EFFECTIVENESS AND TREATMENT EXPERIENCE OF HUMAN EPIDERMAL GROWTH FACTOR RECEPTOR-2 POSITIVE BREAST CANCER PATIENTS ON TARGETED THERAPY, KENYATTA NATIONAL HOSPITAL

BY

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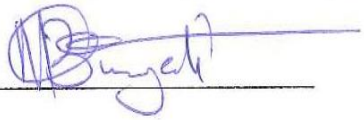
November, 2022

DECLARATION

I, Millah Vunyali Mang'are declare that this proposal is my original work and has not been presented in any other institution of higher learning or elsewhere for award of credit.

Signature 

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DEDICATION

I would like to dedicate this achievement to my wife Mary and children Fredrick, Feliciah and Fidel.

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OPERATIONAL DEFINITIONS

Breast cancer - Breast cancer is a type of cancer that starts in the breast. It can start in one or both breasts. Cancer starts when cells begin to grow out of control

Baseline parameters - An initial measurement of a condition that is taken at an early time point and used for comparison over time to look for changes. For example, the size of a tumor will be measured before treatment (baseline) and then afterwards to see if the treatment had an effect

Bio-similar–Bio-similar drugs are medicines that are very similar in structure and function to other biologic drugs, such as targeted therapy or immunotherapy used to treat some diseases, including certain types of cancer.

Cardio-toxicity -During follow-up, there is a new beginning or deterioration of myocardial injury or ventricular function from baseline.

Effectiveness- the usefulness of treatment, changes in their life and body response of patients with HER2 positive on targeted therapy.

Experience – Whatever patients experience, how the targeted therapy makes them feel and whether they derive benefit from it. Considering how people feel following target therapy.

Response - Treatment response denotes the extent to which a patient improves, irrespectively of the presence or absence of symptom. Most respondents report positive and negative symptoms

Targeted therapy - Targeted therapy is a type of cancer treatment that targets proteins that control how cancer cells grow, divide, and spread.

ABBREVIATIONS AND ACRONYMS

ASCOCAP- American Society of Clinical Oncology and the College of American Pathologists

CTC – cancer treatment center

CTCAE – common terminology criteria for adverse events

ErbB- family of proteins containing four receptor tyrosine kinases, structurally related to the epidermal growth factor receptor.

ERC – Ethics and Research committee

GFD – ground floor ward D

HER 2- human epidermal growth factor receptor 2

HIC -high income countries

IARC – international agency for cancer care

IHC – immune histochemistry

IREC – institutional Research and Ethics Committee

ISH – In situ hybridization

KNH – Kenyatta National Hospital

LMIC – low and middle income countries

LVEF – left ventricular ejection fraction

NHIF – National health insurance Fund

PH20 – an enzyme that improves subcutaneous tissue permeability

QOL – quality of life

RSCL – Rotterm symptom checklist

SEM – symptoms experience model

SSA- sub–Saharan Africa

UON – University of Nairobi

WHO- World Health Organization

ABSTRACT

Among the four-breast cancer molecular subtypes, HER2-positive breast cancer accounts roughly to 20% of the occurrences, aggressive and has a poorer prognosis than other sub-classification. Trastuzumab has had a significant impact on the natural past of the breast cancer (HER2-positive). Though, there is scarcity of comprehensive data in Sub-Saharan African countries including Kenya. The study involved establishing effectiveness and describing the experiences of patients diagnosed with breast cancer (HER2- positive) and put on Herceptin. The effectiveness and treatment experiences of breast cancer patients on Herceptin was investigated in this research using qualitative and quantitative data collection methods. Quantitative and qualitative data was collected over a period of 6 weeks. This was done in CTC at Kenyatta National Hospital among clients with HER2 positive breast cancer.

A questionnaire based on patient-reported outcomes (PROs) was used to collect quantitative data from 44 randomly selected participants. In addition, 14 interviews with people who had been purposively selected from the study population. Quantitative data was analyzed using social sciences of statistical package (SPSS version 26.0). The findings of the univariate analysis were presented using proportions and frequency. To assess associations between categorical variables, bivariate analysis was done using Chi-square, with p-values of 0.05 or less considered significant. Text, frequency tables, and bar graphs was used to present descriptive statistics. Thematic analysis was used to analyze narrative data that had been clustered together in qualitative data analysis.The Kenya National Hospital-University of Nairobi Ethics and Research Committee (KNH/UON ERC) granted permission.

The highest percentage (48.8%) of participants were 50 years and above. Most (36.4%) were married, and majority had stopped working (77.3%). Many (88.1%) earned a monthly income below 10000Kshs, and most participants had primary education (52.3%) and all participants had NHIF cover (100%). Physical changes experienced by participants were tingling sensation and numbness (14.4%), joint aches (13.7%), fatigue (13.1%) and high blood pressure (11.4%). Psychological experience includes insomnia (27.0%), anxiety (25.8%), depression and cognitive impairment at (23.6%) respectively. Sociological changes experienced were financial burden (30.5%), family distress (28.4%), social isolation (21.1%) and marital strain at (20.0). Chi -square relation showed county of residence, income and education were statistically significant with level of understanding treatment regimen. In conclusion HER2 -positive patients on Herceptin experience physical, psychological, and sociological changes. It aggravates psychological and sociological changes due to high price, low level of understanding and low income.

CHAPTER 1

1.1 Background

Breast cancer in the world is the most prevailing cancer in women around, as well as the main cause of death related to cancer (Torre *et al.*, 2015). Cancer of the breast claimed 53,000 people's lives in 2015, accounting for 2.4 million of the 17.5 million were diagnosed worldwide. 44,000 (2%) of breast cancer cases were in men (Khanali *et al.*, 2021). In high-income countries (HICs) cancer of the breast is prevalent, although it is also growing increasingly in middle- and low-income countries (LMICs) (Jedy-Agba *et al.*, 2016). Mortality rates are substantially low in high income nations than in low-income countries. In 2018, age-standardized breast cancer death rates in LMICs were 14.9 per 100,000 women, compared to 11.6 in high-income nations (Bray *et al.*, 2018).

As per the International Agency for Cancer Research (IACR), Cancer of breast incidence in 2018 was predicted in Central Africa to range from 27 per 100,000 patients to 39 per 100,000 patients in Southern Africa (Pace and Shulman, 2020). While the prevalence of cancer of the breast appears to be less in Sub-Saharan Africa (SSA), there is poor survival from the disease generally in the zone, with high mortality (Jedy-Agba *et al.*, 2016). As a result of increase in population, living of unhealthy lifestyles and aging, there is anticipated rise of breast cancer cases in Africa by 2030 (Sylla and Wild, 2012). Despite other competing public health concerns, infrastructure, late staging, inadequate health care, and shortage of proper finance have all been associated to poor breast cancer patient survival in SSA (Pace and Shulman, 2016). Furthermore, in secluded SSA countries with excellent breast cancer treatment resources, unaffordability and inequity of services have been frequently stated (al-Haddad *et al.*, 2015). Late presentation and advanced stages at diagnosis have been common in some breast cancer instances, which may explain the higher fatality rates recorded (Bray *et al.*, 2018).

Diagnosis and treatment of cancer have a significant effect on a person's physical, psychological, and social well-being. During the diagnosis and treatment process, patients encounter various physical and emotional difficulties in their families, in their social lives and at workplace, and their lives are negatively affected (Williams, Jeanetta and James, 2016). There have been significant advancements in breast malignancy prevention, diagnostic, and management procedures in recent years. Patients' survival rates are improving, and advances in breast cancer treatment have a favorable impact on women (Choi *et al.*, 2014). Patients' perspectives of the disease and symptoms have shifted as a result of these advancements. Patients' lives are extended by treatment modalities for breast cancer, but they can also induce difficulties including infection, vomiting, and loss of appetite, discomfort, anemia, nausea, and tiredness. In adjusting to their changed situations, patients who have breast cancer diagnosed require much assistance (Hajian *et al.*, 2017). Patients with breast cancer may experience psychological distress as a result of their anxiety, fear, and uncertainties about their future lives as a result of the disease's known and unknown features (Bener *et al.*, 2017).

Patients with breast cancer can benefit from targeted therapy, which is a sort of treatment. It identifies and attacks specific types of cancer cells by using medications on other substances. Targeted therapy may be used in conjunction with other treatments such chemotherapy, radiation therapy or surgery or alone. The development of more effective medicines has significantly improved these patients' prognosis. Patients with cancer of the breast, adding (HER2) positive targeted drugs to standard treatments is linked to a major increase in overall survival (Mendes, 2015).

Trastuzumab is a targeted therapy medication that is often used to treat breast cancer patients. Patients who get trastuzumab are more likely to develop cardiotoxicity, which includes congestive heart failure or asymptomatic dysfunction of left systolic ventricular (Onitilo, Engel and Stankowski, 2014). Due to the growing number of available medications, the appropriate timing of HER2 positive targeted therapy through many lines of care is critical (Mendes, 2015). Late in the drug's development, congestive heart failure was discovered as a safety indication. However, when trastuzumab was given concurrently with anthracyclines, the rates of cardiac dysfunction were highest, and decreases in left ventricular ejection fraction was common occurrences asymptomatically (Jerusalem, Lancellotti and Kim, 2019).

In Africa, there is a scarcity of knowledge about the issues of cancer management and efforts to improve results. Even though North and South Africa have more resources to combat breast cancer, all nations have similar prognostic variables (Vanderpuye *et al.*, 2017). All candidates for trastuzumab treatment candidates must have a cardiac examination baseline assessments during treatment every three months, especially those who have previously exposed to anthracyclines or who are at risk for cardiac problems. Patients with breast cancer face a variety of challenges with their families as a result of their diagnosis. When the affected patients do not have a clear understanding of the severity and scope of their ailment, treatment begins soon after diagnosis. The tumor is frequently removed in the initial management. For individuals with breast cancer, this primary surgical therapy is a significant step forward in the disease's progression. Psychosocial care, in addition to patient therapy, is crucial, with afflicted patients' psychosocial support having a favorable effect on how they manage their diseases (Mutebi and Edge, 2014).

During research on the care and support of breast cancer patients, it was determined that the most essential thing they required was sufficient knowledge, followed by requirements for managing daily life and emotions (Attari *et al.*, 2021). During the initial interview, the areas that patients with breast cancer found difficult should be extensively assessed. However, it has been noticed that breast cancer survivors' needs are routinely overlooked (Chen *et al.*, 2020). Patients undergo several treatments, after breast cancer diagnosis is made. The influence of side effects on physical wellbeing and psychological health is the most visible experience of these periods (Palesh et al., 2018).

Overall survival has increased significantly as a result of improved timely breast cancer therapy. While there is evidence of adjuvant medicines' possible long-term impacts, there has been relatively less research on patients' personal experience of change before, during and after therapy (Braybrooke et al., 2015). Patients' identities,

fertility, self-esteem, sexual functioning, and vulnerability are all harmed as a result of cancer treatment. Patients report on an overwhelming experience with low and high moments as they progress through treatment (Campbell-Enns and Woodgate, 2017).

Few cancer studies have been conducted in Kenya, and none of them have particularly examined how patients with breast cancer respond to targeted therapy. In the study of determinants of breast cancer early detection for cues to expanded control and care, 75% of participants identified low socioeconomic status, lack of information on breast cancer and its screening, and a long distance to the nearest health facility as the three main health seeking barriers. The real-world experiences of women in western Kenya demonstrate that few women seek professional medical care until symptoms are advanced, low uptake, and with socioeconomic variables of health being linked in shaping individuals' and communities' behaviors related to seeking health care(Kisiangani *et al.*, 2018).

Breast cancer survivors in Kenya were the subjects of a qualitative study titled "In Their Own Words: Knowledge, Experiences, and Attitudes Regarding Breast Cancer Genetics." This was to learn about Kenyan breast cancer survivors' knowledge, attitudes, and experiences with genetics and heritable cancer (Lee *et al.*, 2018). Another study at KNH on biopsychosocial effects of chemotherapy among breast and cervical cancer showed biologic effects, psychological and sociological effects (Bosire, 2019)

According to (Heuser *et al.*, 2018), breast cancer patients reported problems with physical functioning, self and body image, work, returning to work, sexuality, relationships with others, and social security. The experiences of patients, their adapting techniques, and analyzing if there is change in support sources play a role in service planning (Purkayastha et al., 2017)

1.2 Problem statement

The development of molecular targeted therapy, such as monoclonal antibodies trastuzumab and pertzumab, has resulted from a greater understanding of breast cancer biology (Adeloye *et al.*, 2018). In addition to measures such as general survival, the toxicity of therapy and the experience during treatment are crucial factors in determining the addition of a new clinical standard. In clinical trials, treatment toxicity is routinely examined, whereas patient experience is less commonly assessed. Depending on the sub-class and stage at which breast cancer is diagnosed, all play a key role in disease care. As a result, it was critical to think about each unique patient with breast cancer and their treatment given the influence of breast cancer on people's identities, it was vital to investigate the experiences of those who are undergoing targeted therapy(Cobleigh *et al.*, 2020). Breast cancer treatment, particularly for individuals who have received adjuvant chemotherapy or radiation, can be exceedingly stressful. Targeted therapy is used to treat patients with breast cancer (HER2 positive).

Patients receiving targeted therapy on the other hand, report side effects, which can be life-threatening given that they can receive up to 18 rounds. 42 percent of patients with breast cancer in Kenya are in stage III, while 18 percent are in stage IV (Sayed *et al.*, 2014). On hormonal basis and HER2 positive status, all sub-classes of cancer of the breast have the capacity to spread (Ekpe *et al.*, 2019). Health statistics from where trastuzumab was used, the Kenyan survival rate for both early-stage and advanced-stage breast cancer (HER2-positive) was at 4 years and inadequate (Tuwei and Degu, 2021).

In this regard, it was critical to understand what people with HER2 positive breast cancer go through as the disease progresses and how best to treat them. The research goal was to establish and describe experiences of patients with HER2 positive breast cancer receiving targeted therapy at Kenyatta National Hospital.

1.3 Study justification

The mental, physical and social well-being of a person significantly impact breast cancer diagnosis and treatment (Hu *et al.*, 2021). During the diagnostic and treatment process, patients with cancer of the breast have a variety of physical and emotional obstacles in social, family and quality of life declines as a result (Hajian *et al.*, 2017).In recent years, targeted therapy has made great progress in the treatment of breast cancer (HER2 positive). As a result, improved patients' perspectives on the disease and their needs have altered. Treatment techniques for people with breast cancer (HER2 positive) has extended patients' lives, however they can also cause difficulties (Adeloye *et al.*, 2018).

Breast cancer patients try to cope with the bad events that occur throughout the disease's therapy. Chills, fever, puffiness of the face, headache, hot flashes, wheezing, weariness, diarrhea or constipation, loss of appetite, muscular and body discomfort are all expected clinical symptoms. Cough, heart disease, and other side effects of targeted therapy are also possible (Onitilo, Engel and Stankowski, 2014).Another factor that has been highlighted as benefiting breast cancer patients in coping with the disease is social support. During the diagnosis and treatment process 53% of cases of patients with breast cancer claim their needs not being met(Purkayastha *et al.*, 2017). Psychological, physical functioning, body image, relationship with spouse, sexuality, work, and social security were all difficulties for patients with breast cancer (Guedes et al., 2018). In Kenya breast cancer (HER2 positive) treatment, no known information on targeted therapy use. At Kenyatta National Hospital several patients use Herceptin as monotherapy or in combination with other treatment modalities. Many patients who are on Herceptin are treated as outpatient cases where they are given the treatment and they go back home.

What they go through in terms of experience back at home was unknown. As the diagnosis and treatment process progress, patients' experiences, coping mechanisms, and planning for the services, it was necessary to determine whether the sources of support have changed.

In this regard, it was critical to understand what people diagnosed with HER2 positive cancer of the breast go through during the progression of their illness and care. The goal of the research was to establish effectiveness

and report the experiences of patients with cancer of the breast (HER2 positive) being treated with targeted therapy.

The major goal was to contribute and provide a better profile on the experiences of patients on targeted therapy for cancer multi-disciplinary management team, resulting in improved care of patients with cancer of the breast (HER2 positive). The outcomes of the research may help to improve how multidisciplinary team provides care in tandem with the demands of breast cancer patients.

1.4 Research Questions

1. What was the relation between socio-demographic characteristics and treatment experience of breast cancer patients on targeted therapy at Cancer Treatment Center KNH?

2. What were the physical changes HER-2 positive breast cancer patients experience during treatment of targeted therapy at Cancer Treatment Center KNH?

3. How do HER2 positive breast cancer patients respond psychologically to targeted therapy at Cancer Treatment Center KNH?

4. What were the sociological changes experienced by HER-2 positive breast cancer patients on targeted therapy at Cancer Treatment Center KNH?

1.5 Broad Objective

To describe the effectiveness and treatment experiences of HER-2 positive breast cancer patients on targeted therapy at Cancer Treatment Center KNH.

1.6 Specific Objectives

1. To describe the relation between socio-demographic characteristics and treatment of HER-2 breast cancer patients on targeted therapy at Cancer Treatment Center KNH.

2. To identify the physical changes of HER2 positive breast cancer patients experience on targeted therapy at Cancer Treatment Center KNH.

3. To describe the psychological responses of HER-2 positive breast cancer patients on targeted therapy at Cancer Treatment Center KNH.

4. To identify the sociological changes experienced by HER-2 positive breast cancer patients on targeted therapy at Cancer Treatment Center KNH.

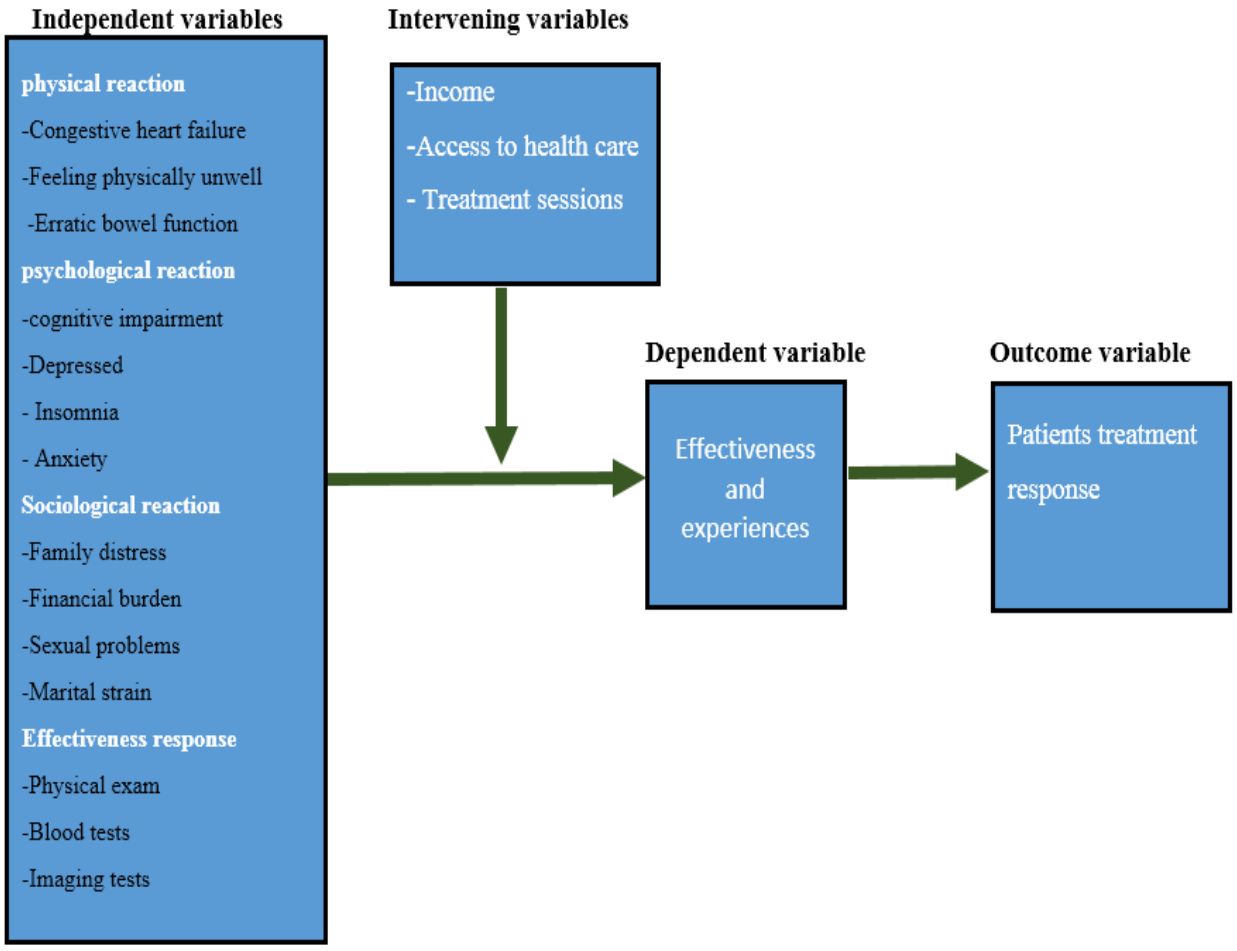
1.7 Hypothesis

There is no relationship between socio-demographic characteristics and treatment experiences of patients with breast cancer (HER2 positive) on Herceptin at CTC KNH

1.8 Conceptual framework

The research conceptual framework was built on theoretical framework in order to demonstrate relation between targeted therapy and patient experiences with breast cancer (HER2 positive). This framework seeks to explain the inter-relatedness of experiences of breast cancer (HER2 positive) patients and targeted therapy. This can be used to establish the patients` perceptions and actions taken when they perceive ill health. The outcome variable is based on the patient experience which moderate the health-seeking behavior. The independent variables are patient effective treatment response, physical reaction, psychological reaction, and sociological reaction, while the dependent variable is effectiveness and experiences. This is illustrated in figure below.

Fig.1 conceptual framework



1.9 Study Assumption

The study will be conducted in the hospital setting which is considered conducive for all respondents.

CHAPTER 2 - LITERATURE REVIEW

2.1 Introduction

The chapter provides an overview of the numerous scientific publications, reports, and books that the author studied during the research process. Hinari, PubMed, and Google Scholar were used to conduct the literature search. The words "experiences," "targeted therapy," and "breast cancer" were frequently utilized. Cancer of breast is by far the frequent cancer amongst women, accounting for 2 million (23 percent of all cancers cases) new in 2018 and ranking second generally (10.9 percent of cancers cases) (Bray *et al.*, 2018). Cancer is becoming the most common in both industrialized and developing countries. Women's mortality rates in Eastern Africa range from 19.3 per 100,000 to 89.7 per 100,000. In Western Europe, with low rates (low than 40 per 100,000) among developing countries and increasing rates (more than 80 per 100,000) in industrialized regions (excluding Japan)(Siegel, Miller and Jemal, 2016)

Cancer of the breast accounts for 23% of all female cancer incidences in Kenya (Sayed *et al.*, 2014). High fatality results from patients having late stage or advanced cancer (Bray *et al.*, 2018). Improving breast health care and breast cancer awareness in local communities is a vital first step in bettering breast cancer outcomes. Another crucial stage is to correctly diagnose and treat the patient. Mostly, the minimal data on cancer of the breast incidence available in Kenya is hospital-based and built-up areas (Sayed *et al.*, 2014)

The stage of breast cancer and the type of breast cancer, was an important factor in making decisions about treatment. Different types of drug treatment might be used, most women with breast cancer in stages I II, or III are treated with surgery, often followed by radiation therapy (Karunanithi *et al.*, 2018). Many patients also get some kind of systemic drug therapy. In general, the more the breast cancer has spread, the more treatment the patient will likely get. But treatment options are affected by multidisplinary team preferences and other information about breast cancer, such as: If the cancer cells have hormone receptors. That is, if the cancer is estrogen receptor (ER)-positive or progesterone receptor (PR)-positive, If the cancer cells have large amounts of the HER2 protein (that is, if the cancer is HER2-positive), How fast the cancer is growing (measured by grade), Overall health, and If the patient has gone through menopause or not(Mendes, 2015)

Most women with breast cancer in stages I, II, or III will get systemic therapy as part of their treatment. This might include: Chemotherapy, Hormone therapy (tamoxifen, an aromatase inhibitor, or one followed by the other), Targeted drugs, such as trastuzumab (Herceptin), pertuzumab or abemaciclib, Immunotherapy and Some combination. The types of drugs that might work best depend on the tumor’s hormone receptor status, HER2 status, and other factors (Metsälä *et al.*, 2022).

2.2 Targeted therapy

Human epidermal growth factor receptor 2 (HER) is a member of the ErbB family, which also includes the receptor tyrosine kinases HER1, 2, 3, and 4(Zhu and Verma, 2015). Signaling is activated by an external ligand like epidermal growth factor and is ligand dependent. The intracellular, transmembrane, and extracellular domains of the HER2 receptor regulate both cell growth and death (Mendes, 2015).

According to ((Wang and Xu, 2019), 18 to 20 percent of human breast tumors have overexpression of the HER2 gene as a result of gene amplification, which is linked to a more aggressive phenotype. The outcome of this disease has significantly improved as a result of the introduction of monoclonal antibodies (Di Modica, Tagliabue and Triulzi, 2017). The creation of potent HER2 targeted medications is seen as a significant advance in the treatment of breast cancer. A fully humanized monoclonal antibody against the extracellular domain called trastuzumab (Herceptin) has been approved for both adjuvant and metastatic treatment of Her2 positive breast cancer. Trastuzumab's mode of action involves suppression of HER2 extracellular domain cleavage and antibody-dependent cellular cytotoxicity (Daniels *et al.*, 2017)

All patients with HER2 positive breast cancer who are having adjuvant chemotherapy should be provided with one year of trastuzumab, considering disease features and patient preference. There is no denying that HER2 targeted therapy improves the prognosis for patients with HER2 metastatic breast cancer. A wide range of therapy options are now available for HER2 advanced breast cancer, which once had a terrible prognosis and has the longest median survival(Sapna *et al.*, 2020).

In the case of HER2 positive breast cancer, targeted medicines have become a genuine game changer with the least amount of added toxicity. They provide selected therapeutic alternatives. HER2 positive targeted therapy is a prime illustration of how translational research and utilizing specific traits of malignant tumors can effectively translate biological results to clinical use (Schramm *et al.*, 2015)

Targeted treatment is a sort of treatment modality that uses medicines or compounds to identify and attack exact cancer cells. Monoclonal antibodies are targeted medications that are used to treat breast cancer. There is minimal chance to damage Normal cells than radiation modality or chemotherapy. Monoclonal antibodies are laboratory made immune structure proteins that can stick to exact targeted cancer cells, potentially assisting tumor cells proliferation as a cancer cure. After that, the proteins can destroy cancer cells, halt them from growing, or stop them from spreading (Masoud and Pagès, 2017). Monoclonal antibody therapy example is trastuzumab, a monoclonal antibody that sends growth signals to breast cancer cells to block the effects of the (HER2)growth factor protein(Sapna *et al.*, 2020).

The introduction of targeted anti-HER2 medication has dramatically improved disease management in individuals with breast cancer (HER2 positive) (Wang and Xu, 2019).HER2 are transmembrane proteins that regulate cellular division and also play a role in breast cells repair. Breast cell proliferation and division can be uncontrolled if HER2 + is overexpressed (Iqbal and Iqbal, 2014). About 20% of all aggressive cancer of breast are (HER2) positive. Trastuzumab (Herceptin) is the first HER2 targeted therapy to be developed. Targeted

therapies are becoming more common in the first-line context and beyond (Wang and Xu, 2019).

2.3 Effectiveness and Response to targeted therapy

Cancer arises when a cell's DNA mutates or becomes defective. Targeted treatment drugs are designed to avoid normal cells and concentrate on certain targets. Some cancer cell mutations are detected on the cell surface, whereas others are found within the cells. These drugs might be able to:

- Disable the signals that allow cancer cells to proliferate.
- Once cancer cells have reached their target, prevent them from establishing new blood arteries that feed tumors.
- Stop producing hormone that promote tumor growth
- If a cell’s capacity to shut down is impaired, repair it

Prior to the development of HER2 targeted therapy, HER2 overexpression was linked to a worse prognosis regardless of other medical factors including stage, period, malignant tumor grade and particularly in patients who were not exposed to adjuvant treatment. The monoclonal antibody trastuzumab, in conjunction with chemotherapy and endocrine therapy, has considerably increased response rates and survival in HER2 targeted therapy (Miller and Schwartzberg, 2019).

In 2019, the food and drug administration authorized trastuzumab/hyaluronidase (Herceptin) a formulation for subcutaneous injection. Trastuzumab/hyaluronidase is administered as a gradual sub-cutaneous over 2-5 minutes. It is the drug of choice in patients with breast cancer (HER2 positive) early, as well as patients with advanced breast cancer the HER2 positive sub-class who are receiving chemotherapy (Wang and Xu, 2019). The effectiveness of targeted therapy is monitored through continuous hospital visits where physical exam, blood tests, and imaging are done.

2.4 Changes caused by Targeted Therapies

As the patients endure with a life- limiting illness, patients with incurable cancer face significant physical and mental challenges. These patients are not only dealing with the fact they have a terminal diagnosis, but they are also dealing with a high symptom burden and several challenging medical decisions (Braybrooke et al., 2015). Patients must decide if the benefits of treatment outweigh the high toxicity and unfavorable side effects of cancer treatment. Patients’ ability to make educated treatment decisions is influenced by how they cope with their disease (Hajian *et al.*, 2017)

A cancer diagnosis has psychological ramifications; at least one-third of cancer patients suffer from mental health disorders, and young women are more vulnerable (Campbell-Enns and Woodgate, 2017) Breast cancer is a major source of stress for patients, and many of them experience psychological issues such as anxiety, despair, fear of recurrence, and concerns about their family and future (Hu *et al.*, 2021). Physical and

psychological improvements in these patients attest to the importance of quality of life (Chen *et al.*, 2021). The way these patients cope with their situation may have an effect on overall quality of life (Bayati *et al.*, 2019)

Nonetheless, patients have large unmet needs for supporting care, primarily in the areas of knowledge and unfulfilled needs in their physical well-being and daily activities (Sayed *et al.*, 2019). It is critical to identify breast cancer patients' cancer related experiences and coping techniques in order to develop and appropriate target interventions for these patients in order to optimize health care (Wilson *et al.*, 2017)

Patients' coping techniques might influence their demand for information about their illness, self-efficacy and how they respond to the disease and its treatment (Hu et al., 2021). Adaptive adjustment strategies may be positive response that may help patients in certain situation, whereas maladaptive coping strategies refer to more negative responses. Patients with cancer may deal differently since their life-threatening illness causes them increased symptom burden and emotional distress (Bener et al., 2017).

Patients' views of their illness and treatment decisions may be influenced by the deployment of certain methods, which could have a long-term impact on their treatment course and, ultimately, their end-of-life outcomes. Breast cancer patients are vulnerable to a number of effects as a consequence of the impacts of malignancy diagnosis, treatment and care (Guedes *et al.*, 2018).

2.4.1 Physiologic changes

These impacts are a result of how the body works physiologically, referred to as the treatment's negative effects that patients may really identify and experience (Huang *et al.*, 2019). At therapeutic doses, targeted therapy can have side effects. Many patients typically have potentially significant reactions requiring prompt treatment. It is crucial to comprehend these side effects and how to manage them because they impact how well a target treatment is tolerated. Commonly experienced physical reactions in congestive heart failure, fatigue, nausea and vomiting.

2.4.1.1 Congestive heart failure

Targeted treatments have resulted in cardio-vascular toxicity in 116 of 159 individuals, or 73%. Most of these adverse reactions were brought on by the treatment-related development of high blood pressure or the deterioration of pre-existing hypertension. Treatment-related cardio-vascular toxicity has been identified and is now managed as part of standard cancer therapy (Agunbiade, Zaghlol and Barac, 2019).The development of targeted therapies, which block molecular pathways involved in oncogenesis and tumor growth, has improved the management of many cancers, including breast cancer. Despite the advantages of disease stability, toxicities, particularly cardiovascular toxicities, have become more and more apparent.

Breast cancer patients who test positive for the human epidermal growth factor receptor 2 (HER2 positive) are treated with targeted medicines like trastuzumab, which has significantly improved survival. However, left ventricular dysfunction has also been linked to trastuzumab. Since the early occurrences, the incidence of trastuzumab-induced heart failure has decreased, largely as a result of improved screening, careful monitoring of changes in left ventricular function, and avoiding the concomitant use of anthracyclines. Recent research

indicates that a critical factor in trastuzumab cardiotoxicity is ErbB2 suppression in cardiac myocytes(Jerusalem, Lancellotti and Kim, 2019). Trastuzumab and other HER2-targeted therapies are utilized in combination with immune checkpoint inhibitors, proteasome inhibitors, and vascular endothelial growth factor inhibitors as additional classes of highly effective medications for the treatment of solid tumors. But these have also been linked to cardiac toxicity, which can vary from a mildly asymptomatic drop in ejection fraction to myocarditis (Goldhar *et al.*, 2016).

2.4.1.2 Fatigue/feeling physically unwell

Fatigue is a state of low energy, weakness, and exhaustion (Dumas *et al.*, 2020). With prevalence estimates ranging from 25 percent to 99 percent, it is the most upsetting and prevalent symptom during breast cancer therapy (Noal *et al.*, 2016). Even though fatigue usually gets better after stopping breast cancer treatment, some people still have more persistent symptoms. In those who are affected, fatigue dramatically lowers daily functioning and quality of life (Xiao *et al.*, 2017). Fatigue is linked to somatic and psychosocial variables in people with breast cancer (Abrahams *et al.*, 2016)

The molecular mechanisms behind weariness point to immune activation as a factor in its development (Dumas *et al.*, 2020). A sensitive and trustworthy biomarker of systemic inflammation, C-reactive protein is simple to test in clinical practice. In breast cancer patients, elevated C-reactive protein levels are linked to fatigue. However, only a small number of prospective studies evaluating fatigue predictors before and throughout therapy have also considered fatigue into survivorship (Abrahams *et al.*, 2016).There is little information available on fatigue during and after targeted therapy for current breast cancer treatment. Fatigue impairs a patient's ability to respond to treatment, causes patients' anxiety, and may induce their depression (Xiao *et al.*, 2017)

2.4.1.3 Erratic bowel functions (Nausea and vomiting)

One of the most upsetting side effects of targeted therapy for breast cancer patients is treatment-induced nausea and vomiting, which can reduce treatment responsiveness and, consequently, decrease overall survival. The emetogenic potency of the specific cytotoxic drugs or regimens used, as well as a few patient-specific characteristics, determine how much nausea and vomiting a patient experience (Hosseini *et al.*, 2016). The adoption of appropriate antiemetic regimens to better control of nausea and vomiting has been made possible by advances in understanding of the pathophysiology of these conditions and the identification of risk factors (Cope, 2022). The majority of the regimens employed in this patient population are regarded as being mildly emetogenic, 60 to 90 percent of breast cancer patients' treatment regimens result in nausea and vomiting (Nies *et al.*, 2018). By using treatment recommendations, doctors can incorporate the most recent scientific findings into their clinical procedures. Most patients' nausea and vomiting could be avoided with the proper antiemetic regimen use the management of nausea and vomiting, however, continues to be a difficult task for the multidisciplinary team (Magalhães *et al.*, 2020).

2.4.1.5 Oral Mucosal Toxicities of Targeted Therapies

The most frequent dose-limiting complication seen is oral mucositis. It is distinguished by aphthous-like lesions that differ significantly from those brought on by chemo- and radiation. About 30% of patients treated with monotherapy experience these single or multiple well-circumscribed, round, superficial, painful ulcers, which are only found in the non-keratinized mucosa and occasionally surrounded by an erythematous associated stomatitis; 5% of these toxicities are grade 3; additionally, although most lesions are self-limited, they can be extremely painful(Vigarios, Epstein and Sibaud, 2017).

2.4.1.6 Nail Toxicities of Targeted Therapies

Targeted therapies have the potential to harm the folds of the nails, with paronychia and periungual pyogenic granuloma being separate from chemotherapy-induced lesions, which are typically found in the nail matrix or nail plate. Clinicians must be well knowledgeable of the variations between chemotherapy and targeted therapy-associated nail toxicities because some patients may receive both treatment modalities concurrently (Huynh Dagher *et al.*, 2021). After several weeks or months of treatment, typical lesions, which primarily affect toenails or thumbs, slowly enlarge. Typically, damage begins with the onset of periungual inflammatory paronychia and progresses to an overgrowth of friable granulation tissue on the lateral and/or proximal nail folds, imitating ingrown nails (Siegel, Miller and Jemal, 2016). Even while these lesions are typically not severe, they can nonetheless be quite crippling for the patient, especially if they last for a long time. Aggressive measures must therefore be taken to assist patients in coping with these side effects.

2.4.1.7 Liver problems

Tucatinib, lapatinib, and neratinib can all harm the liver. During treatment, blood tests should be performed to assess liver function (Sodergren *et al.*, 2016). The multidisciplinary team will evaluate any potential indicators or symptoms of liver issues, such as hives, yellowing of the skin or the whites of the eyes, black urine, or pain in the right upper abdomen (Liu *et al.*, 2017).

2.4.1.8 Lung disease

Some female patients using trastuzumab deruxtecan may develop significant lung illness. In rare circumstances, this could potentially be fatal (Hackshaw *et al.*, 2020). It's crucial to evaluate symptoms including fever, wheezing, breathing difficulties, and coughing. Acute coughs typically accompany a cold or the flu; they begin suddenly and might linger for two to three weeks. Smoking, asthma, and allergies are possible causes of chronic coughs that persist longer than three weeks (Sodergren *et al.*, 2016).

2.4.2 Psychological reactions

A typical side effect of the detection and treatment of breast cancer is psychological disorders (Zdenkowski *et al.*, 2016) and energy, sleep, mood, and cognitive problems are included. These symptoms seriously impair patients' quality of life and may recur years after treatment (Runowicz *et al.*, 2016). Patients want aid in managing their symptoms as well as precise information about the likelihood of these side effects. The most experienced effects in breast cancer include sleep disturbance (insomnia), depression, and cognitive impairment.

2.4.2.1 Insomnia

A definition of insomnia is having trouble falling asleep, staying asleep, or having non-restorative sleep. It is a clinical syndrome marked by complaints that persist for at least a month and result in clinically substantial distress or impairment in crucial domains of functioning. Sleep issues have been recorded in patients with both early-stage and metastatic cancer, as well as before, during, and after cancer therapy (Savard *et al.*, 2015). According to recent study, breast cancer patients and survivors frequently report having trouble falling asleep(Karunanithi *et al.*, 2018). Depending on the technique of measurement, the prevalence of sleep disturbances ranges from 20% to 70%. In the largest study to date, which included 300 breast cancer survivors, 51 percent reported having sleep issues and 19 percent had insomnia (Bean *et al.*, 2021). The diagnosis and treatment of cancer as a triggering factor for sleep disturbance is supported by the fact that 50% of the women indicate that breast cancer either started or worsened their sleep issues (Savard *et al.*, 2015).

2.4.2.2 Depression

Depending on the sample, in particular the definition of depression and the technique of assessment, the prevalence of depression in women with breast cancer ranges from 1.5 percent to 50 percent. The behavioral adverse effect of cancer treatment with the most research is depression (Asif *et al.*, 2016). 20 to 30 percent of women report having increased depression symptoms, according to most of research, even though serious depressive illness may be much less common. A clinical syndrome called major depressive disorder produces a severe impairment in daily functioning and lasts for at least two weeks. The first six months following a cancer diagnosis are often when psychological distress and depression symptoms are at their peak. Initially adjusting to the shock of the diagnosis, women gradually deteriorate as the acute side effects of cancer treatment take hold (Ali, 2021).

Depression has a negative impact on every aspect of quality of life for cancer patients and is linked to lower medical adherence and more obstacles to receiving cancer treatment. A lot of people are concerned about the negative effects of treatments, including not comprehending the suggested treatments (Tsaras *et al.*, 2018). There is evidence that depressed cancer patients have higher morbidity and mortality rates (Ali, 2021). Depression should therefore be a top priority for early detection and treatment.

2.4.2.3 Cognitive impairment

Patients with breast cancer who get targeted therapy frequently report cognitive problems both during and after treatment (Dumas *et al.*, 2020). Multiple cognitive domains, including language, verbal and nonverbal memory, spatial ability, and motor function, show cognitive abnormalities brought on by targeted therapy, pointing to a pattern of generalized cognitive impairment. Deficits seem to be especially noticeable in women receiving high-dose treatment (García-Sánchez, Torregrosa and Cauli, 2021).

2.4.2.4 Emotional outburst/anxiety

Emotional distress is the "sixth vital sign" in the treatment of cancer Breast cancer patients' emotional discomfort is a significant result, and when it is severe, it has been linked to lower treatment compliance (Martin *et al.*, 2017). As a result, the American Society of Clinical Oncology (ASCO) has encouraged improved access to groups and resources that provide support as well as screening for emotional distress in general and anxiety and depression in particular (Dumas *et al.*, 2020). However, emotion experience doesn't start and stop with emotion generation because our affective experiences also involve complimentary emotion regulation (Palesh *et al.*, 2018). The mechanisms of emotion creation and control, when combined, constitute a crucial component of the individual's subjective experience with cancer.

2.4.3. Sociological reactions

Cancer and its treatment create a sociological change risk, as do patient-related vulnerabilities. The patient's stated symptoms should be addressed with a complete symptom-targeted evaluation, according to management recommendations (Dumas *et al.*, 2020).

2.4.3.1Family distress

Depending on the situation, a patient may have varied responsibilities within the family. These activities and responsibilities can be difficult to carry out while undergoing treatment (surgery, targeted therapy, and radiation therapy) (Alexander *et al.*, 2019). Due to the treatment and its adverse effects, the patient must deal with a variety of problems, including physical deformity, difficulties with intimacy, and the ability to look after family members (Karunanithi *et al.*, 2018). This causes psychological disturbance; anxiety and depression are recognized in 38% of cancer patients, along with distress, adjustment disorders, delirium, and post-traumatic stress disorder (Alexander *et al.*, 2019).

The demographic and psychosocial aspects of cancer in the context of India have received substantial attention in the literature. The study looked at and investigated the financial burden and coping mechanisms, involvement and support, and role in decision-making by the immediate family members, including the psychosocial aspects of patient's role within family, in patients diagnosed with breast cancer over the full course of treatment (Khoshnazar *et al.*, 2016).

2.4.3.2 Social isolation

Due to false information and beliefs, both the diagnosis and treatment of cancer are subject to significant societal stigma (Agatha Ogunkorode *et al.*, 2021). Due to the negative effects and stigma associated with cancer, they could also isolate themselves. Due to low self-esteem brought on by a changed body image and prolonged illness brought on by the adverse effects of targeted therapy, the person may also isolate themselves from their family and friends. The consequences of targeted therapy cause the person's regular work routine to be disrupted because they typically take extensive sick breaks and undergo multiple reviews (Maree and Mulonda, 2015)

2.4.3.3 Financial burden

The cost of targeted therapy for cancer treatment is very high, this implies that even patients with health insurance must supplement their payments to cover the expense of treatment because other insurers will not pay for everything. Patients and their families are financially burdened by this expensive and extended treatment, which may also cause family members' social stress (Kim *et al.*, 2015). This can significantly affect the standard of living, and some patients have even been abandoned by their partners and families. At Kenyatta National Hospital, targeted therapy in Kenya costs between 50,000 and 100,000 per cycle. This is significantly more than what most patients can spend for only treatment. They rely on the National Hospital Insurance Fund (NHIF) to help them pay for medical care. People who are not covered by the program must pay cash, which may cause social tension (Bosire, 2019)

2.4.3.4 Marital strain/Sexual effect

Sexuality may be negatively impacted by breast cancer therapies as well as the disease itself. Some although they are common, not everyone may experience them. Healthy relationships and individual wellbeing are influenced by love, affect ion, and sexual intimacy(Hinyard *et al.*, 2017). Stress and relationship disruption can result from sexual dysfunction. Targeted therapy has been linked to changes in sexual performance and sexual function (Cathcart-Rake *et al.*, 2021). Sexual orientation may change as a result of numerous physical and psychological side effects of cancer therapy ,Changes in body image can have a significant impact on how a person perceives their own sexual identity (Guedes *et al.*, 2018).

2.5 Theoretical framework

2.5.1 Theoretical model: Roy's adaptation model (RAM)

RAM theoretical framework developed in late 1960s, will be used to guide the study. RAM defined as the inmate and acquired coping processes as two sub systems and guide the assessment of individual's adaptation(Ursavaş, Karayurt and İşeri, 2014).

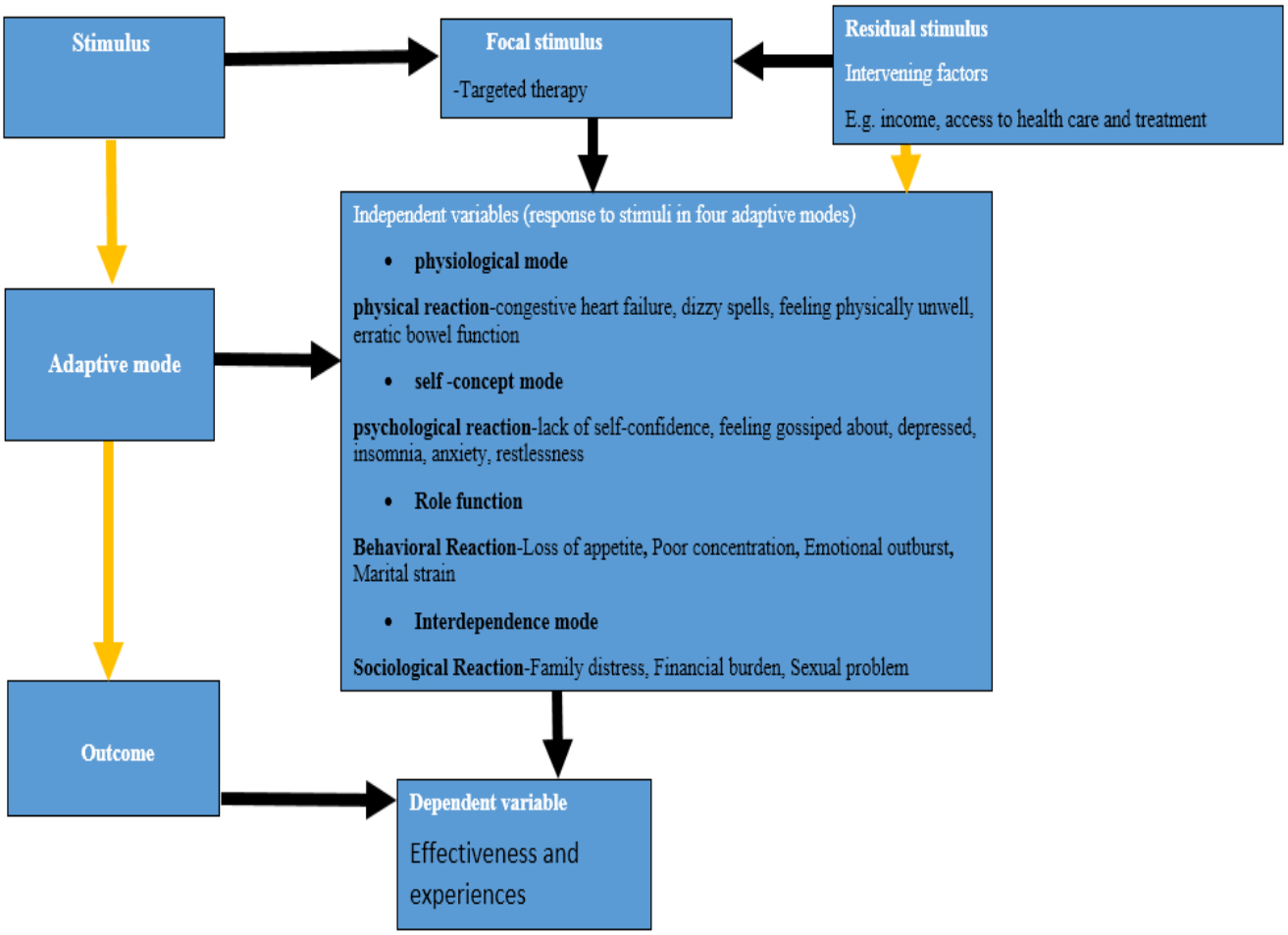
The metaparadigm concepts of Roy Adaptation Model are person, environment, health and nursing (Metsälä et al., 2022). The Roy Adaptation Model sees the person as a biopsychosocial being in continuous interaction with a changing environment. The environment includes focal, contextual and residual stimuli. A focal stimulus is the confrontation with one's internal and external environment. The individual immediately resists these internal and external stimuli. Nurses aim to manage the focal stimulus first, and then the contextual stimuli (Ursavaş, Karayurt and İşeri, 2014). The contextual stimuli are those other stimuli that contribute to the focal stimuli and affect the current situation (Metsälä et al., 2022). The residual stimuli are closed factors affecting the current situation. These are beliefs, behaviors and personal experiences. They originate from the past and affect the response to treatment therefore identifying the patient experience during targeted therapy will enable provide a better care to individuals with HER-2 positive breast cancer.

2.7.2 Application of Roy's model

For this research, the focal stimulus was the targeted therapy, the contextual stimulus which was known to affect the individual. It refers to all other stimuli of the human systems' internal and external environment that can be identified as having negative or positive effect on the current situation. This study was aimed to find out the experiences and effectiveness of treatment of targeted therapy to four adaptive modes.

Lack of adaptation in the physiologic mode would exhibit the physical reactions. Self-concept, role function and the interdependent mode would exhibit the psychological and sociological reactions of targeted therapy. The adaptive mode could be positive outcome leading to a positive treatment response or negative outcome leading to negative treatment response.

Fig.2 Theoretical framework



CHAPTER THREE - STUDY METHODS

3.1 Study Area

The research took place at Kenyatta National Hospital, which was founded in 1901. KNH is one of Nairobi County's largest National Referral and Teaching Hospitals, 3.5 kilometers west of the central business district. KNH receives oncology patients from all over the country and east Africa where it provides specialized care for oncology patients, especially chemotherapy and radiotherapy.

This study was conducted in the Cancer Treatment Center (CTC) located on the second floor of the old hospital wing of KNH. An average of 2300 patients are attended to at CTC per month. On average about 50 patients of the 150 diagnosed with cancer of the breast receive targeted therapy at the CTC (source: cancer treatment center daily patient attendance record, October 2018 to January 2019). Patients scheduled for targeted therapy come to the clinic every 3weeks for 18 cycles. CTC being a multidisciplinary department is the most appropriate because the majority of patients diagnosed with cancer receive their treatment as outpatients.

3.2 Study Design

This study was carried out using a descriptive cross sectional study design. Quantitative and qualitative data was collected for a period of 4 weeks to find out effectiveness and treatment experiences of HER2 positive breast cancer patients on targeted therapy (Herceptin). Quantitative data was collected using questionnaires while qualitative data was collected through interviews.

3.3 Study population

Patients with HER 2 positive breast cancer who visited the clinic and received care at Kenyatta National Hospital in 2022, regardless of their stage of disease, and who were undertaking targeted therapy treatment method, were approached when they returned for a follow-up visit and subsequent treatment.

3.4 Selection of participants

The following criteria was utilized to choose study participants.

3.4.1 Inclusion Criteria

Adults aged 18 and above

Consenting patients

Patients on targeted therapy

Patients on combination therapy (targeted therapy and chemotherapy)

Patients who have received more than 2 doses of targeted therapy

Patients with a diagnosis of HER2 positive breast cancer.

3.4.2 Exclusion criteria

Patients from other health facilities

Patients with other subtypes of breast cancers

Patients who have received more than 11 cycles of targeted therapy.

3.5 Determination of sample size

3.5.1 Quantitative study

The Fischer formula was used to compute the sample size determination technique that produced an illustrative sample from the proportion. For population sizes smaller than 10,000, the following formula was used to get the sample size:

$$n = \frac{z^2 p}{d^2}$$

Where:

n=the desired sample size (if the study population is greater than 10,000).

z=the normal standard deviation at the desired confidence interval level taken to be 1.96 which corresponds to the 95% confidence interval

p=the proportion in the target population estimated to have breast cancer (HER2+), the characteristics being measured is not known in the hospital. Since p is not known, it was estimated to be 50% (Ebrahim, 2018)

q = the proportion in the target population estimated not to have the characteristics being measured (1-p).

d = Standard error at 95% confidence limit (0.05%)

Therefore $= \frac{(1.96)^2 (0.5) (0.5)}{(0.05)^2}$

n= 384 respondents

If the target population is less than 10,000, the alternative formula below is applied.

$$nf = \frac{n}{1+n/N}$$

Where:

nf =the desired sample size (when the population is less than 10,000)

n= the desired sample size (when the population is more than 10,000)

N= the estimated population size within the period of study which is approximately 50.

The above can be substituted as follows:

Therefore, $nf = \frac{384}{1+384/50}$

$=384/8.68$

= 44 respondents with breast cancer (HER2 positive)

3.5.2 Qualitative study

The sample size was determined by data saturation which was observed after interviews.

3.6 Sampling procedure

Simple sampling procedure was used where every participant was approached to participate. The researcher identified participants as they are registered on arrival on the day of targeted therapy. The first patient to register was used as a starting point. The eligible participants were approached, and the purpose of the study was explained to them individually. Those who agreed to participate signed a consent form and given a questionnaire to complete, and for those who were no able to fill were guided by a research assistant.

Purposive sampling technique was used to select participants for the qualitative data collection. This technique was used because the study population have similar experiences though they may have different characteristics. A nurse working in the cancer treatment center was asked to select participants for an interview because of the interactions with the participants. The nurse was able to select participants with different characteristics found in the population which included patients with HER2 positive breast cancer, age, level of education and insurance cover. The sample size was achieved through saturation.

3.7 Recruitment and consenting procedure

As soon as approval to conduct the study was obtained, a meeting was scheduled with the department nursing service manager to discuss the researcher`s intention to conduct the study. With permission of the hospital administration, a meeting with the nurses in charge of various CTC followed to discuss the study participants' eligibility criteria and date of commencement. The department provided a register of all patients with HER2 positive breast cancer. This facilitated the identification of prospective respondents using simple sampling. The researcher approached the participants and requested them willingly to participate in the study. Additional information was provided as per the consent document attached.

3.8 Collection of data instruments and procedures

3.8.1 Data collection instruments

To obtain qualitative and quantitative data, the researcher employed self-administered questionnaires containing open and closed-ended questions. The questionnaire were divided into two portions, of which took 15- 20 minutes to complete; The first section collected information on marital status, age, work status, sex, and education level, work status, while the second section focused on the patients' symptoms as measured by a modified Rotterdam Symptom checklist (RSCL). RSCL was created as a tool to track cancer patients' symptoms as they progressed through treatment and into survivorship. Validity and reliability of the tool has been tested before use in many cancers related research (Pelayo-Alvarez, Perez-Hoyos and Agra-Varela, 2013). The English version of the tool was used and translated into Kiswahili, for the respondents who could not read English or Swahili the questionnaire was administered by the researcher.

3.8.2 Data quality control assurance

To ensure data quality, one-day training research assistants by the principal researcher on how to administer the questionnaire to ensure accuracy and consistent data was collected. The research assistants participated in the pre-test in order to familiarize themselves with the questions in the data collection tool. Credibility was ensured by researcher being present during the interview and taking notes

3.8.3 Pre-Testing the study instrument

Pre-testing the questionnaire was done using 5 percent of the study respondents attending cancer treatment center at KNH. The purpose of the pretest was to ensure the questions meet objectives, to familiarize with the study questions and ensure a uniform understanding of the questions. Adjustments was done to the data collection tool after the pretest. The outcome of a pretest was to help in standardizing the questionnaire. All ethical procedures were followed during the pre-testing of the tool.

3.8.4 Collection of data procedures

3.8.4.1 Qualitative data

Qualitative data was collected through interviews with individual patients who had given consent to participate. The interview was held in consultation room 2 and with the help of research assistants, who helped record the

interview. Using a guided objective that is the symptoms experienced by patients and how targeted therapy has affected them. The interview lasted around 20-30 minutes. The patients were also allowed to add any information relevant. Thematic analysis was used to analyze narrative data that had been clustered together in qualitative data analysis. GFC was used for pre-testing.

3.8.4.2 Quantitative data

Quantitative data was collected from 44 randomly selected individuals using a questionnaire based on patient-reported outcomes (PROs) and patients file was reviewed and physical exam assessment, blood tests, and imaging information will be extracted for the last six months.

The social sciences of statistical package were used to analyze quantitative information (SPSS version 26.0). The findings of the univariate analysis were presented using frequency and proportions. To assess associations between categorical variables, bivariate analysis was done using Chi-square method, with p-value of 0.05 or less considered important. Messages, frequency tables, and bar graphs were used to present descriptive statistics. The questionnaires were serialized once finished to ensure the respondents' anonymity.

3.9 Management and analysis of data

All data that was collected from patients file and in the questionnaire was gathered in a research file and stored on the personal computer of the principal investigator with limited access to the research team. To maintain confidentiality to all, the identification information was removed and replaced with a code to represent the individual respondent.

The Statistical Package for Social Science (SPSS) software package was used to code, check for correctness, and process the data. Descriptive statistics was used to determine how patients understood the meaning of targeted therapy. Quantitative data was analyzed using statistical measures of central tendency. Categorical data was be exposed to inferential statistics using Chi-square test to establish effectiveness and treatment experience of breast cancer (HER2 positive) clients on targeted treatment at Kenyatta National Hospital and P values of < 0.05 significant. Then the data was presented in frequency tables, bar graphs, and pie charts to show dispersion or distribution of relevant factors.

Qualitative data was collected during the interview with audio recorder. The moderator used a semi-structured guide of questions to elicit verbal responses from participants prepared based on the study objectives. On average the interview took 20-30 minutes. Before the information was analyzed, the researcher transcribed all interview. The researcher created Microsoft word files for interviews. All files were protected by setting a password. The researcher used phenomenological study design that described the essence of a phenomenon by exploring it from the perspective of those who had experienced it. The interview was analyzed thematically. For thematic analysis, the researcher used Braun and Clarke (2006) step by step guidelines. The author used the word guidelines to highlight the flexibility of this qualitative analytic method. These guidelines were 1)

familiarizing with data, 2) coding data, 3) generating initial themes, 4) reviewing themes, 5) defining and naming themes and 6) writing report.

Characteristics	**Frequency(n)**	**Percentage (%)**
Age (18-40,41- 60,60 and above)		
Marital status (single, married, separated, widowed or divorced)		
Education (no education, high school or less, college/ university)		
Income (< Kshs10000,10000-50000,50000 and above)		
Employment (student, employed, unemployed)		
Insurance cover (No insurance cover, NHIF, others)		
Place of residence (rural, urban)		
Time since treatment (<3 months,3-6 months,6 months – 1 year, 1 year and above		
General physical response (poor, fair, good)		
General psychological response (poor, fair, good)		
General sociological response (poor, fair, good)		

Table1: Dummy table of patient's characteristics

3.10 Study Limitation

The responses were confined to patients who had HER2 positive cancer of the breast at the time of the trial. The research may not be exhaustive of the targeted therapy in Kenya. However, the researcher ensured that the questionnaire was valid and reliable in data collection. Limited resources in terms of available time and finances. With more resources available other hospitals would be included in the study.

3.11 Ethical consideration

The study was carried out with the approval of the KNH-UON Ethical and Research Committee (ERC). After approval, I obtained permission from the Chief Executive Officer KNH to carry out the study. Before signing consent, participants were informed about the study's objective and advantages, the confidentiality of the information that was acquired, and the study's volunteer foundation. Participants were not forced to participate

in any way, and those who refused did not face any negative consequences.

Participants were identified using numbers during the interview. The researcher reassured the participants that the risks were minimal, and that if any discomfort was caused by some of the questions during the interview, the researcher would respond quickly to help. Participants were informed of no financial or direct benefit, but the research could be used to improve on the care provided during the process of targeted therapy.

Autonomy: The researcher reassured the participants that the risks were minimal, and that if any discomfort is caused by some of the questions during the interview, the researcher would respond quickly to help.

Privacy and confidentiality: All respondents were assured of confidentiality from the beginning of the interview. Names of respondents were not recorded instead they were given codes. The respondents` information was not shared with anyone and the results were presented and discussed without revealing the identities of the respondents. A suitable place for the interview at the hospital was selected to maintain privacy.

Beneficence: No incentive or individual payment was given to those who participated in the study. Results of the study was to contribute to policy development towards better management of patients with breast cancer.

Risks: The research were approved to ensure that it doesn't predispose patients to harm with adherence to ethical conduct as stipulated by institutional research and ethics committee (IREC). Information was taken using self-administered questionnaires thus minimal risk to the respondent. In case a respondent felt psychological or social discomfort, they were allowed to stop and get psychological care.

Justice: Exclusion and inclusion criteria, as well as simple sampling method, was used to select respondents fairly.

3.12 Dissemination plan

Study findings was presented in a report to the cancer treatment center and made available to the Department of Nursing at the University of Nairobi. This is where various stakeholders and policymakers in the country's health sector can access the research.

CHAPTER 4: RESULTS

4.1 Introduction

This study focuses on describing the effectiveness and treatment experience of HER- 2 positive breast cancer patients on targeted therapy at the cancer treatment center KNH. This section reports on the findings with regard to the study objectives. A total of 44 participants participated and a 100% response rate was achieved. All questionnaires given to participants were returned. This achievement was possible because the questionnaires were mainly researcher administered. Purposive sampling was conducted, and 14 participants were interviewed 14 of which was the point of saturation. Patients over the age of 18 who were HER-2positive treated for breast cancer at Kenyatta National hospital and were able to provide in-depth information on the research questions comprised the sample of this study. Of the breast cancer patients, those who were known to have other subtypes of breast cancer were excluded from the study. The data collection was based on the principles of saturation (Yıldırım ve Şimşek 2006) and the Fischer formula. The final sample comprised 14 interviews and 44 questionnaires that HER-2-positive breast cancer patients filled in their treatment period. The results are organized according to the study objective. Descriptive statistics are presented in the form of tables, bar graphs, and pie charts. Inferential statistics where Chi-square analysis to check for the association between socio-demographic factors and treatment experience.

4.2 Socio-demographic characteristics

The table below shows the description of the socio-demographic characteristics of the participants in the study. Many respondents came from Kiambu (18.2 %), 36.4% were married, and many (48.8%) of the participants were aged above 50 years. All the participants had an NHIF card at (100%), but it was unable to cater for treatment 18 sessions. Very few (25.0) had formal employment and many of the participants had a monthly income of below 10,000kshs but the majority (77.3%) had stopped working and most of the participants had primary education (52.3%).

Table 2: Socio-demographic characteristics

Socio-demographic characteristics		Frequency	Percentage
County of residence	Kiambu	8	18.2
	Nairobi	7	15.9
	Meru	6	13.6
	Kirinyaga	6	13.6
	Murang'a	5	11.4
	Makueni	4	9.1
	Kitui	3	6.8
	Machakos	2	4.5
	Nyandarua	2	4.5
	Embu	1	2.3
Marital status	Married	16	36.4
	Divorced	12	27.3
	Single	8	18.2
	Widow	8	18.2
Career	Housewife	11	25.0
	Casual laborer	9	20.5
	Business	8	18.2
	Farmer	8	18.2
	Retired	4	9.1
	Teacher	3	6.8
	Cook	1	2.3
Working status	No	34	77.3
	Yes	10	22.7
Owing an NHIF card	Yes	44	100.0
NHIF card being able to cater for the cost of treatment	No	27	62.8
	Yes	16	37.2
Income	Less than 10000	37	88.1
	10000 - 50000	5	11.9
Education level	Primary	23	52.3
	Secondary	15	34.1
	College	6	13.6
Age recorded	Above 50	21	48.8
	41_50	14	32.6
	31_40	6	14.0
	30 and less	2	4.7

4.3 Socio-demographic characteristics of interview participants

A total of 14 participants were interviewed. Those participants were identified using abbreviation and numbers as shown below

Table 3: Socio-demographic characteristics of interview participants

Participants	Age	Gender	Marital status	Occupation	Herceptin cycle
001	43	Female	Married	Business	12
002	24	Female	Single	Student	2
003	51	Female	Separated	Farmer	8
004	59	Female	Widow	Retired teacher	11
005	44	Female	Married	Casual laborer	4
006	55	Female	Separated	Business	15
007	60	Female	Widow	Farmer	10
008	48	Female	Separated	Business	4
009	39	Female	Married	Housewife	7
010	52	Female	Widow	Farmer	5
011	44	Female	Married	Business	9
012	36	Female	Married	Casual laborer	3
013	54	Female	Separated	Business	9
014	62	Female	Widow	Retired teacher	8

4.4 Relation between socio-demographic characteristics and treatment experience of breast cancer patients on targeted therapy at Cancer Treatment Center KNH.

Respondents came majorly from 10 counties with the highest representation being Kiambu County. The majority of the respondents from Machakos (100%), Nairobi (42.9%), and Nyandarua (50.0%) stated that they understood most of the treatment regimen. The relation between the county of residence and level of understanding is statistically significant (p-value=0.025). The majority of the respondents irrespective of marital status stated that they do not understand the treatment regimen. The relation between marital status and level of understanding is not statistically significant (p-value=0.228). The majority of the respondents, irrespective of NHIF card status, stated that they do not understand the treatment regimen. The relation between ownership of the NHIF card and the level of understanding of the treatment regimen is not statistically significant (p-value=0.228). The majority of the respondents who earn less than 10000 stated that they do not understand most of the treatment regimen (67.7%). Many respondents who earn between 10000 and 50,000 did understand the type of treatment they are receiving and the schedule. The relation between income and level of understanding is statistically significant (p-value=0.007). The majority of the respondents with primary education level (100%), stated that they needed help understanding most of the treatment regimen. The majority of respondents with college education did understand the type of treatment they are received and the schedule. The relation

between the level of education and level of understanding is statistically significant (p-value=0.001). The majority of the respondents with of age 31-40 years and those above 50 years stated that they do not understand the treatment regimen (66.7% and 57.1) respectively. The relation between age and level of understanding is not statistically significant (p-value=0.870).

Table 4: Level of understanding on the type of treatment receiving and schedule

Socio- demographic		**Level of understanding on the type of treatment receiving and schedule**			**N**	**χ^2 (p-value)**
		I don't understand at all	**I am still a little confused**	**I understand most of it**		
County of residence	Machakos	0	0	100	2	31.543 (0.025)
	Kitui	33.3	66.7	0	3	
	Meru	50	50	0	6	
	Kirinyaga	83.3	0	16.7	6	
	Nairobi	42.9	14.3	42.9	7	
	Kiambu	62.5	37.5	0	8	
	Makueni	100	0	0	4	
	Murang'a	80	20	0	5	
	Embu	100	0	0	1	
	Nyandarua	0	50	50	2	
Marital status	Single	37.5	25	37.5	8	8.137 (0.228)
	Married	62.5	18.8	18.8	16	
	Divorced	50	41.7	8.3	12	
	Widow	87.5	12.5	0	8	
NHIF card being able to cater for cost of treatment	Yes	62.5	25	12.5	16	0.310 (0.856)
	No	55.6	25.9	18.5	27	
Income	Less than 10000	67.6	24.3	8.1	37	9.947 (0.007)
	10000 - 50000	20	20	60	5	
Education level	Primary	100	0	0	23	51.138 (≤0.001)
	Secondary	20	66.7	13.3	15	
	College	0	16.7	83.3	6	
Age recorded	30 and less	50	0	50	2	2.482 (0.870)
	31_40	66.7	16.7	16.7	6	
	41_50	64.3	21.4	14.3	14	
	Above 50	57.1	28.6	14.3	21	

4.5 Physical changes of HER2 positive breast cancer patients experience on targeted therapy at Cancer Treatment Center KNH.

4.5.1 Physical examination

All patients on Herceptin underwent a physical examination to assess if they are fit to receive treatment and assess progress before the administration of Herceptin. Breast assessment for appearance, dimpling, discharge, and lymph node involvement. The information noted from the patient's file on physical exam showed remarkable improvement from those who had reported being in pain, discharge from a breast wound, and weakness in the affected arm. Interview conducted many participants reported improvement in their general condition including reduced breast pain, reduction in breast mass, discharge, and wound healing. "*Since I started using Herceptin, I have seen great improvement, my left breast that was swollen has reduced, minimal pain my breast wound is now dry and healing well" (010)*

4.5.2 Blood tests (laboratory tests)

Patients on Herceptin need their blood sample taken prior to treatment including complete blood count, urea electrolyte and creatinine. The majority of the participants had acceptable laboratory results that enabled them to continue with the Herceptin treatment. Neutrophils are considered the most important laboratory value and (45%) of participants had acceptable results as below. Neutrophils range 2500 – 7000 (30-75%)

Neutrophils levels (N=44)	Frequency (N=44)	Percentage (%)
Below 2500	20	45.4
2500-4500	15	34.1
4500 - 6500	7	15.9
Above 6500	2	4.5

4.5.3 Imaging test

Patients on Herceptin require to undergo imaging tests, especially echocardiogram to monitor cardiac toxicity after every 3 months. Many participants with LVEF (biventricular ejection) (40.9%) had good biventricular systolic and diastolic functions.

4.5.4 Physical changes since the introduction of Herceptin

Most of the respondents stated that they had tingling sensations and numbness (14.9%), followed by those who stated that they have joint aches (13.7).

Table 5: Physical changes since the introduction of Herceptin

Physical changes	Frequency	Percentage
Tingling sensation and numbness	26	14.9
Joint aches	24	13.7
Fatigue	23	13.1
High blood pressure	20	11.4
Lack of appetite	18	10.3
Nausea and vomiting	17	9.7
Breathing problem	16	9.1
Mouth ulcers	16	9.1
Skin and nail changes	15	8.6
Total	**175**	**100.0**

The interviews, on the other hand, concurred with the response on the questionnaires, that patients on Herceptin with Her-2 positive breast cancer suffer physical changes. Physical strains experienced during the treatment process are as follows: fatigue, joint aches, tingling sensation, and numbness.

"Herceptin treatment is quite tolerable, occasionally I feel tired. I suffer joint aches, and tingling sensation. For example, my hands and legs have reduced sensation especially early in the morning." (009)

"Drugs caused mouth ulcers and diarrhea." (002)

"I only experienced profuse sweat, skin rash and muscle pain during the first administration of Herceptin." (008)

Majority of the respondents stated that they were told the side effects they might get while on Herceptin treatment (95.5%)

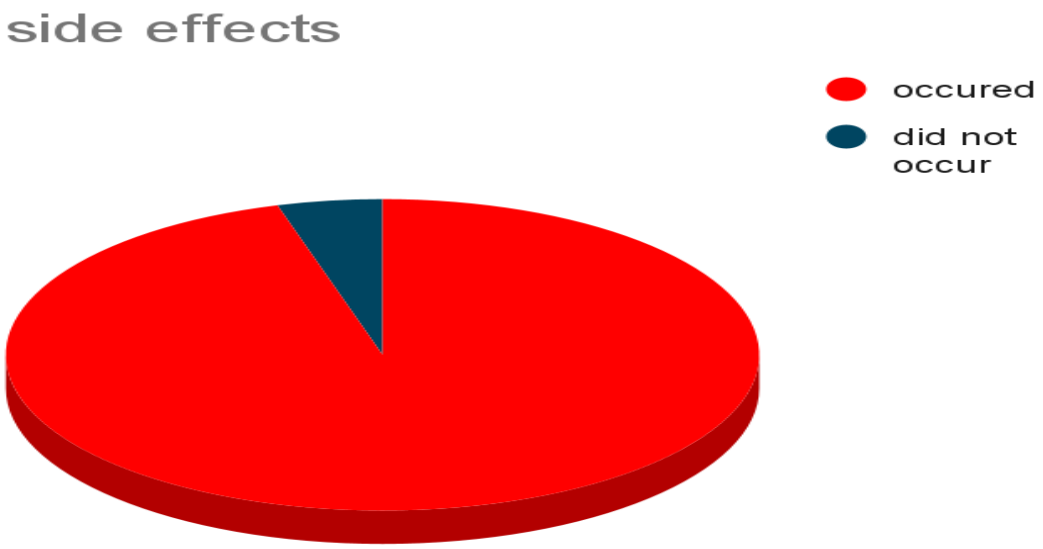
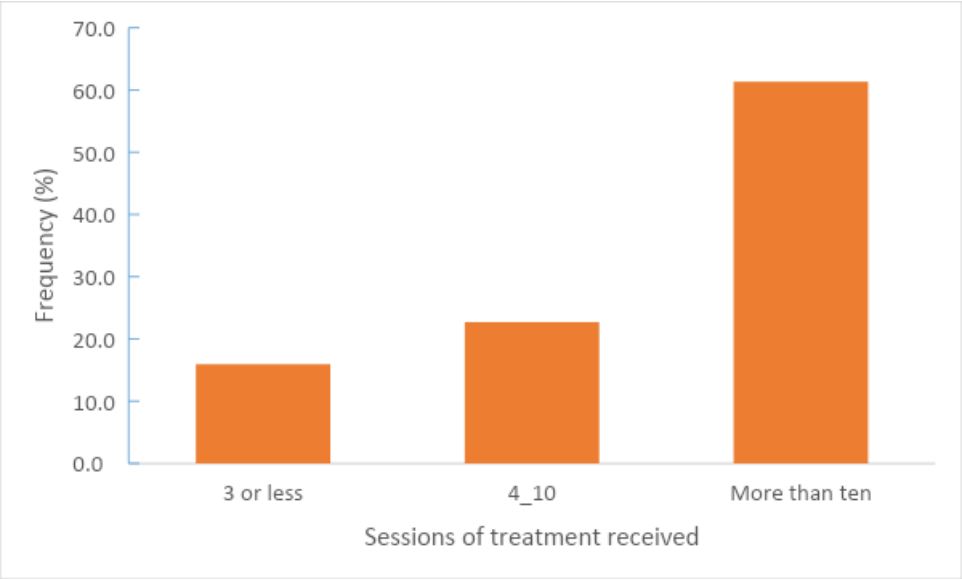


Figure 3: Herceptin Side effects

Most patients had received more than 10 sessions of Herceptin (61.4%), followed by 4-10 sessions (22.7%) and less than 3 sessions at (15.9%).

Fig: 3 Sessions of Herceptin



The majority of the respondents stated that they were receiving Herceptin only (77.3%) as the only form of treatment and those who were on a drug combination (22.7%) stated that they use carboplatin and paclitaxel.

Table 6: Other treatment received

Other treatment received	Frequency	Percentage
Carboplatin	4	44.4
Paclitaxel	5	55.6
Total	**9**	**100.0**

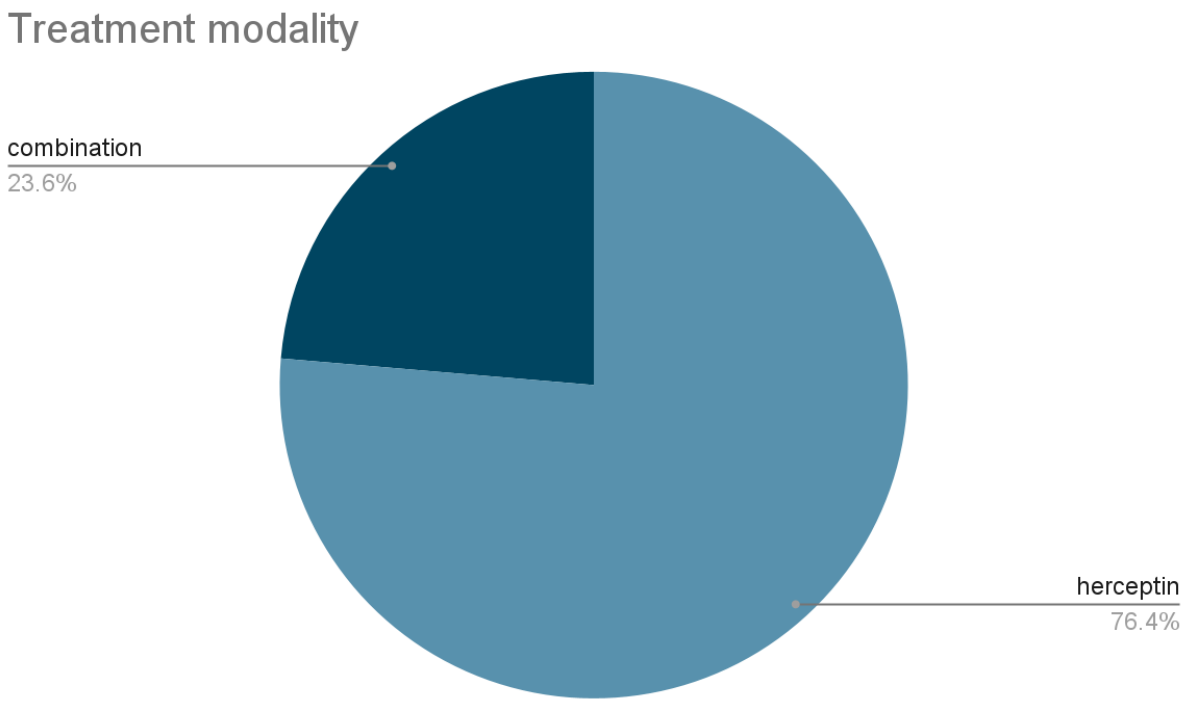


Figure 4: Receiving targeted therapy only or in combination with other types of treatment modalities

4.5.5 Period of diagnosis, treatment benefits and side effects

Most respondents had been diagnosed with cancer more than 6-12months and more than a year at (34.1%)

Table 7: Period of knowing one has cancer

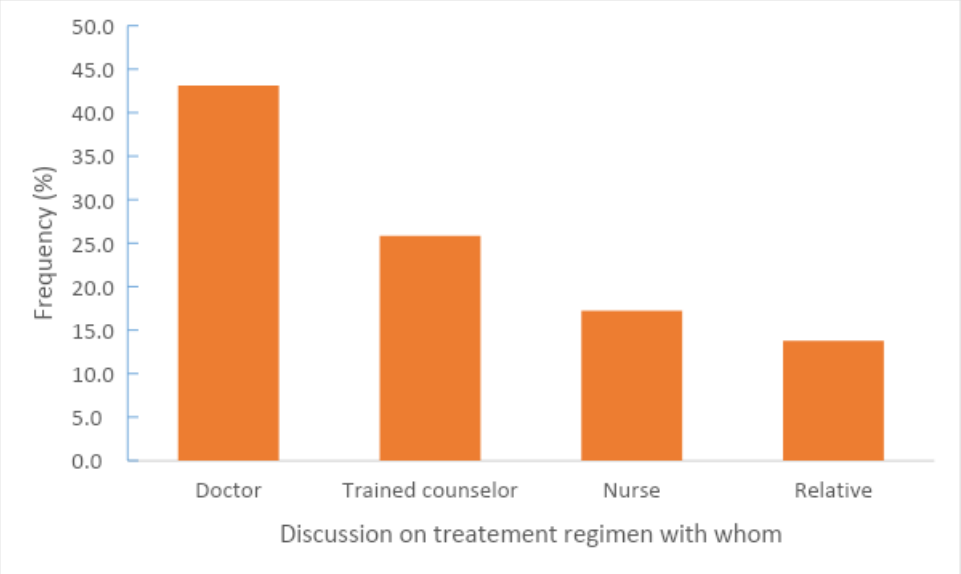
Period of knowing one has cancer	Frequency	Percentage
Less than one month ago	2	4.5
1_6 months ago	12	27.3
6_12 months ago	15	34.1
More than one year ago	15	34.1
Total	**44**	**100.0**

All respondent stated treatment they were receiving discussed at 100%

Discussion about treatment regimen	Frequency	Percentage
Yes	43	100.0

Most respondents had their treatment explained to them by doctors (43.1%), followed trained counselors (25.9%) and nurse and relatives at (17.2%) and (13.8%) respectively.

Fig 5: discussion of the treatment regimen



The majority of the respondents did not understand the type of treatment regimen they were receiving and the schedule (59.1%).

Table 8: Level of understanding on the type of treatment receiving and schedule

Level of understanding on the type of treatment receiving and schedule	Frequency	Percentage
I don't understand at all	26	59.1
I am still a little confused	11	25.0
I understand most of it	7	15.9
Total	**44**	**100.0**

Majority of respondents were told the benefits of the treatment that they were receiving (97.7%)

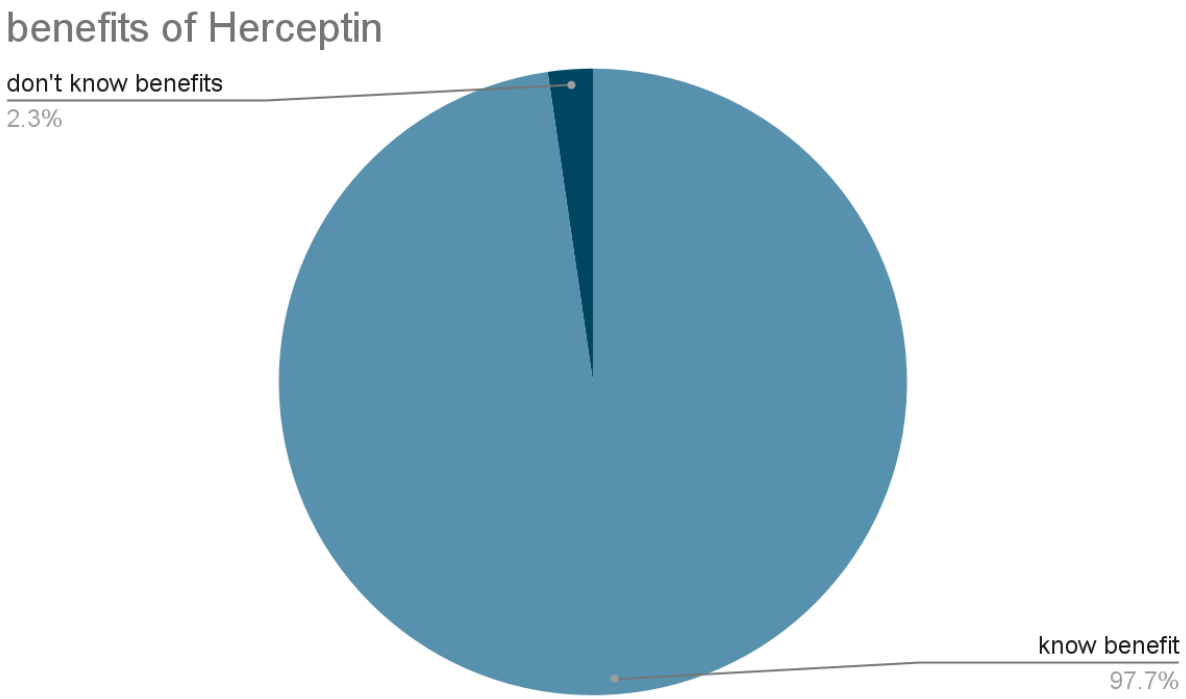


Figure 6: Benefits of treatment

Most of the respondents did not think of stopping the treatment (65.9%) and those who thought of stopping were (34.1%).

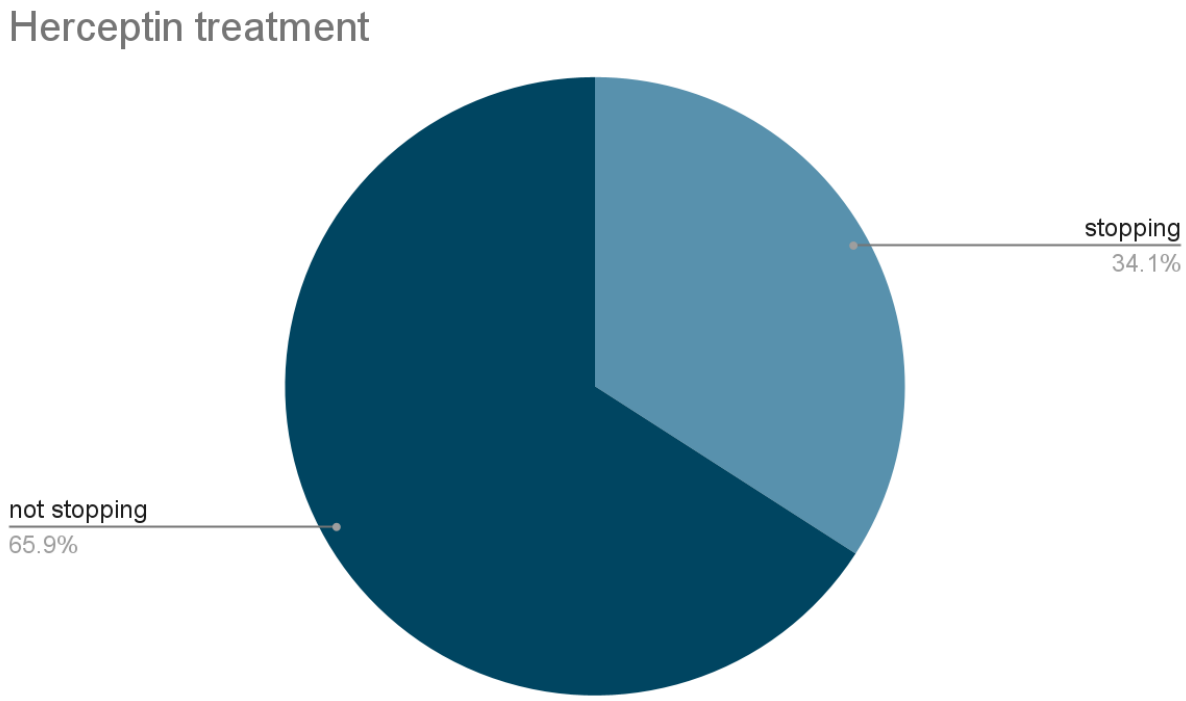


Figure 7: Thought of stopping receiving treatment

4.6 Psychological responses of HER-2 positive breast cancer patients on targeted therapy (Herceptin) at Cancer Treatment Center KNH.

4.6.1 Psychological responses

Respondents mentioned psychological responses that affected them, the most prevalent psychological reaction was Insomnia (27.0%), followed by anxiety (25.8%).

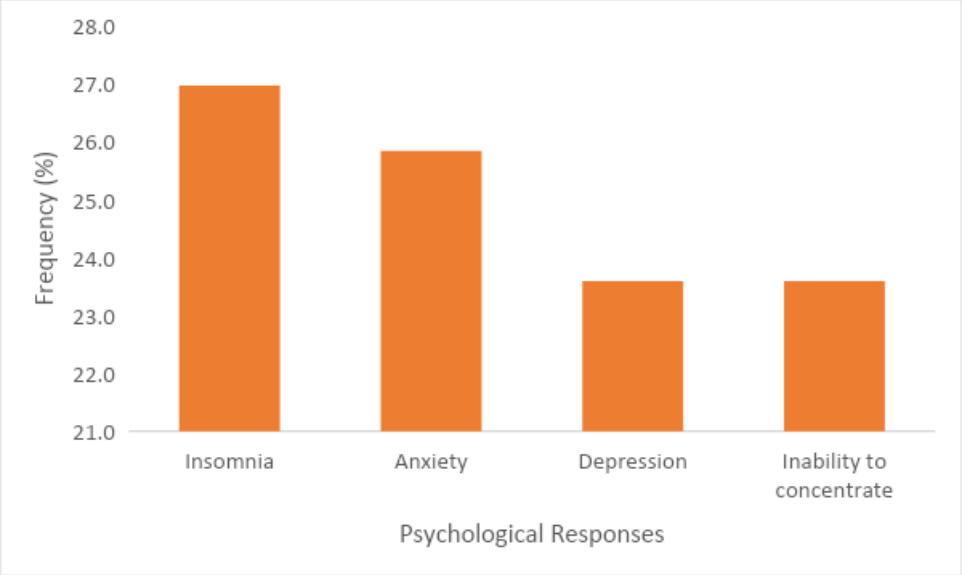


Fig 8: Psychological response

Psychological strains in the interviews specified by patients were uncertainty, changes in body image, loneliness, and changes in the emotional state. One patient defined uncertainty as *"I experience emotional currents; I question myself; why me; what's going to happen to me because the drug is out of stock and am forced to go to a private facility to buy and I don't have money" (004)*

One of the areas uncertainties experienced is about the effects of targeted therapy (Herceptin). They had finished chemotherapy and were now put on Herceptin. A patient defined the Herceptin-related uncertainty she experienced as "*now I am having Herceptin treatment, I wonder if my hair will still shed, if I will suffer nausea or if I won't be able to eat?" (006)*

"I have fears. For example, when am told to have 18cycles of Herceptin and I wonder if I will manage considering the high cost of Herceptin." (013)

Patients with Her-2 positive breast cancer suffer fear of pain, and anxious of the treatment process.

"*I have fears about the next phases of the treatment process. Chemotherapy had a worse experience I wonder if Herceptin will be the same." (004)*

During the interviews, patients said that they experienced body image problems due to the removal of breasts

"*One of my breasts was removed. This affects me. For example, during friends gathering, I feel not complete." (001)*

"*At the moment, I have problems with my body tingling sensation, joint aches and sweating a lot. This affects me psychologically." (012)*

Another psychological strain is loneliness. One patient defined the loneliness they experienced as *"For example, I tell someone about my state. Then, everyone avoids me thinking am going to request money or assistance and find myself alone." (007)*

Other respondents in the interview conducted with patients with HER-2 positive breast cancer revealed that they experienced changes as less anger, reduced sadness, and reduced regret in their emotional lives.

"I wasn't like this before. I did not have any interest in sexual activity, but now am developing interest slowly and hope the situations will be back to normal." (011)

"You want friends and relatives not to be told, you want others not to worry, but you feel that you are shattered." (014)

"I cried a lot, I was told to receive 18 cycles of Herceptin, but I managed to continue receiving. I was sad when NHIF only covered four sessions per year, and I almost gave up." (003)

4.7 Sociological changes experienced by HER-2 positive breast cancer patients on targeted therapy (Herceptin) at Cancer Treatment Center KNH

Financial burden was found to be the most prevalent sociological burden (30.5%), followed by family and friends' distress 28.4%.

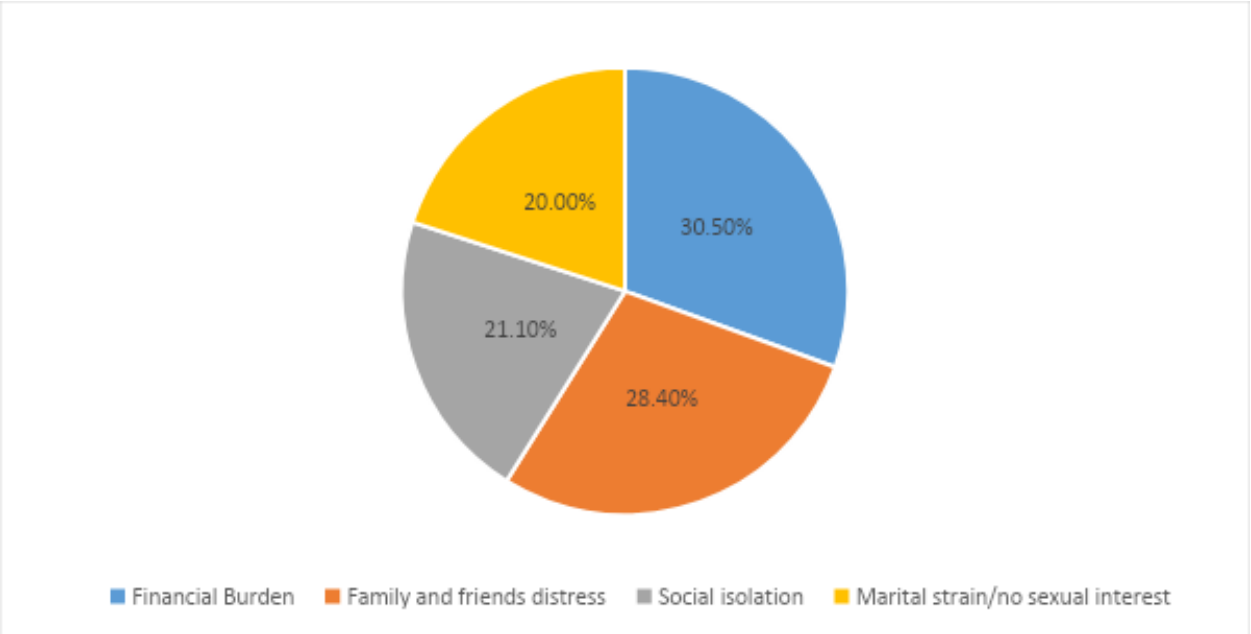


Fig 9: Sociological changes experienced by HER-2 positive breast cancer patients

In the interview, respondents were distressed when they came to the hospital and found Herceptin out of stock.

"You are told Herceptin is out of stock, at least here it is slightly cheaper, going out to a private facility to purchase the drug at a higher fee and bring it back to be prepared again at a fee really drains me financially" (005)

Most respondents were married (36.4%), followed by divorced (27.3), single and widow at (18.2%).

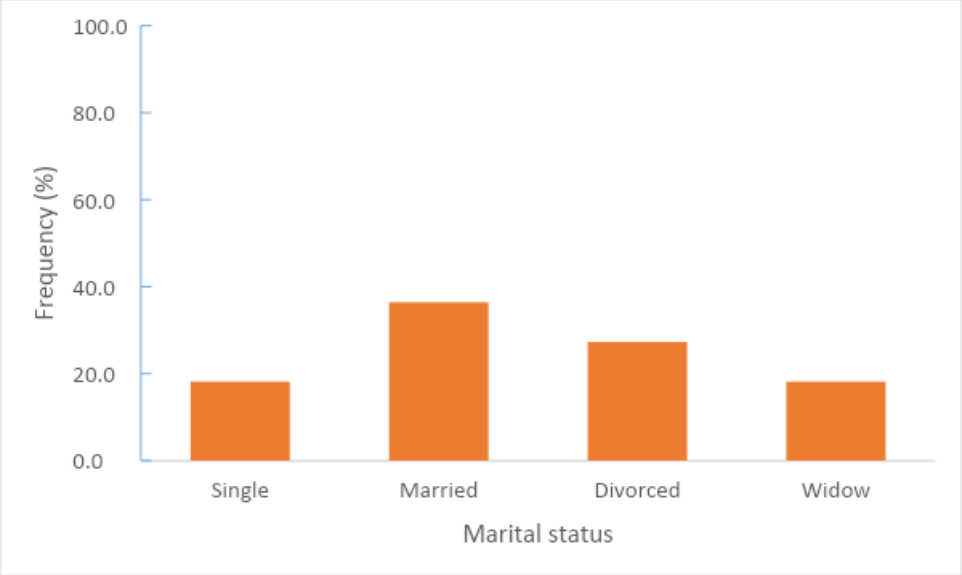


Fig 10: Marital status

The majority of the respondents received their social support from their Husbands (25.6%), followed by Sons and relatives at 18.6%.

Patients with HER2-positive breast cancer regarded difficulties arising in the family or behaviors like staying away from other people as social strains.

"*My skin and hair looked terrible, some people did not come close to me, but after starting Herceptin, I regained my hair, skin looked fine this has made family and friends not to isolate me." (007)*

Patients with breast cancer on Herceptin regarded topics like having difficulty getting Herceptin drugs availability, lack of support provided for patients by waiting for long before being administered with Herceptin, and transportation problems as strains related to the health care system.

"You come to the hospital very early in the morning to get your treatment so that you can get home only to stay at CTC until the afternoon because they give priority to those patients with long hour chemotherapy administration,''(003)

Majority of the respondents received their social support from their Husband (25.6%), followed by Sons and relatives at 18.6%.

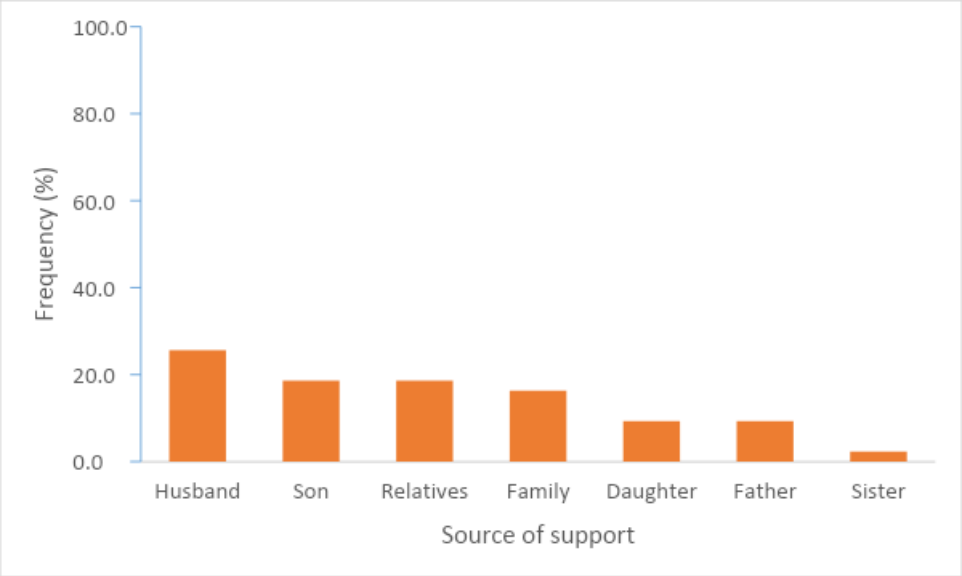


Fig. 11: source of support

A higher percentage of respondents missed treatment (67.4%), with a minimum number of missed sessions of 1 and a maximum of 3 sessions with an average number of sessions missed being a mean of 1.66

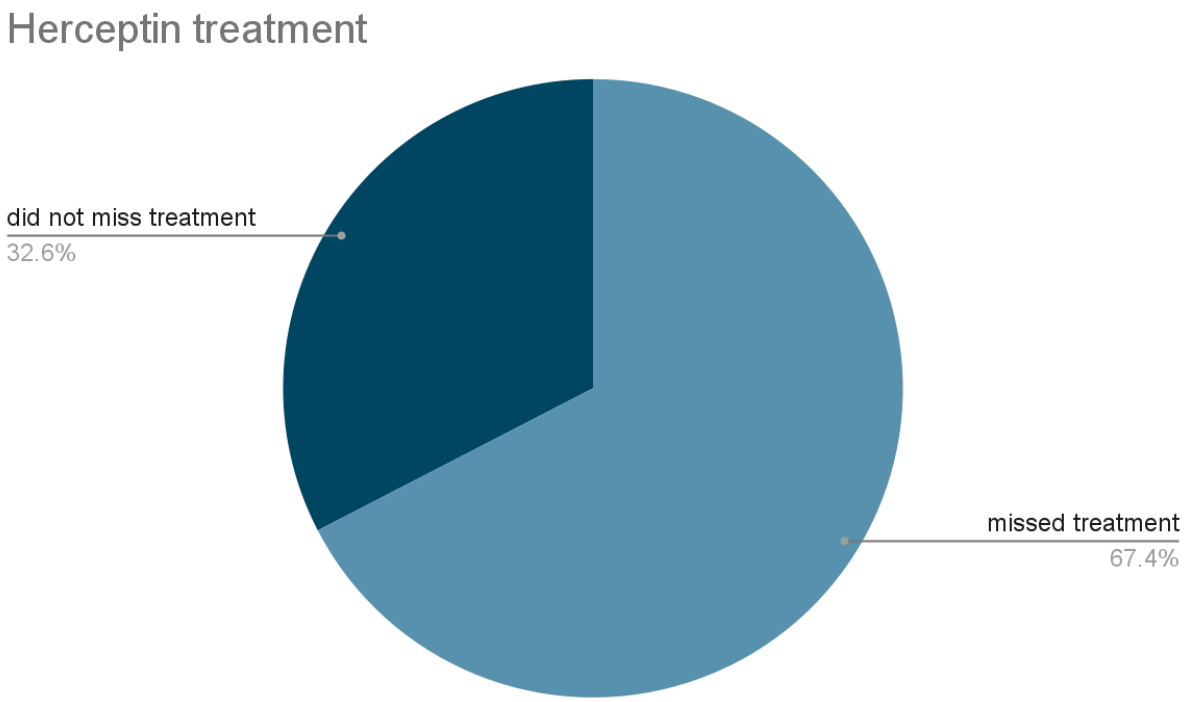


Figure 12: Missing treatment

Table 9: Number of sessions missed

Number of sessions missed	Statistics
N	29
Mean	1.66
Std. Deviation	.769
Minimum	1
Maximum	3

Some respondents during the interview stated to have missed treatment or delayed for weeks or months due to delay in NHIF approval and lack of funds to buy Herceptin when out of stock.

"I am not working, when told to go buy Herceptin, I cannot afford. I must request for financial support from friends which takes time hence miss treatment for 2 times" (009)

"NHIF only caters for 4 cycles per year and am supposed to get 18cycles, I have missed the fifth cycle due to lack of finance to purchase Herceptin which is very expensive" (002)

CHAPTER 5: DISCUSSION AND LIMITATION

5.1 Discussion

5.1.1 Introduction

This chapter presents the discussion of the study findings on the effectiveness and treatment experience of Her-2 positive breast cancer patients on targeted therapy (Herceptin) at CTC KNH. The discussion is organized into socio-demographic factors, physical changes, psychological changes, and sociological changes experienced by HER-2 positive breast cancer patients on Herceptin.

5.1.2 Relation between socio-demographic characteristics and treatment experience of breast cancer patients on targeted therapy

HER 2 positive breast cancer patients came majorly from surrounding Counties. Since KNH is in Nairobi County, the proximity made many patients to be referred to KNH. Many participants were aged above 50 years illustrating many patients medical attention when the disease is at advanced state and as one ages there is increased chance to develop cancer. This concurs with real-world experiences of women in western Kenya which demonstrate that few women seek professional medical care until symptoms are advanced, and socioeconomic variables of health are linked to shaping individuals' and communities' behaviors related to seeking health care (Kisiangani *et al.*, 2018), In addition, another study states that as a result of an increase in population, living of unhealthy lifestyles and aging, there is anticipated rise of breast cancer cases in Africa (Sylla and Wild, 2012). Very few had formal employment and many participants had a monthly income of below 10,000kshs but the majority had stopped working and most of the participants had primary education. Low level of education makes majority not to have formal employment and being unwell there capacity to function fully is affected. In another study, patients' ability to make educated treatment decisions is influenced by how they understand disease (Hajian *et al.*, 2017). At Kenyatta National Hospital, targeted therapy costs between 55,000 and 100,000 per cycle. This is significantly more than what most patients can spend for only treatment. They rely on the National Hospital Insurance Fund (NHIF) to help them pay for medical care. This concurs with Bosire, (2019) people who are not covered by NHIF must pay cash, which may cause social tension. Patients do not understand the treatment regimen that they undergo, most of them could mention chemotherapy to mean Herceptin. According to Tsaras *et al.*, (2018) suggested that a lot of people are concerned about the adverse effects of treatments, including not comprehending the suggested treatments.

5.2 Physical changes of HER-2 positive breast cancer patients experience on targeted therapy (Herceptin)

The introduction of targeted anti-HER2 medication improves disease management in individuals with breast cancer. Patients with Her 2 positive breast cancer since the introduction of Herceptin undergo physical changes majorly being a tingling sensation, numbness, joint aches, and fatigue. Agunbiade, Zaghlol, and Barac, (2019) explained that most of these adverse reactions brought on by treatment-related cardiovascular toxicity have been identified and are now managed as part of standard cancer therapy. Through a review of patients' records on

physical examination, blood tests, and imaging, it was noted that they showed remarkable improvement in their general condition. This concurs with a study by Wang and Xu, (2019) that there is no denying that HER2-targeted therapy improves the prognosis for patients with HER-2 metastatic breast cancer The majority of patients were generally receiving Herceptin as the only form of treatment and had received more than 10 sessions demonstrating how Herceptin has become the main drug of choice in Her 2 positive breast cancer. All the participants had their treatment and what to expect explained to them by doctors and most of them did not understand the type of treatment they were receiving.

5.3 Psychological responses from patients with HER-2 positive breast cancer on targeted therapy (Herceptin)

In this Psychological challenges that affected Her 2 positive breast cancer patients were Insomnia, cognitive impairment, distress, and anxiety. According to another study, breast cancer patients on targeted therapy and survivors frequently report having trouble falling asleep(Karunanithi *et al.*, 2018). The interview schedules informed that patients were uncertain, changes in body image, loneliness, and changes in the emotional state leads to psychological challenges. In this study many patients had finished chemotherapy and commenced on Herceptin, they did not know what the experience will be the 18 cycles and having to undergo an echocardiogram every 3 months. Savard *et al.*, (2015) state that the diagnosis and treatment of breast cancer as a triggering factor for sleep disturbance is supported by the fact that 50% of the women indicate that breast cancer either started or worsened their sleep issues. One of the areas of uncertainties experienced is about the effects of targeted therapy (Herceptin), they had either finished chemotherapy or undergone surgery and are now put on Herceptin. Patients with Her-2 positive breast cancer suffer from fear of pain, and anxiety about the treatment process. A study by Palesh *et al.*, (2018) concludes emotion experience doesn't start and stop with emotion generation because affective experiences also involve complementary emotion regulation. Patients with breast cancer who get targeted therapy frequently have cognitive problems both during and after treatment (Dumas *et al.*, 2020).

5.4 Sociological changes from patients with HER-2 positive breast cancer on targeted therapy (Herceptin)

From this study it was found that patients with HER-2 positive breast cancer on targeted therapy (Herceptin) experience financial burden and isolation which are the most prevalent sociological burden. In a study on the diagnosis and treatment process, patients encounter various physical and emotional difficulties in their families, in their social lives, and at the workplace, and their lives are negatively affected (Williams, Jeanetta, and James, 2016). The majority of the respondents received social support from their spouses since most of them reported not being able to work as they used to. Patients with HER2-positive breast cancer regarded difficulties arising in the family or behaviors like staying away from other people as social strains, due to false information and beliefs, both the diagnosis and treatment of cancer were subject to significant societal stigma (Agatha Ogunkorode *et al.*, 2021)

This study established that patients with breast cancer on Herceptin regarded topics like having difficulty getting Herceptin drugs availability, lack of support provided for patients by waiting for long before being administered with Herceptin, and transportation problems as strains related to the health care system. Patients were concerned about why they had to wait for other patients whose treatment took more than three hours before they were treated. A study by Maree and Mulonda, (2015) found that the consequences of targeted therapy cause the person's regular work routine to be disrupted because they typically take extensive sick breaks and undergo multiple reviews.

The major source of support was the spouse and the major reason for missing or delayed treatment for days, weeks, or months was due to a delay in medical insurance approval and a lack of funds to buy Herceptin when out of stock. In a study done at Kenyatta National Hospital, targeted therapy in Kenya costs between 50,000 and 100,000 per cycle. This is significantly more than what most patients can spend for only treatment. They rely on the National Hospital Insurance Fund (NHIF) to help them pay for medical care. A study by Bosire, (2019) showed that people who are not covered by the program must pay cash, which may cause social tension. There was a unanimous answer that there is no longer any sexual relationship going on except in an instance where it was stated that it improved over time. Sexual orientation may change as a result of numerous physical and psychological side effects of targeted cancer therapy. Changes in body image can have a significant impact on how a person perceives their own sexual identity(Guedes *et al.*, 2018).

5.5 Limitations

1. Most patients' files had limited information after initial physical assessment documentation hence it was challenging for patient follow-up.
2. Very few patients could turn up for Herceptin treatment once they reach NHIF limit cover because they could not afford the cost of the drug. This makes them miss the treatment.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

1. Since the location of KNH is in Nairobi County, it informs that most of the patients will come from the surrounding counties, and they are aged above 50 years. The majority of patients do not have formal work because of the illness, the source of support is majorly from the husband, and medical insurance is not able to cater for all sessions of treatment.
2. During the treatment process, patients encounter various physical, psychological, and sociological changes. Despite the drug having side effects, this study shows improvement in treating Her2-positive breast cancer patients.
3. Insomnia was noted as the most prevalent psychological challenge, patients are anxious because of side effects and some are reluctant to undergo Targeted therapy. Other challenges include the inability to buy Herceptin, worried about being a burden to family and friends, and partial payment of 8 cycles out of 18 by NHIF resulting in treatment delay and poor disease prognosis.
4. Her2-positive breast cancer patients who receive Herceptin experience fewer side effects and improved health status. Some of the physical changes include body tingling sensation and numbness, fatigue, and joint aches during the initial stages of Herceptin administration.
5. Lack of enough stock and high cost of Herceptin, and limitless insurance coverage lead to patients being sociologically strained. Proper management will inform better stocking of Herceptin and ease the sociological strain. Patients sociologically experience reduced interaction with people (isolation), and body weakness hence they cannot perform their social roles in the family and at the workplace.

6.2 Recommendations

- Many do not have formal work, insurance medical cover should consider all 18 cycles of Herceptin to minimize patient distress and missing treatment because patients cannot afford the cost.
- It is paramount that a multi-disciplinary team advises patients on the treatment they are receiving.
- Multi-disciplinary team at CTC should use the results of this study to improve efficiency during patient treatment, especially at pharmacies where patients on Herceptin wait for a long before they receive their treatment.
- KNH to ensure availability of Herceptin to avoid patients buying at a higher cost and delaying their treatment process.
- There are few studies on targeted therapy in Kenya, the results of this study should be in the national cancer registry for reference by the policymakers and future researchers.
- This research recommends other institutions to be included in this study including private and public hospitals to have a wider picture.
- KNH to implement the use of subcutaneous Herceptin injection which takes 2-5 minutes to administer, this will reduce Her 2 positive breast cancer waiting time, they wait for a long before the intravenous injection is prepared and takes at least one hour on administration.
- Ensuring regular stocking of Herceptin and reducing the price to enable affordability

REFERENCES

Abrahams, H.J.G. *et al.* (2016) 'Risk factors, prevalence, and course of severe fatigue after breast cancer treatment: a meta-analysis involving 12 327 breast cancer survivors', *Annals of Oncology*, 27(6), pp. 965–974. Available at: https://doi.org/10.1093/annonc/mdw099.

Agatha Ogunkorode, Rev.Sr. *et al.* (2021) 'Factors influencing the health-seeking behaviors of women with advanced stages of breast cancer in Southwestern Nigeria: An interpretive description study', *International Journal of Africa Nursing Sciences*, 14, p. 100273. Available at: https://doi.org/10.1016/j.ijans.2020.100273.

Agunbiade, T.A., Zaghlol, R.Y. and Barac, A. (2019) 'Heart Failure in Relation to Tumor-Targeted Therapies and Immunotherapies', *Methodist DeBakey Cardiovascular Journal*, 15(4), pp. 250–257. Available at: https://doi.org/10.14797/mdcj-15-4-250.

Alexander, A. *et al.* (2019) 'The Impact of Breast Cancer on the Patient and the Family in Indian Perspective', *Indian Journal of Palliative Care*, 25(1), p. 66. Available at: https://doi.org/10.4103/IJPC.IJPC_158_18.

Ali, H.S. (2021) *Prevalence and Correlates of Depression and Anxiety Among Patients With Cervical Cancer at Cancer Treatment Centre, Kenyatta National Hospital*. Thesis. UON. Available at: http://erepository.uonbi.ac.ke/handle/11295/160691 (Accessed: 7 July 2022).

Asif, H.M. *et al.* (2016) 'HER-2 Positive Breast Cancer - a Mini-Review', *Asian Pacific Journal of Cancer Prevention*, 17(4), pp. 1609–1615. Available at: http://journal.waocp.org/article_32284.html (Accessed: 7 July 2022).

Bayati, M. *et al.* (2019) 'Investigating the effect of Integrated Educational Program on the Quality of Life among Cancer Patients: A Clinical Trial Study', *Asian Pacific Journal of Cancer Prevention : APJCP*, 20(11), pp. 3457–3467. Available at: https://doi.org/10.31557/APJCP.2019.20.11.3457.

Bean, H.R. *et al.* (2021) 'Insomnia and Fatigue Symptom Trajectories in Breast Cancer: A Longitudinal Cohort Study', *Behavioral Sleep Medicine*, 19(6), pp. 814–827. Available at: https://doi.org/10.1080/15402002.2020.1869005.

Bosire, A.M. (2019) *Biopsychosocial Effects of Chemotherapy Among Breast and Cervical Cancer Patients Attending Kenyatta National Hospital Cancer Treatment Center.* Thesis. University of Nairobi. Available at: http://erepository.uonbi.ac.ke/handle/11295/108033 (Accessed: 7 July 2022).

Bowles, E.J.A. *et al.* (2012) 'Risk of Heart Failure in Breast Cancer Patients After Anthracycline and Trastuzumab Treatment: A Retrospective Cohort Study', *JNCI Journal of the National Cancer Institute*, 104(17), pp. 1293–1305. Available at: https://doi.org/10.1093/jnci/djs317.

Bray, F. *et al.* (2018) 'Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries', *CA: A Cancer Journal for Clinicians*, 68(6), pp. 394–424. Available at: https://doi.org/10.3322/caac.21492.

Campbell-Enns, H.J. and Woodgate, R.L. (2017) 'The psychosocial experiences of women with breast cancer across the lifespan: a systematic review', *Psycho-Oncology*, 26(11), pp. 1711–1721. Available at: https://doi.org/10.1002/pon.4281.

Chen, Y. *et al.* (2021) 'The Development and Validation of the Psychological Needs of Cancer Patients Scale', *Frontiers in Psychology*, 12, p. 658989. Available at: https://doi.org/10.3389/fpsyg.2021.658989.

Cope, D.G. (2022) 'Clinical Updates in Nausea and Vomiting', *Seminars in Oncology Nursing*, 38(1), p. 151249. Available at: https://doi.org/10.1016/j.soncn.2022.151249.

Daniels, B. *et al.* (2017) 'Use and outcomes of targeted therapies in early and metastatic HER2-positive breast cancer in Australia: protocol detailing observations in a whole of population cohort', *BMJ Open*, 7(1), p. e014439. Available at: https://doi.org/10.1136/bmjopen-2016-014439.

Di Modica, M., Tagliabue, E. and Triulzi, T. (2017) 'Predicting the Efficacy of HER2-Targeted Therapies: A Look at the Host', *Disease Markers*, 2017, p. e7849108. Available at: https://doi.org/10.1155/2017/7849108.

Dumas, A. *et al.* (2020) 'Impact of Breast Cancer Treatment on Employment: Results of a Multicenter Prospective Cohort Study (CANTO)', *Journal of Clinical Oncology*, 38(7), pp. 734–743. Available at: https://doi.org/10.1200/JCO.19.01726.

García-Sánchez, J., Torregrosa, M.D. and Cauli, O. (2021) 'Cognitive Functions under Anti-HER2 Targeted Therapy in Cancer Patients: A Scoping Review', *Endocrine, Metabolic & Immune Disorders - Drug Targets(Formerly Current Drug Targets - Immune, Endocrine & Metabolic Disorders)*, 21(7), pp. 1163–1170. Available at: https://doi.org/10.2174/1871530320666200729153009.

Goldhar, H.A. *et al.* (2016) 'The Temporal Risk of Heart Failure Associated With Adjuvant Trastuzumab in Breast Cancer Patients: A Population Study', *Journal of the National Cancer Institute*, 108(1), p. djv301. Available at: https://doi.org/10.1093/jnci/djv301.

Guedes, T.S.R. *et al.* (2018) 'Body Image of Women Submitted to Breast Cancer Treatment', *Asian Pacific Journal of Cancer Prevention : APJCP*, 19(6), pp. 1487–1493. Available at: https://doi.org/10.22034/APJCP.2018.19.6.1487.

Gunusen, N.P., Inan, F.S. and Ustun, B. (2013) 'Experiences of Turkish Women with Breast Cancer During the Treatment Process and Facilitating Coping Factors', *Asian Pacific Journal of Cancer Prevention*, 14(5), pp. 3143–3149. Available at: https://doi.org/10.7314/APJCP.2013.14.5.3143.

Hackshaw, M.D. *et al.* (2020) 'Incidence of pneumonitis/interstitial lung disease induced by HER2-targeting therapy for HER2-positive metastatic breast cancer.', *Breast Cancer Research and Treatment*, 183(1), pp. 23–40. Available at: https://go.gale.com/ps/i.do?p=HRCA&sw=w&issn=01676806&v=2.1&it=r&id=GALE%7CA630331727&sid=googleScholar&linkaccess=abs (Accessed: 22 August 2022).

Hajian, S. *et al.* (2017) 'Coping Strategies and Experiences in Women with a Primary Breast Cancer Diagnosis', *Asian Pacific Journal of Cancer Prevention : APJCP*, 18(1), pp. 215–224. Available at: https://doi.org/10.22034/APJCP.2017.18.1.215.

Hosseini, M. *et al.* (2016) 'Guided imagery effects on chemotherapy induced nausea and vomiting in Iranian breast cancer patients', *Complementary Therapies in Clinical Practice*, 25, pp. 8–12. Available at: https://doi.org/10.1016/j.ctcp.2016.07.002.

Hu, R.-Y. *et al.* (2021) 'Stress, coping strategies and expectations among breast cancer survivors in China: a qualitative study', *BMC Psychology*, 9(1), p. 26. Available at: https://doi.org/10.1186/s40359-021-00515-8.

Huang, C. *et al.* (2019) 'Nursing Interventions on Sexual Health: Validation of the NISH Scale in Baccalaureate Nursing Students in Taiwan', *The Journal of Sexual Medicine*, 9(10), pp. 2600–2608. Available at: https://doi.org/10.1111/j.1743-6109.2012.02784.x.

Huynh Dagher, S. *et al.* (2021) 'Cutaneous toxicities from targeted therapies used in oncology: Literature review of clinical presentation and management', *International Journal of Women's Dermatology*, 7(5, Part A), pp. 615–624. Available at: https://doi.org/10.1016/j.ijwd.2021.09.009.

Karunanithi, G. *et al.* (2018) 'Assessment of Psychological Distress and its Effect on Quality of Life and Social Functioning in Cancer Patients', *Indian Journal of Palliative Care*, 24(1), pp. 72–77. Available at:

https://doi.org/10.4103/IJPC.IJPC_104_17.

Khoshnazar, T.A.K. *et al.* (2016) 'Communication Needs of Patients with Breast Cancer: A Qualitative Study', *Indian Journal of Palliative Care*, 22(4), pp. 402–409. Available at: https://doi.org/10.4103/0973-1075.191763.

Kim, Y.A. *et al.* (2015) 'The Economic Burden of Breast Cancer in Korea from 2007-2010', *Cancer Research and Treatment : Official Journal of Korean Cancer Association*, 47(4), pp. 583–590. Available at: https://doi.org/10.4143/crt.2014.143.

Kisiangani, J. *et al.* (2018) 'Determinants of breast cancer early detection for cues to expanded control and care: the lived experiences among women from western Kenya.', *BMC Women's Health*, 18(81). Available at: https://www.cabdirect.org/globalhealth/abstract/20193087889 (Accessed: 22 August 2022).

Lee, S. *et al.* (2018) 'In Their Own Words: A Qualitative Study of Kenyan Breast Cancer Survivors' Knowledge, Experiences, and Attitudes Regarding Breast Cancer Genetics', *Journal of Global Oncology*, (4), pp. 1–9. Available at: https://doi.org/10.1200/JGO.17.00061.

Liu, S. and Kurzrock, R. (2014) 'Toxicity of targeted therapy: Implications for response and impact of genetic polymorphisms', *Cancer Treatment Reviews*, 40(7), pp. 883–891. Available at: https://doi.org/10.1016/j.ctrv.2014.05.003.

Liu, Y. *et al.* (2017) 'Liver toxicity of chemotherapy and targeted therapy for breast cancer patients with hepatitis virus infection', *The Breast*, 35, pp. 191–195. Available at: https://doi.org/10.1016/j.breast.2017.08.001.

Magalhães, B. *et al.* (2020) 'Cancer patients' experiences on self-management of chemotherapy treatment-related symptoms: A systematic review and thematic synthesis', *European Journal of Oncology Nursing*, 49, p. 101837. Available at: https://doi.org/10.1016/j.ejon.2020.101837.

Maree, J.E. and Mulonda, J. (2015) '"My experience has been a terrible one, something I could not run away from": Zambian women's experiences of advanced breast cancer', *International Journal of Africa Nursing Sciences*, 3, pp. 24–30. Available at: https://doi.org/10.1016/j.ijans.2015.07.001.

Martin, A.N. *et al.* (2017) 'Anti-Yo Mediated Paraneoplastic Cerebellar Degeneration Associated with Pseudobulbar Affect in a Patient with Breast Cancer', *Case Reports in Oncological Medicine*, 2017, pp. 1–3. Available at: https://doi.org/10.1155/2017/8120689.

Masoud, V. and Pagès, G. (2017) 'Targeted therapies in breast cancer: New challenges to fight against resistance', *World Journal of Clinical Oncology*, 8(2), pp. 120–134. Available at: https://doi.org/10.5306/wjco.v8.i2.120.

Mendes, D. (2015) 'The benefit of HER2-targeted therapies on overall survival of patients with metastatic HER2-positive breast cancer – a systematic review', p. 14.

Metsälä, E. *et al.* (2022) 'The Factors for Success and Lack of Success in the Breast Cancer Patient Care Pathway: A Qualitative Study From the Health Care Staff Perspective', *European Journal of Breast Health*, 18(3), pp. 222–228. Available at: https://doi.org/10.4274/ejbh.galenos.2022.2022-3-1.

Miller, E.M. and Schwartzberg, L.S. (2019) 'Biosimilars for breast cancer: a review of HER2-targeted antibodies in the United States', *Therapeutic Advances in Medical Oncology*, 11, p. 1758835919887044. Available at: https://doi.org/10.1177/1758835919887044.

Nies, Y.H. *et al.* (2018) 'A qualitative study among breast cancer patients on chemotherapy: experiences and side-effects', *Patient preference and adherence*, 12, pp. 1955–1964. Available at:

https://doi.org/10.2147/PPA.S168638.

Noal, S. *et al.* (2016) 'Fatigue and quality of life (QoL) during and after adjuvant treatment by trastuzumab (Herceptin®) among breast cancer patients (BC pts): a case-control study', *Japanese Society of Medical Oncology*, 27. Available at: https://doi.org/10.1093/annonc/mdw364.68.

Odle, T.G. (2014) 'Adverse Effects of Breast Cancer Treatment', *Radiologic Technology*, 85(3), pp. 297M-319M. Available at: http://www.radiologictechnology.org/content/85/3/297M (Accessed: 7 July 2022).

Onitilo, A.A., Engel, J.M. and Stankowski, R.V. (2014) 'Cardiovascular toxicity associated with adjuvant trastuzumab therapy: prevalence, patient characteristics, and risk factors', *Therapeutic Advances in Drug Safety*, 5(4), pp. 154–166. Available at: https://doi.org/10.1177/2042098614529603.

Palesh, O. *et al.* (2018) 'Management of side effects during and post-treatment in breast cancer survivors', *The Breast Journal*, 24(2), pp. 167–175. Available at: https://doi.org/10.1111/tbj.12862.

Reyes-Habito, C.M. and Roh, E.K. (2014) 'Cutaneous reactions to chemotherapeutic drugs and targeted therapies for cancer: Part I. Conventional chemotherapeutic drugs', *Journal of the American Academy of Dermatology*, 71(2), p. 203.e1-203.e12. Available at: https://doi.org/10.1016/j.jaad.2014.04.014.

Rosen, A.C. *et al.* (2013) 'Impact of dermatologic adverse events on quality of life in 283 cancer patients: a questionnaire study in a dermatology referral clinic', *American journal of clinical dermatology*, 14(4), pp. 327–333. Available at: https://doi.org/10.1007/s40257-013-0021-0.

Runowicz, C.D. *et al.* (2016) 'American Cancer Society/American Society of Clinical Oncology Breast Cancer Survivorship Care Guideline', *CA: A Cancer Journal for Clinicians*, 66(1), pp. 43–73. Available at: https://doi.org/10.3322/caac.21319.

Sapna, F. *et al.* (2020) 'Therapeutic Strategies for Human Epidermal Receptor-2 Positive Metastatic Breast Cancer: A Literature Review', *Cureus* [Preprint]. Available at: https://doi.org/10.7759/cureus.9522.

Savard, J. *et al.* (2015) 'Cancer treatments and their side effects are associated with aggravation of insomnia: Results of a longitudinal study', *Cancer*, 121(10), pp. 1703–1711. Available at: https://doi.org/10.1002/cncr.29244.

Sayed, S. *et al.* (2019) 'Breast Cancer knowledge, perceptions and practices in a rural Community in Coastal Kenya', *BMC Public Health*, 19(1), p. 180. Available at: https://doi.org/10.1186/s12889-019-6464-3.

Schramm, A. *et al.* (2015) 'Targeted Therapies in HER2-Positive Breast Cancer - a Systematic Review', *Breast Care*, 10(3), pp. 173–178. Available at: https://doi.org/10.1159/000431029.

Siegel, R.L., Miller, K.D. and Jemal, A. (2016) 'Cancer statistics, 2016', *CA: A Cancer Journal for Clinicians*, 66(1), pp. 7–30. Available at: https://doi.org/10.3322/caac.21332.

Sodergren, S.C. *et al.* (2016) 'Systematic Review of the Side Effects Associated With Anti-HER2-Targeted Therapies Used in the Treatment of Breast Cancer, on Behalf of the EORTC Quality of Life Group', *Targeted oncology*, 11(3), pp. 277–292. Available at: https://doi.org/10.1007/s11523-015-0409-2.

Tsaras, K. *et al.* (2018) 'Assessment of Depression and Anxiety in Breast Cancer Patients: Prevalence and Associated Factors', *Asian Pacific Journal of Cancer Prevention : APJCP*, 19(6), pp. 1661–1669. Available at: https://doi.org/10.22034/APJCP.2018.19.6.1661.

Ursavaş, F.E., Karayurt, Ö. and İşeri, Ö. (2014) 'Nursing Approach Based on Roy Adaptation Model in a Patient Undergoing Breast Conserving Surgery for Breast Cancer', *The Journal of Breast Health*, 10(3), pp. 134–140. Available at: https://doi.org/10.5152/tjbh.2014.1910.

Vigarios, E., Epstein, J.B. and Sibaud, V. (2017) 'Oral mucosal changes induced by anticancer targeted therapies and immune checkpoint inhibitors', *Supportive Care in Cancer*, 25(5), pp. 1713–1740. Available at: https://go.gale.com/ps/i.do?p=AONE&sw=w&issn=09414355&v=2.1&it=r&id=GALE%7CA550918637&sid=googleScholar&linkaccess=abs (Accessed: 22 August 2022).

Wang, J. and Xu, B. (2019) 'Targeted therapeutic options and future perspectives for HER2-positive breast cancer', *Signal Transduction and Targeted Therapy*, 4(1), pp. 1–22. Available at: https://doi.org/10.1038/s41392-019-0069-2.

Williams, F., Jeanetta, S. and James, A.S. (2016) 'Geographical Location and Stage of Breast Cancer Diagnosis: A Systematic Review of the Literature', *Journal of Health Care for the Poor and Underserved*, 27(3), pp. 1357–1383. Available at: https://doi.org/10.1353/hpu.2016.0102.

Wilson, F.R. *et al.* (2017) 'Herceptin® (trastuzumab) in HER2-positive early breast cancer: protocol for a systematic review and cumulative network meta-analysis', *Systematic Reviews*, 6, p. 196. Available at: https://doi.org/10.1186/s13643-017-0588-2.

Xiao, C. *et al.* (2017) 'Depressive symptoms and inflammation are independent risk factors of fatigue in breast cancer survivors', *Psychological Medicine*, 47(10), pp. 1733–1743. Available at: https://doi.org/10.1017/S0033291717000150.were

Appendices

Appendix I: Informed consent form for patients

Title of the study: Effectiveness and treatment experiences of targeted therapy on breast cancer (HER2 positive) patients at KNH.

Researcher: Vunyali Millah Mang'are, Master of Science in oncology nursing student year two

Institution of study: University of Nairobi P.O Box 30197-00400 Nairobi

Introduction

I am a student at the school of Nursing Sciences, University of Nairobi pursuing a Master of Science Degree in Nursing Oncology. I am conducting a study titled effectiveness and treatment experiences of targeted therapy on breast cancer HER2 positive patients at KNH

Purpose of the study

The purpose of this study is to establish effectiveness and explore the experiences for patients diagnosed with breast cancer (HER2 positive) and put on targeted therapy. The main aim is to contribute and provide a better profile on the experiences of patients on targeted therapy for cancer multidisciplinary management team and as a result, contributing to the better management of breast cancer patients.

Risks

There will be no economic or physical risks to participating in the study. However, you will take some time off your busy schedule to respond to questions from the self-administered questionnaire. Some questions will require you to disclose personal information that might trigger some negative feelings. If this happens, the researcher will refer you to the hospital counselor for you to have counseling without extra cost.

Benefits

There is no direct monetary benefit in participating in this study. However, the results of the study will be useful in facilitating the understanding of the various experiences of patients on targeted therapy and the results will be used by stakeholders in improving the patients' experience of the effects and the management of the effects when they occur.

Confidentiality

Confidentiality will be maintained and the information you provide will only be used for the intended purpose of the study. All materials used during this study will be kept in a locked cupboard and only the personnel

involved in this study will have access to them. Electronic files will be saved on password.

Voluntary Participation

Participation in this study is voluntary. Refusal to take part will not attract any penalty. You retain the right to withdraw from the study at any time without any consequences.

Compensation

There is no compensation, monetary or otherwise for participating in the study since the patients are coming for their normal clinic review and treatment to the hospital.

Questionnaire procedure

The questionnaire will be self –administered and you will be required to understand before answering them. The questionnaire is numbered, and you will not be required to give any personal information like writing your name. The questions will contain both open and closed ended questions.

Sharing the results

The results of this study may be presented during scientific and academic forums and may be published in scientific journals and academic papers.

Contact person

If you have any further questions during or after the research, feel free to contact the investigator, the supervisor or the KNH/UON ethics and research committee on the contacts given below

1. Investigator

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Kenyatta National Hospital Campus

Appendix II: Consent form (statement of consent)

Participant's statement

I have read this consent form and I have had chance to discuss this research with researcher. I have my questions answered in a language that I understand. The risks and benefits have been explained to me. I understand my participation in this study is voluntary and that I may choose to withdraw anytime. I freely agree to participate in this study.

I understand that all efforts will be made to keep information regarding my personal identity confidential.

By signing this consent form, I have not given up the legal rights that I have as a participant in a research study.

Participant signature/ Thumb stamp _____ date _____

Researcher's statement

I, the undersigned, have fully explained the relevant details of this research study to the participant named above and believe that the participant has understood and has willingly and freely given his/her consent.

Researcher's name_____ Date_____

Signature _____

Consent form in Kiswahili (Fomu ya idhini)

Kauli ya mshiriki

Nimesoma fomu hii ya idhini na nimepata nafasi ya kujadili utafiti huu na mtafiti.nimejibiwa maswali yangu kwa lugha. Hatari na faida zimeelezewa kwangu. Ninaelewa ushiriki wangu katika utafiti huu ni wa hiari na kwamba naweza kuchagua kujiondoa wakati wowote. Ninakubali kwa uhuru kushiriki katika utafiti huu.Ninaelewa kuwa juhudi zote zitafanywa kuweka habari kuhusu siri yangu ya kitambulisho cha kibinafsi.

Kwa kusaini fomu hii ya idhini, sijatoa haki za kisheria ambazo nina mshiriki katika utafiti wa utafiti

Saini ya mshiriki / Muhuri wa bubu _____ Tarehe _____

Taarifa ya watafiti

Mimi, waliotengwa, nimeelezea kikamilifu maelezo muhimu ya utafiti huu wa utafiti kwa mshiriki aliyetajwa hapo juu na ninaamini kwamba mshiriki ameelewa na ametoa idhini yake kwa hiari na kwa uhuru.

Jina la mtafiti_____ Tarehe_____

Sahihi _____

Appendix III: Questionnaire

Questionnaire for the research on effectiveness and treatment experience of targeted therapy in breast cancer (HER2 positive) patients at CTC among Kenyatta National hospital (Swala la utafiti juu ya ufanisi wa aina ya matibabu ya saratani ya matiti wanaohudhuria katika kituo cha matibabu ya saratani Hospitali ya Taifa ya Kenyatta)

Instructions (maelekezo)

The purpose of this questionnaire is to obtain information for the study purpose only. The information obtained will go a long way in improving the clinical experience of patients receiving targeted therapy at cancer treatment center in Kenyatta National Hospital. All your responses will be treated with total confidence (Kusudi ya maswali haya ni kupata habari kwa ajili ya mafunzo. Taarifa itakayopatikana itasaidia pakubwa katika kuboresha matibabu wanayopata wagonjwa katika kituo cha matibabu ya saratani Hospitali ya Taifa ya Kenyatta. Majibu yako yote yatadhibitiwa kwa usiri.

· Please respond to all questions (tafadhali jibu maswali yote)

· Do not write your name or any other identification anywhere on the questionnaire (Usiandike jina lako au kitambulisho kingine chochote mahali popote kwenye dodoso)

·The questionnaire has two sections, kindly complete all the sections (daftari in sehemu mbili, tafadhali kamilisha sehemu zote)

·Please respond according to the instruction given in each section (Tafadhali jibu maswali kulingana na maagizo yaliyotolewa katika kila sehemu)

SECTION A: DEMOGRAPHIC DATA

1. What is your age in years? (Una miaka mingapi)? _____

2. Which is your county of residence? (Je unaishi katika jimbo gani)? _____

3. What is your marital status? (Je, hali yako ya ndoa ni gani)?

	Tick (weka alama)		Tick (weka alama)
Single (Sijaolewa)		Divorced (Talaka)	
Married (Nimeolewa)		Widow (Mjane)	

4. Who provides you with social support? (ni nani hukusaidia kumudu mahitaji yako ya kijamii) _____

5. What is your level of? (kiwango cha elimu)? _____

6. What is your career? (unafanya kazi gani)? _____

7. Are you currently working? (unafanya kazi kwa wakati huu)

	Tick (weka alama)
Yes (ndio)	
No (la)	

If no, why? (ikiwa hufanyi ni kwa nini)? _____

8. What is your average monthly in come in Kenya Shillings? (mapato yako kwa mwezi ni kiasi gani)?

	Tick (weka alama)		Tick (weka alama)
Less than (chini ya)10000		50,000- 100,000	
10000 – 50,000		Above (Zaidi ya) 100,000	

9. Do you have a National Hospital Insurance (NHIF) card? (Je una card ya bima ya NHIF)?

	Tick (weka alama)	If yes, is it activated? (Je inatumika)?		Tick (weka alama)
Yes (Ndio)			Yes (Ndio)	
No (la)			No (la)	

SECTION B: EFFICTIVENESS AND EXPIRIENCE OF TARGETED THERAPY

10. When did you know that you have cancer? (Je ulijua lini kuwa unaugua saratani)?

	Tick (weka alama)
Less than one month ago (chini ya mwezi mmoja uliopita)	
1-6 months ago (mwezi1-6 iliopita)	
6-12 months ago (mwezi 6- 12 iliyopita)	
More than one year ago (Zaidi yam waka mmmoja uliopita)	

11. Has anyone discussed with you about the treatment you are getting for the cancer you have? (Je kuna mtu yeyote amejadiliana na wewe kuhusu dawa unazopokea)?

	Tick (weka alama)
Yes (Ndio)	
No (la)	

If yes who? (kama ndio, nani aliyejadili)

	Tick (weka alama)		Tick (weka alama)
Doctor (daktari)		Relative (jamaa yako)	
Nurse (muuguzi)		Friend rafiki	
Trained counselor (mshauri)		Others specify (wengine taja)	

12. On a scale of 0-3, can you rate the level of understanding on the the type of treatment you are receiving and schedule? (kwa kipimo cha 0-3, unaweza kukadiria kiwango chako cha kuelewa kuhusu aina ya matibabu unayapokea na kuratibu)

Scale	**level of understanding**	Tick (weka alama)
0	I don’t understand at all (sielewi kabisa)	
1	I am still a little confused (bado nimechanganyikiwa kidogo)	
2	I understand most of it (ninaelewa Zaidi yake)	
3	I understand everything (nimaelewa kila kitu)	

13. Were you told of the possible benefits of the treatment you are receiving? (Je umeelezwa faida ya dawa unazopewa)

	Tick (weka alama)
Yes (Ndio)	
No (la)	

14. Were you told of the possible side effects of the treatment you are receiving? (Je umeelezwa uwezekano wa adhari zinazotokana na matibabu unayopokea)?

	Tick (weka alama)
Yes (Ndio)	
No (la)	

15. How many sessions of cancer treatment have you received before today? (Umepewa vipimo vingapi vya dawa hadi sasa)?

	Tick (weka alama)
3 or less (chini ya 3)	
4-10 (kati ya 4-10	
More than 10(Zaidi ya10)	

16. Are you receiving targeted therapy only or in combination with other type of treatment modalities? (Je unatibiwa na aina moja ya matibabu au zaidi ya aina moja ya matibabu)?

	Tick (weka alama)
Yes (Ndio)	
No (la)	

If yes name them (kama ndio, taja)_____

17. Have you ever thought of stopping the treatment you are receiving for cancer? (Je umewahi kufikiria kuacha matibabu ya kutibu saratani)?

	Tick (weka alama)
Yes (Ndio)	
No (la)	

If yes, why? (ikiwa ndivyo mbona)? _____

18. Physical changes caused by targeted therapy (Herceptin) (mabadiliko ya kimwili yanayosababishwa na tiba inayolenga))

Have you experienced any of the following symptoms since you started taking targeted therapy (Herceptin) for breast cancer treatment (please tick where appropriate)

Je, umewahi kupata dalili yoyote kati ya zifuatazo tangu ulipoanza kutumia dawa ya kutibu saratani ya matiti

	Symptoms(dalili)	Yes (ndio)	No(la)
1	Feeling tired (kuhisi kuchoka)		
2	Lack of appetite (kukosa hamu ya kula)		
3	Nausea and vomiting (kichefuchefu na kutapika)		
4	Tingling sensation and numbness (kufa ganzi na kuhisi kuganda)		
5	Breathing problems (shida ya kupumua)		
6	Joint aches (kuumwa na viungu vya mwili)		
7	High blood pressure (shinikizo la damu)		
8	Skin and nail changes (kubadilika kwa rangi ya kucha na ngozi)		
9	Mouth ulcers (vidonda vya mdomoni)		

19. Psychological response (Mabadiliko kwa hisia)

Have you experienced any of the following feelings since you started taking targeted therapy (Herceptin) (please tick where applicable)

Je,umekuwa na mabadiliko katika hisia zifuatazo tangu kuanza kutumia dawa ya kutibu saratanya matiti

	Symptoms(dalili)	Yes (ndio)	No(la)
1	Insomnia (kukosa usingizi)		
2	Depression(huzuni)		
3	Inability to concentrate (kutokuwa na uwezo wa kuzingatia)		
4	Anxiety (wasiwasi)		

20. Sociological changes (Mabadiliko kwa jamii)

Since you started taking Herceptin have you found yourself in any of the following situation?

Je tangu uaze matibabu ya herceptin, umewahi kujipata katika hali zifuatazo

	Symptoms Dalili)	Yes (ndio)	No(la)
1	Family and friend distress (dhiki ya familia na marafiki)		
2	Social isolation (kujitenga dhidi ya kutangamana na watu)		
3	Financial burden (mizigo ya kifedha)		
4	Marital strain/no sexual interest (hakuna maslahi ya ngono)		

Appendix IV: Targeted therapy response

Interview guide (maswali ya mahojiano)

Introduction

My name is Vunyali Millah. I am a student at the University of Nairobi studying for a Masters' degree in oncology nursing. I am carrying out research to find out the effectiveness and experiences of breast cancer patients on targeted therapy in KNH CTC. You are requested to participate in this interview to describe the experiences you have had since you started targeted therapy. You will be given identity numbers which will be used for the purpose of this interview for your identification, otherwise do not give any information that is likely to identify you. The interview is going to be tape recorded but the information will be kept private and confidential. Feel free to participate and remember there is no wrong or right answer. The moderator will guide you through the interview in order to keep it on course. The interview will take around 45-60 minutes and I greatly appreciate you for taking time to participate.

If you agree to participate please give your consent by signing

Participant	signature	initials	date
---	---	---	---

Researcher's signature date

INTERVIEW QUESTIONS

1. Explain how you felt before starting targeted? (Eleza jinsi ulivyo hisi kabla ya kuanza matibabu)

2. Explain how are you feeling after starting targeted therapy? (Eleza jinsi ulivyo hisi baada ya kuanza matibabu?)

3. Have you experienced any physical changes since you started receiving targeted therapy? (Eleza baadhi ya mabadiliko ambayo umeshuhudia kwa mwili tangu ulipoanza kupata matibabu)?

If yes, which ones? (kama ndio,yataje?)

4. What have you done about them? (umefanya nini juu ya hayo mabadiliko mwilini)?

5. Has targeted therapy affected you psychologically? (matibabu ya saratani yamekuadhiri vipi kisaikologia)
If yes, how?

6. Explain how targeted therapy has affected your life in the following? (Eleza jinsi matibabu yameathiri maisha yako ukizingatia)?

a) Social role (jukumu la kijamii)

b) Your usual daily activities (kazi yako ya kawaida)

c) Relationship with family and friends (uhusiano kwa familia na marafiki)

d) Sexual relationship (uhusiano wa kimapenzi)

7. Are you aware of the danger signs you might experience while on the treatment? (je wajua dalili zozote za athari waweza tarajia ukiwa kwenye matibabu haya)?

8. Is there any time you missed your treatment? If yes,why?(kuna wakati ulikosa matibu?kama ndio,mbona)?

9. What would you want to be done better in your care? (Ni nini ungependa kuboreshwa ili upate huduma bora)?

Appendix V: Letter of approval from KNH

KNH/R&P/FORM/01

KENYATTA NATIONAL HOSPITAL
P.O. Box 20723-00202 Nairobi

Tel.: 2726300/2726450/2726565
Research & Programs: Ext. 44705
Fax: 2725272
Email: knhresearch@gmail.com

Study Registration Certificate

1. Name of the Principal Investigator/Researcher
   MILLAH VUNYALI MANG'ARE
2. Email address: Vunyali@students.uonbi.ac.ke Tel No. 0728930475
3. ~~Contact~~ person (if different from PI).....
4. Email address: ..... Tel No. .....
5. Study Title
   EFFECTIVENESS AND TREATMENT EXPERIENCES OF HER-2 POSITIVE BREAST CANCER PATIENTS ON TARGETED THERAPY, KNH
6. Department where the study will be conducted CANCER TREATMENT CENTER (CTC)
   (Please attach copy of Abstract)
7. Endorsed by KNH Head of Department where study will be conducted.
   Name: Dr C Mong'a Signature ..... Date 21/9/22
8. ~~KNH-UoN~~ Ethics Research Committee approved study number P344/04/2022
   (Please attach copy of ERC approval)
9. I MILLAH VUNYALI MANG'ARE commit to submit a report of my study findings to the Department where the study will be conducted and to the Department of Medical Research.
   Signature ..... Date 27 September, 2022
10. Study Registration number (Dept/Number/Year) 28 SEP 2022 / 158 / 2022
    (To be completed by Medical Research Department)
11. Research and Program Stamp

KENYATTA NATIONAL HOSPITAL Research Resource Centre P.O. Box 20723-00202 Nairobi

All studies conducted at Kenyatta National Hospital must be registered with the Department of Medical Research and investigators must commit to share results with the hospital.

Appendix VI: letter of approval from KNH-UON ERC

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

KNH-UON ERC
Email: uonknh_erc@uonbi.ac.ke
Website: http://www.erc.uonbi.ac.ke
Facebook: https://www.facebook.com/uonknh.erc
Twitter: @UONKNH_ERC https://twitter.com/UONKNH_ERC

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

Ref: KNH-ERC/A/349

16th September, 2022

KENYATTA NATIONAL HOSPITAL APPROVED 16 SEP 2022 KNH/UoN-ERC P.O. Box 20723 - 00202, NAIROBI

Millah Vunyali Mang'are
Reg. No.H56/38012/2020
Dept. of Nursing Sciences
Faculty of Health Sciences
University of Nairobi

Dear Millah,

RESEARCH PROPOSAL: EFFECTIVENESS AND TREATMENT EXPERIENCES OF HER-2 POSITIVE BREAST CANCER PATIENTS ON TARGETED THERAPY, KENYATTA NATIONAL HOSPITAL (P344/04/2022)

This is to inform you that KNH-UoN ERC has reviewed and approved your above research proposal. Your application approval number is **P344/04/2022.** The approval period is 16th September 2022 – 15th September 2023.

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by KNH-UoN ERC.
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KNH-UoN ERC 72 hours of notification.
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KNH-UoN ERC within 72 hours.
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to KNH-UoN ERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) https://research-portal.nacosti.go.ke and also obtain other clearances needed.

Yours sincerely,

DR. BEATRICE K.M. AMUGUNE
SECRETARY, KNH-UoN ERC

c.c. The Dean, Faculty of Health Sciences, UoN
The Senior Director, CS, KNH
The Assistant Director, Health Information Dept., KNH
The Chairperson, KNH- UoN ERC
The Chair, Dept. of Nursing Sciences, UoN
Supervisors: Dr. Lucy Kivuti Bitok, Dept. of Nursing. Sciences, UoN
Dr. Sabina Wakasiaka, Dept. of Nursing Sciences, UoN

Appendix VII: NACOSTI license

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **861426**

Date of Issue: **19/October/2022**

RESEARCH LICENSE

This is to Certify that Mr.. Millah Mang'are Vunyali of University of Nairobi, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Nairobi on the topic: EFFECTIVENESS AND TREATMENT EXPERIENCES OF HER-2 POSITIVE BREAST CANCER PATIENTS ON TARGETED THERAPY, KENYATTA NATIONAL HOSPITAL for the period ending : 19/October/2023.

License No: **NACOSTI/P/22/20991**

861426

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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See overleaf for conditions