activities, without which the knowledge level does not improve. This strengthens the notion that passive exposure to health services is inadequate, and purposeful instructional tactics, are required in order to course measureable change in preventive health knowledge.

The results compliment the evidence that health education, especially in cases provided by healthcare professionals is a cost-effective and sustainable approach to minimising the burden of breast cancer as people engage in early detection behaviour practices. They also manifest themselves in accordance with the overall view of the public health realm that female education is an important step in lowering late-stage cancer diagnoses in the context of more

limited resources[4]. This study proves that integration of BSE education into routine maternal and child health services is of cardinal priority as a direct connection between improved knowledge and educational intervention in terms of maternal and child health outcomes can be evidenced.

In the hypotheses test of the knowledge on BSE, the results highlight two important findings, first, there was a similarity in the knowledge between the control and experimental group prior to the intervention which illustrates similarity in the baseline analysis. This similarity indicates that any post-intervention inequalities may be explained by the educational strategy but not by other inequalities. This is in line with the significance of creating equivalence in quasi-experimental researches to ascertain validity of findings[5]. Secondly, there is a profound positive change in post-intervention knowledge within the experimental group pointing to high efficacy of the structured health education in increasing the knowledge of breast self-examination in mothers. Educational activities have persistently demonstrated the improvement of awareness and self-care behavior, especially in maternal and child health activities[6].

The post-intervention results also indicate the practical extensiveness of goal-specific nursing interventions in closing knowledge gaps in nursing mothers. The large effect size shows not only significant but also a practical impact of the intervention, which makes it robust and potentially beneficial as far as education is concerned. Studies with similar designs have found that community-implemented health referencing and education contribute greatly to awareness and protective health behaviour among mothers, which is consistent with these results[7]. This is particularly emphasized on the role of nurses as healthcare frontiers in

education on preventive health practices especially in the low and medium income settings where access to healthcare educative services would be scarce.

In sum, the results support the notion that both groups began over the same level of knowledge, but nursing-led intervention resulted in increased knowledge among the experimental group. This shows that the investment on systematic education interventional strategies holds a high value in enhancing health literacy and health behavior in nursing mothers concerning preventive behaviors and practices. By implication, such interventions can help to shrink the long-term risks of late detection of breast cancer through the enhancement of breast self-examination. This is consistent with the global health leverage advancing information on health among women as one of the essential tools to the reduction of morbidity and mortality[8].

4.3.3 Discussion of Skills of Breast-Self Examination

The results of this study indicated that nursing mothers possessed weak breast self-examination (BSE) ability before the intervention; however, these women showed a great improvement after receiving a structured education in the experimental arm. This finding can be combined with other evidence that low baseline skills in BSE in women in low- and middle-income countries are prevalent due to the lack of awareness, training, and unrelated focus on preventive health practices[9]. The intervention successfully filled this gap because the majority of the participants in the experimental group improved their level of skills, whereas the ones in the control group did not change. This highlights the vitality of specific educational therapy in empowering women with useful skills to carry out early detection of such abnormalities in the breast.

Furthermore, the significant change in the average scores before and after intervention in experimental group confirms the importance of the skill-based training as opposed to the knowledge-based one. According to Teshome et al.[10], there are more effective teaching methods when it comes to the promotion of the behaviour change in the preventive health practices, which is focused on practice and demonstration. The intervention through the use of demonstration with repetition practice had the effect of not only helping to acquire cognitive awareness but also achieving competency of BSE and such intervention should therefore be implemented at the routine maternal and child health services.

Lastly, the insubstantial advancement of the control group demonstrates that women, even at risk of a breast cancer, may not develop preventive health skills without a structured support. This result agrees with that of Osei-Afriyie et al.[11], who found that inadequate repetition of education on health behaviours does not lead to diverse changes in breast health behaviours. Integrating organized BSE education into the healthcare policy and nursing practice is, therefore, essential in the provision of ensured skills to nursing mothers and other women so that they can recognize abnormalities at an earlier stage, and late presentation of breast cancer is discouraged, leading to health outcomes.

Results demonstrate that at baseline, the difference in the skills of breast self-examination (BSE) between nursing mothers in the control and experimental groups was not significant, denoting that both groups of individuals were at the same level of competence. This comparability is essential because it eliminates the possibility of pre-existing differences on the skills of the different parties and therefore eliminates the potential to confound the effect of the intervention. Nonetheless, the outcome of the experiment showing a significant positive outcome in the experimental compared to the control group has eminent practical significance

undercut by the huge effect size. This corresponds to research findings that documented the positive power of tailored health education in increasing knowledge and abilities concerning BSE[12]. It further confirms the notion that practical and skills-based interventions, especially on women dealing with reproductive age, are critical in strengthening preventive health behaviours[13]. The large increase in the experimental group indicates that experience and practice and focus training play an important role in the acquisition and retention of skills, and this correlates with results in other interventions programs in low- and middle-income countries where there is a lack of awareness and practice of BSE[14]. These findings thus vindicate the need to include organized BSE education in maternal and child health programmes as a very cost effective measure to enhance breast cancer early detection.

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Chapter Five

Summary, Conclusion and Recommendations

5.1 Summary

The study aimed to assess the effect of an educational-based intervention on the knowledge and skills of breast self-examination (BSE) among nursing mothers in selected secondary health facilities in Osun State. Specifically, it sought to evaluate the pre- and post-intervention knowledge of BSE among the participants, examine their pre- and post-intervention skills, determine the difference between the pre- and post-intervention knowledge mean scores, and identify the difference between the pre- and post-intervention skills mean scores.

The study adopted a quasi-experimental design involving two groups, the control and experimental groups, to evaluate the effect of an educational-based intervention on the knowledge and skills of breast self-examination (BSE) among nursing mothers in selected secondary health facilities in Osun State. Nursing mothers attending postnatal clinics in these

facilities formed the study population, with specific inclusion and exclusion criteria guiding their selection. A sample size of 156 participants, 78 each from the control and intervention groups, was determined using statistical formulae with adjustments for attrition. A multistage sampling technique was used across the three senatorial districts of Osun State to ensure representativeness, with systematic random sampling employed to select nursing mothers from postnatal registers.

Data were collected using a structured test paper and a teaching module developed by the researcher. The instrument consisted of sections covering socio-demographic characteristics, knowledge of breast cancer and BSE, and a checklist to assess practical skills following the intervention. The teaching module was delivered in two sessions and combined theoretical knowledge with practical demonstrations to improve the participants' ability to conduct BSE effectively. The instruments underwent validity and reliability checks, including expert review and a pilot study, to ensure their accuracy and consistency. Data collection followed four stages: pre-intervention, planning, intervention, and post-intervention, with the intervention group receiving the teaching module while the control group received routine health education.

The data obtained were analysed using SPSS version 27, applying descriptive statistics, frequency distributions, and independent t-tests, with significance set at $p<0.05$. Ethical approval was obtained from the relevant health research committee, alongside informed consent from participants who were assured of confidentiality, anonymity, and voluntary participation. Participants were informed of their right to withdraw at any stage without

repercussions. Confidentiality was maintained by using codes instead of names and storing data securely. These measures were intended to safeguard participants' rights while ensuring the credibility and integrity of the research process. The findings of the study are as follows:

1. Before the intervention, the majority of nursing mothers in both groups had poor knowledge of breast self-examination (BSE), but after the intervention, 98.6% of the experimental group attained good knowledge, while the control group remained at poor knowledge.

2. Similarly, all participants in both groups initially had poor BSE skills; however, post-intervention, 82.4% of the experimental group demonstrated good skills and 17.6% attained intermediate skills, while the control group remained at poor skill level.

3. The experimental group recorded a significant improvement in knowledge, with mean scores increasing from 10.08 ± 1.54 to 22.18 ± 2.10, reflecting a mean difference of +12.10, while the control group showed only a negligible mean difference of +0.11.

4. The experimental group also showed a substantial improvement in skills, with mean scores rising from 4.52 ± 1.00 to 14.03 ± 1.08, a mean difference of +9.51, compared to the control group's negligible increase of +0.09, confirming the effectiveness of the educational intervention.

5. There was no significant difference in the pre-intervention knowledge mean scores of nursing mothers in the control and experimental groups, indicating that both groups had comparable baseline knowledge of breast self-examination (BSE).

6. Similarly, no significant difference was found in the pre-intervention skills mean scores between the two groups, showing that both groups were at the same skill level before the intervention.

7. A significant difference was observed in the post-intervention knowledge mean scores, with the experimental group recording a much higher score than the control group, demonstrating the strong effectiveness of the intervention in improving knowledge of BSE.

8. The post-intervention skills mean scores also showed a highly significant difference, with the experimental group outperforming the control group, confirming that the educational intervention had a substantial positive impact on BSE skills among nursing mothers.

5.2 Conclusion

The findings of the study concluded that the intervention consisting of an educational program was quite efficient in the improvement of knowledge and skills of self breast examination of nursing mothers. Although the two groups began the same on the scale of poor knowledge and skills, it is only the experimental group that showed an outstanding progress in the post-interventional period and gained a high level of knowledge and a significantly improved practical skill level. Compared to the group in control, there was no significant change over the study in the control group. This demonstrated the value of well-structured educational interventions in increasing the knowledge and skills of the nursing mothers in the important field of health prevention.

5.3 Recommendations

1. The health facilities must include the training of structured breast self-examination broadcasts as part of normal maternal and child health care services so that breast self-examination knowledge and skills are imparted in nursing mothers.

2. A form of follow-up education should be regularly arranged so that the nursing mothers can go through education reinforcement and maintenance of skills in breast self-examination.

3. Nurses and midwives need to receive quality training and feel empowered with a common set of teaching and training instruments to be able to educate nursing mothers on breast self-examination.

4. In addition to the period in hospital, the community outreach and awareness programmes need to be developed to deliver the benefits of education in breast self-examination to nursing mothers and women in the community at large.

5. Education on breast self examination must be fronted as compulsory during postnatal and antenatal care visit to apprehend all nursing mothers on early exposure.

6. Policymakers ought to establish and implement polices, which encourage preventive health education programs like breast self examination to decrease the cases of late breast cancer among the women.

5.4 Contribution to Knowledge

1. The paper presents empirical data on the fact that systematic education on health results in a strong increase in the level of knowledge and applied knowledge of nursing mothers

in breast self-examination. Scarcity of educational interventions in preventing health risk behaviours underlines the necessity of using this intervention strategy.

2. Unlike most of the past literature which have concentrated on awareness as a single factor, this study shows that the intended interventions not only augments knowledge but also has an impact in improving practical skill conducts thus closing the gap between hypothetical and practical practice of BSE.

3. The paper is a contribution in terms of providing knowledge which is relevant, as it touches on context specific information by nursing mothers who remain a less represented population in breast health studies, subsequently broadening the scope of how populations that include maternal groups can implement preventive practices against breast cancer.

4. The results demonstrate the importance of including breast self-examination education as a part of maternal and child health services, hence giving substantiated evidence to policymakers, health educators, and practitioners to implement breast self-examination education in clinical and community practice.

5.5 Implication to Nursing Practice, Teaching, Research and policy

Implications for Nursing Practice

This study has immediate application in the nursing practice in relation to the promotion of preventive health behaviours among women. Nurses are in the forefront of providing healthcare and a vital source of patient instruction, as well as educating, and enabling. The fact that the knowledge and skills on breast self-examination (BSE) showed remarkable

increment among the nursing mothers following the intervention indicates that the health education was effectively conducted by the nurses. Concerted efforts should be made by nurses to include routine elements of BSE education and demonstrations in maternal and child health services, antenatal clinics, and community outreach programmes. In doing so, nursing practice will promote early detection behaviours, minimise the effects of late-stage breast cancer and ultimately increase the health outcomes experienced by women.

Implications for Teaching and Research

In instructional, this study highlights the need to include practical aspects of preventive health education (such as breast self-examination) in nursing curricula, besides providing only the theoretical understanding. The focus of the nursing teachers should be on skills-based learning techniques, which include demonstrations and interactive teaching methods, in order to help students become competent in knowledge and practice. Researchwise, the study acts as base of more research that should be conducted in regard to the retention of BSE knowledge and skills by nursing mothers even after a long period. It also points at the need to conduct further research to examine such interventions in any broader populations and contexts, to test the sustainability and scalability. Further investigation can be done on how digital platforms and technology-based interventions can be used to generate awareness and to acquire skills on BSE.

Implications for Policy

Policy-wise, the study is helpful in providing evidence to include organised breast self-examination education into the countrywide maternal and child health programmes.

Regulators should think through the creation of standard guidelines and protocols on the BSE education to create uniformity in healthcare facilities. The results also imply that it is important to continue to invest in the initiatives of health promotion which enable women to have control over their health. The organization of policies that enhance the skills of nurses and other medical experts in constant preparation on preventive health indicators or education would translate to the maintenance of the benefits of such a program. Through institutionalization of BSE education, health systems will be able to diagnose breast abnormalities early, minimize death due to cancers and the overall health outcome of the population will be improved.

5.6 Suggestion for Further Studies

On the basis of the results of the current study, it is proposed that future research to test the long-term memory regarding knowledge and skills on breast self-examination (BSE) be conducted among nursing mothers after the post-intervention period to establish the sustainability of the educational effect. Future research may also examine the implementation of the subsequent advanced teaching strategies, including the digital health platforms, mobile applications, and peer education in the community to increase BSE courses accessibility and effectiveness. Moreover, quasi-experimental investigations comparing the results of various regions, healthcare facilities, and socio-demographic groups would allow gaining additional insights into the real-life factors contributing to the effectiveness of such health education, whereas mixed-methods research would enable describing both the statistical results of such studies and subjective experiences of nursing mothers with BSE learning

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Appendix I

Lead City University, Ibadan
Faculty of Basic Medical and Health Science, Department of Nursing Science.
Questionnaire on
Effect of Educational-Based Intervention on Knowledge and Skill of Breast Self–Examination Among Nursing Mothers in Selected Secondary Health Facilities, Osun State

Dear Respondent,

I am a Master student in the Department of Nursing, Lead City University. I am conducting a study on the effect of educational-based intervention on knowledge and skill of breast self–examination among nursing mothers in selected secondary health facilities, Osun state. Your cooperation is needed to supply accurate information for the completion of this research. All information supplied will be used for research purposes only and confidentiality will be respected. Please note participating in this study is voluntary and cooperation will be appreciated.

Yours faithfully

Section A: Socio Demographic

Instruction: please read the question carefully and tick the appropriate answer

1. Age: 18- 22years [ ] 23 -31years [ ] 32-40 years [ ] 41-49 years [ ]
2. Educational status: (a) Primary [ ] (b) Secondary [ ] (c)Tertiary [ ] (d) None [ ]
3. Religion: (a) Christianity [ ] (b) Islam [ ] (c) Others [ ]
4. Marital status: (a) Married [ ] (b) Single [ ] (c) Divorced [ ] (d) Widow [ ]
5. Do you have any children? Yes [ ] No [ ]

6. If yes, how many? (a) 1-3 [ ] (b) 4-6 [ ] (c) 6 and above [ ] (d) none [ ]
7. Occupation: (a) Teacher [ ] (b) Trader [ ] (c) Secretary [ ] (d) House keeper/audily [ ] (e) Unskilled worker [ ] (f) Others [ ] _____

Section B: Knowledge of Breast Self- Examination

Please kindly indicate the level of your knowledge on BSE by selecting the following options:

S/N	ITEMS	YES	NO
1.	What do you understand by breast self-examination • Assessment made on the breast by an individual to check for lump or abnormalities		
	• An assessment made on the breast by Doctor or Nurse to check for lump or abnormalities		
2.	Breast self-examination can be done by		
	• Health care workers		
	• Any trained individual		
3.	Breast self-examination helps to detect all the under listed except		
	• Cancer		
	• Lump		
	• Malaria		
4.	What part of the hand can be used to performed breast self-examination?		
	• Tip of fingers		
	• Palm of the hand		
	• Elbow		
	• Pad of the three middle finger		
5.	Should both breast be checked monthly?		
6.	Can breast cancer be detected early?		
7.	Can early detection improve chances of survival?		

8.	Breast self-examination can be done: • While in the shower using the pads of fingers, the female should move around her entire breast in a circular manner moving from the outside to the center, checking the whole breast and armpit. • In front of a mirror: the female should visually inspect her breast with her arms at her sides, next raise her arms high overhead		
9.	During breast self-examination- • Look for any changes in the contour		
	• Any swelling, or dimpling of the skin, or		
	• Changes on the nipple.		
10.	Lying down: when lying down the breast tissue spreads out evenly along the chest wall, the female places a pillow under her left arm behind her head		
11.	Using her right hand, she moves the pads of her fingers around her left breast gently in circular motions covering the entire breast area and armpit		
12.	The female should squeeze the nipple, check for discharge and lumps		
13.	The steps are to be repeated for the right breast		
14.	Which assessment finding should be reported to the physician/nurse? • a breast tenderness prior to menses		
	• dimpling of the breast skin		
	• one breast slightly larger than the other		
	• retracted nipples bilaterally		

Checklist on Breast Self-Examination

Section C: This Section is To Test Your Skills on Breast Self-Examination

S/N	Items	Satisfactory	Unsatisfactory	No attempt
1.	During breast self-examination you should stand in front of the mirror			
2.	Place your hands on the sides of the body			
3.	The hands are raised over the head			
4.	Examine one breast at a time			
5.	Observe each breast for • swelling • dimpling of skin • changes in the nipples			
6.	Ensure the hands are behind the head			
7.	Feel the breast while in supine position by placing the hand under the head of the side being examined			
8.	Place a pillow under the breast being examined			
9.	Use finger tips while examining the breast			
10.	Examine the breast with rotational movement of the fingers			
11.	Examine the breast with linear movement of the fingers			
12.	Examine the breast with radial movement of the fingers			
13.	Perform all the above options			
14.	Pay attention to the upper outer quadrant of the breast (the armpit)			
15.	Press the nipple for any lump and blood discharge			
16.	Pay attention to the axillary lymph nodes			
17.	Pay attention to the Supraclavicular lymph			

	node area			

Appendix II

Informed Consent Form

Please read this document properly before you decide to participate in this study.

My name is AINA Modupe from the Department of Nursing sciences, Lead City University. The purpose of this study is to assess the effect of educational-based intervention on knowledge and skill of breast self–examination among nursing mothers in selected secondary health facilities, Osun state.

Participation in this study will take approximately 15 hours, and there are no known risks involved. The study aims to generate data on breast self-examination (BSE) knowledge and skills among women of reproductive age. Findings will support researchers, clinicians, and policymakers in developing effective, context-specific interventions and advocacy for improved BSE practices and breast health awareness. The study will also enhance women's self-awareness and promote early detection of breast cancer, improving survival rates and treatment options. Participation is voluntary, with no incentives or penalties for choosing not to take part or withdrawing at any point. Confidentiality will be strictly maintained; all responses will be anonymised with a code, and data will be destroyed after analysis. There is no conflict of interest associated with the study.

If you have any question about the study, please feel free to contact:

Name: Aina Modupe

Phone number: 08033569335

If you wish to participate in this study, please sign in the space provided below. Your signature will indicate willingness to participate.

Participant's Signature..... Date.....

Training Module on Breast Self–Examination Among

Introduction

Breast self-examination is a technique for detecting abnormality in the breast

Breast self-examination will cover the following:

- Importance/benefits of breast self-examination
- Abnormalities/changes detected through BSE
- Steps in BSE

Module One

Time allotted: 1 hour

Objectives:

At the End of the Teaching Session the Participants Should Be Able to:

- Define breast self-examination in a clear language
- Benefits of BSE
- Identify abnormalities in the breast
- Identify what time of the month to carry out BSE
- Know different positioning suitable for the BSE

Module Two

Time allotted: 1 hour

Objectives:

At the end of the teaching session the participants should be able to:

- Define breast self-examination in a clear language
- Perform the steps in BSE
- Positioning in performing BSE
- Assess and detect the breast for any changes
- Identify what time of the month to carry out BSE
- Importance/benefit of BSE

What Is Breast Self Examination

Breast self-examination is a method or plan of action for detecting abnormalities of the breast. This method involve the use of the fingers to feel any mass and the eyes to see any discoloration, change in size, and shape. This method is one of the screening process which is simple, not expensive and non-invasive. Some of the abnormalities that can be detected in the breast through breast self-examination are as follows: breast lumps, fibroadenomas (fibrous lump), breast cysts, nipple discharges, inflammation of the breast (mastitis) and painful breast called mastalgia

What Are the Steps in BSE

Step 1: Start by looking for differences between the breasts

Good breast self-exams should be concerned with both the look and feel of breasts. The look element should be performed while either standing or sitting in front of a mirror, with your clothes removed. Examine both breasts and look for:

- Visible lumps
- Any unusual differences between the two breasts
- Dimpling or indentations in the breast tissue
- Redness, scaliness, or other changes to the skin or nipples that appear abnormal
- Changes to your nipples, for example a nipple that is newly inverted or pulling in

Step 2: Put your hands on your hips, pull your elbows forward

Look for the same changes in the breasts from Step 1

- such as redness, lumps and indentations; this time with your hands resting on your hips while squeezing your elbows forward since this might bring out lumps that might not appear otherwise.
- Keep your hands on your hips and slowly rotate from side to side to catch possible abnormalities from more angles.
- Next, lift your arms above your head to see if there's any puckering or dimpling of the skin when you elevate them. "When you raise your arms, the mass, if there is one, stays there and the skin pulls in.

Step 3: Use 3 fingers when examining your breasts

The feel part of the breast self-exam should be done while lying down, with a pillow propping up your head and your arm resting behind it.

- With the opposite hand, take the first three fingers which are index, middle and ring fingers and use them to press down around the breast and surrounding area using circular motions.
- Using three fingers, rather than just one, keeps you from mistaking normal breast tissue for lumps. Increase the pressure you use with each pass around the breasts to ensure you are not just feeling superficial tissue.

Step 4: Examine the areas surrounding the breast

After examining the breasts, it is important to perform a check of the areas around them.

- Continue to use circular motions and increasing pressure as you move from the collarbone to the sternum and down below the breast.
- From the lower part of the breast, move up to the area under your arm to look for any swelling in the lymph nodes.

Note: the researcher ensures the participants identifies that what they are looking for is something that stands out, something that feels like a marble or a walnut, something that definitely feels different than the surrounding breast tissue.

Step 5: Perform the test at the same time each month

Be sure to do the breast self-examination the same time every month. If you are still menstruating,. Women who are postmenopausal can do the exam at any time of the month, as long it is around the same time each month.

Keep in mind that there is some debate about whether women should perform routine breast self-exams to find potentially cancerous lumps. Some of the concerns, according to recent studies, revolve around false positives and the fact that the exams may not necessarily improve a woman's chances of survival.

Signs of Abnormalities In Breast

- lumps inside the breast or underarm area
- changes in breast size and shape
- pain in a specific area that does not go away
- prominent veins on the surface of the breast
- nipple discharge that starts suddenly
- a sore or rash on the nipple
- swelling, redness, or darkening of the breast
- dimpling of the skin on the breast
- inversion of the nipple or other parts of the breast

Complication on Delay In Breast Self Examination

- delay in early detection of breast abnormalities
- delay in effective treatment
- unfavorable outcome
- death

Lesson Learnt By The Participants

- identified abnormalities in breast
- importance/benefits of BSE
- changes in the breast

- steps in performing BSE
- When to perform BSE

Bio-data

A. Personal Data

1. Full Name: **Modupe Aduke AINA**

i. Aina Ola Oluwa House, Opposite 7 Up Depot, Ogo Oluwa Area, Gbongan/Ibadan Road, Osogbo, Osun State, Nigeria

Email Address: dupeaina2002@yahoo.com

Phone Number: 08033569335

2. **Date and Place of Birth**: 24th July, 1959

Place of Birth: Iresi, Osun State

3. **Nationality**: Nigerian

4. Marital Status: Married

5. No. of Children & their ages: Five (5)

6. Name and Address of Spouse: Dr. Olaoluwa Aina

Address: Aina Ola Oluwa House, Opposite 7 Up Depot, OgoOluwa Area, Gbongan/Ibadan Road, Osogbo, Osun State, Nigeria

7. Name and Address of Next of Kin: Dr. Adeagbo Omolola Yinka

Address: Aina Ola Oluwa House,Opposite 7 Up Depot, OgoOluwa Area, Gbongan/Ibadan Road, Osogbo, Osun State, Nigeria

Email: omololaadeagbo88@gmail.com

Phone Number: 08135081158

8. Date of Assumption of Duty in current establishment: 31st July, 2023

9. Status on first appointment in current establishment: Senior Lecturer as Permanent Appointment

10. Present position: Senior Lecturer

11. Date of last promotion: Nil

12. Date of confirmation of appointment: Nil

13. If not confirmed why: Not up to three years

14. Present Salary: N360,000 per month

15. **Faculty**: Faculty of Nursing Science

16. Department: Department of Public/Community Health

B. Educational Background

Education Institutions Attended with Dates and Qualification:

i. Primary Education

Date	Institution	Qualification
1972	Union Baptist Primary School, Osogbo, Osun State, Nigeria	Primary School Leaving Certificate

ii. Secondary Education

Date	Institution	Qualification
2012	West African Senior School Certificate Examination (Nov/Dec) 2012 UI/Ojoo Centre	WASSC
1977	Ebekun Secondary Commercial Grammar School, Iresi.	W.A.S.C

iii. Higher Educational Institutions Attended with Dates & Qualification

Date	Institution	Qualification
2022	Babcock University, Ilishan-Remo, Ogun State, Nigeria	Ph.D. in Public Health
2003	Department of Epidemiology and Community Health, University of Ilorin, Nigeria.	Master Of Public Health (MPH)
2015	National Open University Of Nigeria	Bachelor Of Nursing Science (B.NSc.) (Hons.) Second Class Upper
2000	Federal University of Uyo, Uyo. Nigeria	Degree In Guidance And Counselling Education (B.ED) Second Class Upper.
2001	School of Health Technology, Ilesa. Osun State.	(H.N.D) Public Health Nursing – Upper Credit.
2000	School of Health Technology, Ilesa. Osun State.	Community Health Officer (C.H.O) National Certificate
1985	School of Nursing, Osogbo. Osun state. Nigeria.	General Nursing – Registered Nurse.
1980	Our Lady Of Apostles, Catholic School of Midwifery, Ibadan. Nigeria	Registered Midwife

C. Awards and Fellowships:

- Meritorious Service Award of University College Hospital (UCH) Ibadan by the Finance and Management Committee.
- Osun State Girls Brigade Merit Award
- NYSC/Nigeria Red Cross CDS Group, Excellent Award 2016 as the most outstanding contributor of knowledge for service to humanity.

Fellowships

- A fellow of the African Institute of Public Health Professionals (AIPHP)

D. Work Experience: With Dates (including courses taught where relevant)

- As Senior Lecturer at Thomas Adewumi University, Oko, Kwara State from 2023 till date.

As a Senior Lecturer I am responsible for delivering high-quality teaching and learning, conducting innovative research and publishing scholarly outputs, supervising undergraduate and postgraduate projects, and mentoring junior colleagues. I also play vital roles in departmental and faculty administration, curriculum development, professional service, and community engagement, thereby contributing to the overall growth and reputation of the university.

- Head of Department Public health Nursing University College Hospital, Ibadan – 2013 to 2019.

At The University College Hospital Ibadan, Oyo State: Clinical Duties, Teaching and Supervising research projects of Students on Public and Community Health experience, carrying out research activities, epidemiology surveys. Facilitate in Public Health Seminars. I also participated in Primary Health Care activities in all the Primary Health Care Centres in various states of Nigeria attached to University College Hospital Ibadan, Nigeria.

- Deputy Director of Nursing/Head of Public Health Nursing Department, University College Hospital, Ibadan. Nigeria - 2013 to 2019.
- Asst. Director of Public Health Nursing, Department of Public Health Nursing, University College Hospital, Ibadan. Nigeria - 2007 to 2016
- UNICEF Consultant Edo and Ekiti States - 2004 to 2009

- Senior Nursing Officer, Principal Nursing Officer and Chief Nursing Officer- 1987 to 2004
- Staff Nurse / Midwife, Our Lady Of Fatima Catholic Hospital, (Old Oyo State) Now Osun State, Osogbo, Nigeria – 1980 to 1987

E. Membership of Academic Professional Bodies.

- National Association of Nurses and Midwives of Nigeria (NANMN)
- National Association of Community Health Officers of Nigeria
- National Association of Public Health Nurses of Nigeria

F Publications:

- Olofin-Samuel, M.A., Ojo, E.A., Fatukasi, A.O., **Aina, M.A.**, Adeagbo, O.Y., & Arinson, E.O. (2024). Effects of digital application and training interventions on skills of cardiopulmonary resuscitation among undergraduate nurses in south-west Nigeria. *Journal of Liaoning technical university natural science edition.* 18(4), 324-340 https://www.lgjdxcn.asia/public_article.php?article=339**(China-Scopus indexed)**

- Olofin-Samuel, M.A.,**Aina, M.A.,**Ogidan, O.C., Ayedun, T.O., Gentry, O.A., Adeagbo, O.Y., & Oyolola, V.I. (2024). Acceptance of Hepatitis B Vaccine Among Healthcare Workers in Ondo State. *African Journal of Health Nursing and Midwifery.* 7(2), 93-104. **https://doi.org/10.52589/AJHNM-Q15A42RK**

- **Aina, M.A.,**Gbenga-Epebinu, M.A., Olofinbiyi, R.O., Ogidan, O.C. & Ayedun, T.O. (2023). Perception and acceptance of medical chatbot among undergraduates in Ekiti State University. *British Journal of Education,* 11(11), 1 – 14 **(United Kingdom)**

- **AINA, M. A.** (2023). Assessment of Health Workers on the Management of Health Care Waste in Primary Healthcare Centers in Osun State, Nigeria. *International Journal of Health and Psychology Research (IJHPR)*

- **AINA, M. A.** (2023). Knowledge. Attitude and Practice of Testicular Self Examination among Male Undergraduate Students in Ekiti State University. *International Journal of Public Health, Pharmacy and Pharmacology (IJPHPP)*

- **AINA M.A**. and ADEAGBO O.Y (2022). Women's satisfaction with family planning services in comprehensive health centres in Ekiti State, Nigeria. *Euro Afro Studies International Journal,* 1(2), 13 – 23. DOI: www.doi.org/ 10.5281/zenodo.7552466 **(Austria)**

- **AINA M.A**. and ADEAGBO O.Y (2022). Determinants of Dietary Regimen Adherence among Diabetic Mellitus Patients in Osogbo, Osun State, Nigeria. *Commonwealth Journal of Academic Researc,* 3(10), 1-17**(Portugal)**

- AGBEDE, C.O and **AINA, M.A.** (2021). Outcome of Telephone-Messages Intervention On Self-Care Practices Among Diabetic Patients in A Secondary Health Facility in Oyo State, Nigeria. *International Journal of Medicine, Nursing & Health Sciences*, 2(4), 20 – 34.**(United Kingdom)**

- **AINA, M. A.** (2021). Perception of Self-Care and Self-Care Practice of Diabetic Patients Attending Selected Hospitals in Oyo State, Nigeria *International Journal of Public Health and Pharmacology*, 1(2), 50-59
- **AINA, M.A.** and AGBEDE, C.O.(2021). Diabetic Patients; Health Education Through Physical-Interaction and Practice of Self-Care in A State Hospital in Oyo State, Nigeria, *International Journal of Academic Research in Business, Arts and Science,* Vol. 3(9), 34-45**(United Kingdom)**

1. Thesis/Dissertation:

- Physical Interaction And Telephone-Message Education Interventions On Self-Care Behaviours Among Type II Diabetics In Selected Hospitals In Oyo State, Nigeria.

Publications in Journals:

2. Books/Monographs: Nil

(a) Authored Books: Nil

(b) Edited Books: Nil

(c) Contribution to Books: Nil

3. Published Refereed Conference Proceedings

4. Papers Accepted for Publication:

- Olofin-Samuel, M.A., Ojo E.F., &**AINA, M. A**.(2024). Prevalence of cardiovascular diseases in Nigeria: a meta-analysis. African journal of biomedical research
- Olofin-Samuel, M.A.,**AINA, M. A**., & Oyinloye, M.O. (2024). Social support and quality of life among renal patients undergoing hemodialysis in Ilorin teaching hospital, Kwara State. Sierra Leone journal of medicine
- **Aina, M.A.**, Olofin-Samuel, M.A.**,** Ayedun, T.O., Olofinbiyi, R.O., Adeagbo, O.Y., & Oyibo F.O. (2024). Factors influencing menstrual hygiene practices among female junior secondary school students in Lugbe, Abuja. *International journal of biological and healthcare research* 3(1)
- **AINA, M. A.** and Gbenga-Epebinu, M.A (2023). Lower Back Pain among Healthcare workers in the Nigeria: causes and implications for practise. *Havard International Journal of Innovation Research and Advanced Studies (HAJIRAS)*

5. Book Reviews and Commentaries in Scholarly Journals: Nil

6. Technical Reports: Nil

7. Other Publications: Nil

8. Creative Work: Nil

G. Notable Scholarly or Professional Accomplishments: Nil

H. Major Conferences/Workshops Attended

- Training Workshop on Principles of administration and management by U.I/U.C.H Ibadan continuing education programmes
- Supervisor skills training by UNFPA
- Training on Norplant Insertion and removal techniques by College of Medicine, University of Ibadan, Ibadan, Nigeria

I. Services in Lead City University:

1. **Services Within the University Dept:**

2. Services within the Faculty: Nil

3. Services within the University:

4**. Services Outside the University** (local, State or National or International) Nil

J. Extra Curricular Activities: Reading, Travelling and Meeting People

K. **Others**

L. Names and Addresses of Referees:

PROFESSOR JAMES O. BAMIDELE

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Provost, College of Medicine,

Ekiti State University, Ado-Ekiti.

Ekiti State, Nigeria.

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Osun State, Nigeria.

Phone No:08032394921,08034067918.

Email- k_ogunniyi@yahoo.com

M. Date:

_____ _____

Signature **Date**

The University Compliance Certification

This is to certify that Modupe Aduke AINA with matriculation number LCU/PG/006570 in the Department of Nursing Science, Faculty of Basic Medical and Health Sciences, Lead City University, Ibadan, Oyo State is in full compliance with the approved University format and style.

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Signature **Date**