ADDIS ABABA UNIVERSITY

COLLEGE OF HEALTH SCIENCES SCHOOL OF

PUBLIC HEALTH

THE RELATIONSHIP BETWEEN NUTRITIONAL STATUS AND QUALITY OF LIFE AMONG BREAST CANCER PATIENTS IN ETHIOPIA TREATED AT TIKUR ANBESSA SPECIALIZED HOSPITAL AND SAINT PAUL MILLENNIUM MEDICAL COLLEGE

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Examiners' Approval Sheet

We, the undersigned, members of the Board of Examiners of the final open defense by Ruth Adam, have read and evaluated her thesis entitled *"Nutritional status and quality of life of breast cancer patients: A cross-sectional study"*. This is to verify that the thesis has been accepted in partial fulfillment of the requirements for the masters of public health degree in "Nutrition".

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Table of contents

List of tables

List of figures

ABBREVIATIONS AND ACRONYMS

BC	Breast Cancer
BCPs	Breast Cancer Patients
BMI	Body Mass Index
CA	Cancer
CF	Cognitive functioning
CM	Cancer related malnutrition
DLMIC	Developing and Middle-Income Countries
EF	Emotional functioning
EORTC	European Organization for Research and Treatment of cancer
EORTC QLQ-C30 .	European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Cancer 30
GI	Gastrointestinal
GLOBOCAN	Global organization board of cancer association network
HRQOL	Health related quality of life
KG	Kilograms
PCA	Principal component analysis
PF	Physical functioning
QOL	Quality of Life
RF	Role functioning
RS	Raw score
SF	Social functioning
SGA	Subjective Global Assessment
SPHMMC	St. Paul's Hospital Millennium Medical College
TNM	Tumor, Nodes, Metastases
WHO	World health organization

Summary

Background: Breast Cancer patients often suffer from a substantial loss in weight and energy as a result of changes in appetite and metabolism. The prevalence of malnutrition in breast cancer patients ranges from 30% to 60%. While it is already a proven fact that malnutrition is prevalent among cancer patients, the relationship between nutritional status and quality of life among (QoL) in breast cancer patients had not been adequately explored.

Objectives: This study is conducted to determine the association between nutritional status and quality of life of Breast Cancer patients at Tikur Anbessa Specialized Hospital (TASH) and St. Paul's Hospital Millennium Medical College (SPMMC), Addis Ababa, 2020.

Methods: A cross-sectional study on breast cancer patients treated at Tikur Anbessa specialized hospital (TASH) and St. Paul millennium medical college (SPHMMC) oncology centres out-patient and in-patient departments was done from May to August 2020 . Consecutive sampling was used to select study participants. Nutritional status was assessed using subjective global assessment (SGA) screening tool. Quality of life was assessed using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Cancer 30 (EORTC QLQ C-30) a quality of life measurement scale for cancer patients. To determine the relationship between quality of life scores and nutritional status multivariable linear regression was used.

Results: A total of 411 consecutive breast cancer patients were included. A high prevalence of moderate (30.9%) and severe (25.7%) malnutrition was observed. Regarding the quality of life scores of these patients: The mean of overall quality of life of the study participants was (M=61.33 (*SD*=20.83)). Among the functional scale domains; the first domain with the highest mean score was cognitive functioning (M=76.85 (*SD*=26.87)). The lowest mean among functional scales was observed in social functioning (M=55.03 (*SD*=36.26)). The domain with the highest mean among the symptom scales was fatigue (M=48.98 (*SD*=29.03)) The lowest mean scores were observed in Nausea and vomiting (M=21.65 (*SD*=31.60)). Moderate and severe malnutrition were negatively associated with overall quality of life $\beta = -9.21$ CI (−14.59, −4.67) and $\beta = -17.81$ CI (−16.6,

−2.91) respectively. Malnutrition also showed negative associations with all domains of functional status and strong positive associations with symptom scores covered in the EORTC QLQ C-30.

Conclusion: This study revealed that the magnitude of malnutrition in the breast cancer population is very large and the compromization of their nutritional status also playes a significant role in decreasing their quality of life.

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INTRODUCTION

1.1 Background

Breast cancer (BC) is unregulated multiplication of malignant cells that arises in the breast tissue and it includes spectrum from non-invasive to metastatic carcinoma. Breast cancer is prevalent amongst women and accounts for significant number of deaths. The expected number of cases and annual deaths from it in 2035 are 23.9 and 14.6 million respectively. Globally, it is attributed to one-fourth of the total cancer diagnosis and 14% of cancer deaths according to Global Organization Board of Cancer Association Network (GLOBCAN) 2018 report (1).

In low income countries up to 324,300 women die from this cancer every year, and in some parts of Africa (eastern, middle and southern), it is the second cause of cancer related death among women following cervical cancer. In Africa overall, the estimated number of new cases was 92,600 and total number of death was 50,100 in 2008 and 133, 900 in 2012 (2).

Malnutrition is defined as a loss of energy, protein and fat stores. However, cancer associated malnutrition differs drastically from malnutrition due to basic starvation. The term comprises a wide range of issues which consist of additional causes of malnutrition and complications including anorexia, cachexia and sarcopenia (3).

Cancer patients may experience symptoms such as appetite loss (anorexia) and early satiety from altered hunger signals (3). Cancer Cachexia (systemic inflammation) is often present in which expends the body's metabolic demands and the body uses alternative fuel sources resulting muscle protein catabolism. This in addition to appetite loss depletes lean body mass causing sarcopenia (loss of physical function) (4). Malnutrition resulting from a non-cancer cause results in early loss of body fat compared to cancer related cause in which there is initial loss of lean body mass. As a result immobility and functional loss will occur and these increase the chances infection, and bed sores which are difficult to heal (5). Another key difference is in terms of management: Cancer malnutrition is not corrected by nutrition alone. When the associated cancer cachexia starts to progress, most of the nutritional interventions are unable to reverse it (6). In addition to anorexia and early satiety, the physical limitations decrease food intake (3). Cancer patients may also have

difficulties in swallowing and chewing secondary to obstruction, changes in taste and smell and pain in the throat in cases of head and neck and esophageal cancer (7). Absorption of nutrients could also be delayed due to diarrhea, vomiting, intestinal obstruction and malabsorption in pancreatic, gastric and colon cancer patients (3).

In order to increase the survival rates and reduce morbidity potential recurrence, breast cancer patients undergo different types of treatment modalities. These include surgery, radiotherapy and chemotherapy and are frequently associated with adverse side effects (8). In Ethiopia 83% of the breast cancer patients receive chemotherapy treatment as a frontline therapy or adjuvant or palliative. Adjuvant and neo-adjuvant chemotherapy is provided for duration of 3 to 8 months (9).

Cancer treatments are designed to reduce morbidity by killing or controlling cancer cells and preventing recurrence. This also involves alleviation of symptoms, and allowing patients to be as functional as possible which are aspects of quality of life. Apart from the direct damage inflicted to healthy tissue by the administration of chemotherapeutic drugs, side effects of treatments also indirectly impact food intake, absorption or use by inducing nausea, vomiting, anorexia, abdominal pain, diarrhea, fever, stomatitis and mucositis. Patients will in turn limit their food intake to evade these symptoms; therefore, reducing their dietary consumption which may consequently result in nutrition deficiency. Also, prolonged fasting periods after chemotherapy are prevalent in breast cancer patients (BCPs) and those extending beyond 48 hours will facilitate muscle-mass loss resulting in further deterioration of their nutritional status (10, 11).

Quality of Life (QOL) is defined as the patient's perspectives on their ability to live useful, meaningful and fulfilling lives despite being burdened with disease. It comprises the patient's own view and understanding of their global health, physical, social, financial, psycho-social performances, as well as symptoms such as pain, fatigue, anorexia, nausea, sleep, sexual dysfunction and depression (12). Due to advances in oncological care, the influence of nutritional status on Quality of Life has become an issue of interest and almost all newly diagnosed cancer patients believe that nutrition has a role to play in their anticancer treatment (10). It is an instinct for every human being to value food intake in order to maintain social structure, self-esteem and enjoyment (11).

During the past four decades, quality of life has become interest of medical and psychological researches. It has recently been recognized that maintaining and improving the quality of life for cancer patients is an important part of treatment (11, 12). In contrast to the traditional biomedical indicators of treatment outcome such as overall survival time and progression free survival, there is a growing interest in QoL parameters (13, 14) and are progressively being used to measure how chronic illnesses interfere with activities of daily living. Therefore, it has been considered as “the ultimate goal of all health interventions” (14).

1.2 Statement of the problem

Globally, breast cancer accounts to one-fourth of the total cancer diagnosis and 14% of cancer deaths. According to the GLOBCAN 2018 report mortality in Africa due to cancer accounts for 7.3 % of all the global cancer deaths (1). Despite limitation of epidemiologic data in Ethiopia, the estimated incidences of breast cancer in 2018 were 15,244 (22.6 %) of all cancers among men and women (15). The Addis Ababa cancer registry reports that breast cancer prevalence is at 33% of all female cancer cases, followed by cervical cancer accounting 16% of cases (16). The disease continues to be a public health threat in developing and low middle income countries (DLMIC) and has significant societal implications occurring in young or middle age women when they also have responsibilities of raising their children and taking care of the family as a whole (9).

Although there are no widespread demographics on cancer malnutrition on population basis like cancer incidence statistics are accounted for in most countries, it's recognized that 50% (8.9 million) of all cancer deaths worldwide are credited to cancers regularly associated with malnutrition. Some ot these are; gastric, esophageal, pancreatic and colorectal cancers (17). Studies on oncology settings report the incidence of malnutrition in breast cancer patients ranges from 31% to 60% (17, 18). Half of these present with some form of nutritional deficit at diagnosis (19) with one third of them having lost 10% of their previous body weight. This number could increase to 50% during treatment (4). These factors combined make cancer patients have an almost three-fold higher rate of malnutrition than non-cancer patients (20).

The risk of malnutrition in breast cancer patients is comparatively lower compared to cancers of Gastro-intestinal (GI) tract and head and neck cancers. (11). But, weight gain is a major concern. Weight gain could be due to: chemotherapy-associated hungers, increased snacking to offset nausea and limited physical activity. Many studies have also demonstrated a link between chemotherapy agents and weight gain (21-33). Nevertheless, malnutrition regardless of whether by deficiency or excess has distinct ramifications in affecting the prognosis of breast cancer patients.

These days, because of the critical rise of obesity, we are presently faced with sarcopenic obesity a condition where loss of lean mass is veiled by adiposity\fluid retention making it harder for

conventional screening methods like BMI to identify nutritional deficit. This renders breast cancer patients to suffer from both loss of muscle mass and increased body fat at the same time making them have many negative implications like treatment toxicity functional, and reduced muscular strength and mobility (29, 32, 33).

The impoverishment of nutritional status leads to a decrease in physiological function (muscular, immune and cognitive functions) and predispose to complications. The parameters of Qol (Quality of Life) depend on the physiologic function of that individual. Muscle mass loss will alter the patient's functional status and enhances dependency on others. Loss of cognitive function maximizes risk of developing depression and anxiety which decrease Qol. Therefore, nutritional status is bound to have some effect on Qol as improvement in nutritional status is an influencing factor in the improvement of physiological function (34).

In our setting about 70% of the breast cancer cases are presented to treatment centers at late stages of the disease due to delays in accessing clinical care and inadequacy of health systems in referring patients to oncology treatment centers (9, 35) There is a lag between onset of symptoms to action averaging about 18 months .The delays also lead women to neglect their symptoms for a year or up to 5 or 6 years in some cases (9). This would most assuredly lead to devastating outcomes as studies have demonstrated unchecked nutritional deterioration even weight loss as little as 5% in consecutive months since diagnosis reduces response to therapy and therefore survival with up to 20% of cancer patients dying from complications due to malnutrition instead of the cancer itself (36).

In breast cancer patients, undetected/unaddressed malnutrition leads to severe outcomes and an unfavorable prognosis. Malnourished breast cancer patients go through fewer cycles of chemotherapy and radiotherapy and are susceptible to treatment toxicities. The increased gaps between treatments promote disease progression. These will lead to repeated hospitalizations increasing financial costs for overseeing cancer patients. At its extreme cancer related malnutrition has shown to increase mortality 2 to 5 times in malnourished cancer patients than non-malnourished cancer patients (37, 38).

It is a known fact that malnutrition is associated with increased morbidity and mortality globally. However, its relationship with quality of life of breast cancer patients particularly in developing country like ours where its prevalence is rising rapidly has not been previously assessed.

In oncology patients, QoL is becoming a critical issue because more patients can now be treated, albeit not necessarily cured. Therefore, the expected survival of these patients is longer now than it was a few years ago, and so there is a consequent need to satisfy patients' needs and expectations regarding their everyday life. In this respect, it is important to note that cancer patients often prefer to trade off months of survival if this is associated with a better QoL (39).

Breast cancer, like other serious illnesses, may cause many changes in a person's life like pain, body alterations, physical dysfunctions and discomfort imposes limitations or alterations on everyday behavior, social activities, psychological wellbeing, as well as in other aspects of personal daily life. And also the possible confrontation with imminent death may induce metabolic and lifestyle changes which may have a huge impact on QOL (40)

There are no nutritional assessments, therapy or counselling guidelines in Tikur Anbessa or St. Paul's oncology centers (2 of the country's top treatment centers). In addition, there are only a few studies evaluating the quality of life of cancer patients and specific information on the nutritional status among breast cancer patients undergoing both radiotherapy and chemotherapy is notably lacking in these centers. Furthermore, limited physician number and the lack of proper training will undermine those who are at risk of nutritional deficiencies.

1.3 Significance of the study

This study is conducted to determine the relationship between nutritional status and quality of life among breast cancer patients at major oncology centers in Addis Ababa. The results from this study will not only provide cancer patients' adequate information about the importance of adherence to aggressive nutritional intervention, but also enhance oncologists' proficiency on achieving better assistance on improving the quality of life of their patients by providing nutritional advice/interventions tailored to the patient's specic needs.

This study will show the extent of the malnutrition problem that is experienced amongst breast cancer patients and also its influence on their day-to-day activities, emotional and functional status, and the roles they play at home as well as their symptoms. Thorough nutritional assessment of nutritional status of these patients and earlier detection of nutritional risk symptoms will help us focus our interventions that may help prevent further or pending malnutrition and weight loss during treatment and ultimately improve the quality of life of breast cancer patients.

2. LITERATURE REVIEW

2.1 Introduction

Literatures included in this review were searched from google, google scholar and PubMed search engines. The keywords used to search the literatures were: cancer malnutrition, breast cancer burden, nutritional status, quality of life, SGA and EORTC QLQ C-30. From the obtained articles, those that were published, had direct relevance to the study and written in English were selected for review based on their relationship to the current study. The literature review is organized according to the following sections.

2.2 Breast cancer burden

As indicated by GLOBOCAN 2018 projection, the worldwide cancer burden is evaluated to have risen to 18.1 million new cases and 9.6 million deaths in 2018. Globally one out of 5 men and one out of 6 women are estimated to develop cancer in their lifetime and one in 8 and one in 11 men and women respectively die from it (1). Breast cancer is the most frequently occuring malignancy in women globally, with over 1.3 million cases diagnosed annually accounting for 24.2%, i.e. about one in 4 of all new cancer cases diagnosed in women. It also accounts for approximately 0.5 million deaths worldwide followed by lung and colorectal cancer (1, 41).

In the past three decades, the prevalence of breast cancer has almost doubled (41). Over the decades, the survival rates of breast cancer patients have increased in the developed world. In the 1960's among women who were diagnosed with breast cancer only 35% would be alive after ten years; but, by the mid 1980's this number has risen to 77%. Early detection and various improved treatment options are accredited for this improvement in prognosis among the breast cancer patients (42). In contrast to most cancer types, breast cancer has a long course of illness even if there's metastasis present (41).

Despite its high prevalence in developed countries, breast cancer is incidence is increasing steadily in low income countries. Countries that used to have a low to moderate incidence rate like Africa, Asia and South America, are now experiencing a steady rise in incidence (41). There were 847,000 new cases of cancer 6% of the world total and 591,000 deaths 7.2% of the world total in the 54

countries of Africa in 2012, the most common cancers in women, by far were cancers of the breast (27.6% of all cancers) and cervix (20.4%) (1).

The reason behind the high fatality of breast cancer women is; Most countries in Africa have pyramid shaped population structues in which the larger percentage of the population is in the younger age than old. This means that in most African health centers, a higher prevalence of breast cancer is observed in the younger than the aging population groups due to the low median age of the population (43). In any population, young breast cancer patients tend to have a pathologically and clinically aggressive type of breast cancer with rapid progression and high fatality rate(41). And, since most breast cancer cases presented in Africal health centers are at young age their patterns are most aggressive in their clinical course and are considered to have high mortality rates (43).

Ethiopia is also one of the African countries with pyramid population structure. In Ethiopia according to a study done in Tikur Anbessa hospital over a period of sixteen years, 1997-2012, more than 50 cancer types, a total of 16,622 new cases were registered in Tikur Anbessa Specialized Hospital. Out of this, 3460 equivalent to 20.8% prevalence were new cases of breast cancer representing approximately 216 cases per annum (44).

2.3 Malnutrition in breast cancer patients

Nutritional decline is regularly acknowledged as a subsequent of the course of cancer treatment. Cancer alters the physiological and metabolic features of the patients' intake of important nutrients. In addition, symptoms such as appetite loss, nausea, vomiting, taste changes, constipation and diarrhea that may result from the tumor itself of treatment side effects have negative impacts on energy and dietary intake resulting in malnutrition which plays a significant role in the progression of the disease and ultimately prognosis (45)

A comparative cross sectional study that compared 117 breast cancer patients with 88 women without breast cancer in terms of calorie, macronutrient and different food groups intake before and during chemotherapy stated that before the initiation of chemotherapy there were many similarities in the dietary habits between the two groups but as the treatment progressed reports

showed a significant reduction in energy, fat and protein intake as well as specific food groups assessed with 24 hour dietary recalls (46).

A retrospective study done in china that evaluated 495 patients with advanced cancer using PG-SGA revealed that severe weight loss >20% in 6 months was found in 7% of the patients and it continued to occur in 80.4% of the patients as treatments progressed. And, while 59% of the patients had difficulties in eating food, 62% of the patients had a reduction in fat and 83% of the patients had nutrition impact symptoms, including nausea and vomiting, appetite loss and diarrhea (47).

A study done to estimate the prevalence of malnutrition in patients with breast cancer during their treatments using patient generated subjective global assessment tool (PG-SGA) at an Anti-Cancer Center in Batna (Algeria) among 167 patients reviled that 77.2% of patients were at high risk of malnutrition and almost all patients (97%) needed nutritional interventions and also Half of the patients (47.8%) with metastasis were severely malnourished (25).

In Benghazi city of Libya, a cross-sectional study done to assess the nutritional status of 145 female cancer patients using Subjective Global Assessment (SGA), identified that 73.5 % of the subjects were at risk of malnutrition and while 25 % were severly malnourished leaving only 1.5 % well nourished females in the study (26).

2.4 Weight gain in breast cancer patients

In recent years, the prevalence of malnutrition in breast cancer patients cannot be stated without the context of epidemic obesity (48). One-third of cancer diagnoses are attributed to behavioral and nutritional risks that lead to excess body weight. Overweight and obesity are now prevalent in patients with breast cancer and the upward shift in body weight makes it more challenging to detect malnutrition. Weight gain can occur in 50-90% of women receiving chemotherapy (49, 50). Weight gain of more than 10KGs is not an uncommon finding and is also predictable during chemotherapy because reduced physical activities and increased energy intake are usually reported among breast cancer patients (50)

A retrospective study that analyzed A total of 172 advanced breast cancer patients who underwent surgery after Chemotherapy concluded that High visceral fat is associated with worse Non-

Chemotherapy outcomes in breast cancer patients, especially postmenopausal patients (51). The results from a study done in England have confirmed that the majority of breast cancer patients gain weight during chemotherapy and that approximately 1/3 of patients gain more than 5 kg in weight (29). Additionally a study aimed at determining the association of antineoplastic chemotherapy on weight change following breast cancer diagnosis revealed that patients who had received chemotherapy were 65% more likely to gain weight than those who did (52).

A Brazilian prospective longitudinal study conducted to evaluate the impact of treatment on the nutritional status and diet of breast cancer patients indicated at first assessment 56% of the women were overweight and these patients showed a significant increase in weight, BMI and waist circumference and a worse nutritional status in the three sequential assessments that followed (53).

In accordance with the above litratues, a study done in Malaysia also revealed that more than half (51.6) % of its study population were pre-obese or obese. The main reason postualated for this high increase being the prevalence of physical inactivity resulting in energy imbalance in these patients (21).

2.5 Nutritional status and Quality of life of breast cancer patients

The effect of nutritional status on quality of life by most accounts is related to seems to the various interactions between inflammation and metabolic disorders caused by malnutrition. These changes lead to physiological and physical decline and increased disease symptoms in addition to psychological, family role and social dimensions that have negative impacts on QoL (54).

In a Philippian cross-sectional study that included a total of 97 subjects, 40.2% were considered malnourished according to their SGA scores. quality of life and its parameters: physical state, role, emotional state, cognitive functioning, cancer fatigue, nausea and vomiting, pain, insomnia, and loss of appetite were statistically different across all Subjective Global Assessment groups (34).

Another study that used SGA to determine nutritional status which included 119 cancer patients out of whom 32.8% of participants were moderately malnourished and 26.9% were severely presented an important association with physical and role functional scales and with some symptomatic scales as such as appetite loss, dysphagia, fatigue, and diarrhea. An important association of weight loss of >10% was observed with appetite loss. (55).

An observational study in Frsnce of 907 cancer patients indicated that malnutrition either moderate or severe was diagnosed in 43.5% of the patients using the SGA screening tool and it was also shown that compared to the well-nourished patient group the mean quality of life of the malnourished group was considerably lower 62.8 vs 48.8. And, cancer patients who had not lost weight had significantly higher physical, cognitive, emotional and social functioning scores and lower symptom scores compared to patients who had a weight loss of >10% in the past 6 months (18).

According to a study done in brazil on one hundred and forty-three cancer patients of whom 58.7% were breast cancer patients using SGA, all patients who were severely malnourished at baseline either died or discontinued the treatment when patients' health status declined rapidly (56). And findings from a study conducted among 50 non-terminal cancer population inclusive of patients with breast malignancy demonstrated that protein intake below 0.9g/kg was associated with a poorer perception of physical functioning (57).

A systematic review that included 26 studies on the role of nutritional status in predicting QoL demonstrated a strong association between these two variables in the breast cancer population (23). Whereas a cross-sectional study conducted in Malaysia on 41 breast cancer patients that attempted to explore the association between nutritional-related variables and quality of life using dietary intake, the results revealed that neither energy nor protein intakes were significantly associated with quality of life (40).

However, a cross-sectional study done on much larger sample size (one hundred Iranian breast cancer survivors) using dietary recalls and PG-SGA as well as anthrompmetric measurments indicated that survivors with better nutritional status had better functions and experienced less common symptoms, whereas malnourished survivors had lower physical, cognitive and social performance and experienced greater symptoms (58). And another Malaysian study that aimed at investigating how nutrition indicators inflence Health-related Quality of Life of breast cancer patients during tratment concluded that being well-nowrished improved overall quality of life while being malnourished decreased functional status significantly (21).

2.6 Factors affecting the quality of Life of breast cancer patients

Patients who have been diagnosed with breast cancer have altered physical and psychological well-being. They are also associated with economic and social impacts that impinge on function, appearance, and social interactions, leading to the disruption of the daily routines, not to mention psychological impacts like depression and anxiety that mostly occur after diagnosis that affect quality of life (59).

Age

A population survey done in the US on 1357 breast cancer patients to assess the relationship between socio-demographic characteristics and cancer treatment on quality of life found that women above the age of 70 had better quality of life than younger ones, and the impact of the disease was more extreme on social and emotional functioning as well as body image outcomes of quality of life in younger women (60). Similarly, a prospective study done in Shanghai, china to assess the quality of life of 1160 breast cancer patients in terms of social support, health insurance and clinical factors revealed that there is a significant relationship between quality of life and age ($P< 0.05$) (61). However, a recent study that evaluated the quality of life of Moroccan breast cancer women reported that younger women tended to have better quality of life than older ones because they tolerated the side effect of cancer treatments much better (62).

Occupation

An Iranian cross-sectional study conducted to determine the predictors of quality of life among 119 women diagnosed with breast cancer revealed a significant relationship between occupation and quality of life ($p<0.01$) claiming that unemployed patients had lower quality of life compared to those with certain jobs (63). In accordance with the above studies, a descriptive and cross-sectional study that was undertaken to determine the factors affecting cancer patients' quality of life on 352 breast cancer patients in Turkey showed that Housewives had a social and physical wellbeing lower than patients employed in diverse activities (64).

Financial Status

A study in Iran that assessed predictors of quality of life among 119 breast cancer patients revealed a significant association between financial status and quality of life claiming those with low income had low quality of life (63) . In another cross-sectional survey that targeted 100 patients diagnosed with breast cancer in Nepal more that 90% of the patients with financial difficulties had significantly lower quality of life (65). And a study in Ethiopia among 250 breast cancer patients showed that women with the income of 320-700 birr had lower quality of life (66).

Education

A population survey from the United States revealed that chemotherapy lowered functional scales of patients and had an immensely great impact on on those who had lower levels of education (67). An institution based study on breast cancer patients and their care givers presented findings that compared to patients with no education, those with primary and secondary level of education had better quality of life scores (OR 1.9 and 2.9 respectively) (68).

Marital status

A descriptive cross-sectional study done to determine the quality of life of cancer patients in Ghana found that compared to married patients, single patients had worse quality of life (64). Another cross-sectional study in Kenya also supported this finding by stating that marriage was associated with better quality of life (68). Results from a Turkish study also determined that single patients had more emotional and role difficulties than married ones, and singles faced more psychological deficits when receiving chemotherapy and had less social support (69).

Disease and treatment related factors

Beyond the socio demographic factors which can impair quality of life of breast cancer patients, clinical stage of the disease, tumor size, time since diagnosis, number of chemotherapy cycle, presence of comorbidity, nodal involvement and previous treatments are other factors which can affect QOL of breast cancer patients.

Physical dimansions of quality of life are affected by the presence of co-morbidities, stage of diagnosis also has an effect. If breast cancer is diagnosed at early stage which means before the metastasis of the tumor compared to late stage it has better outcomes on the quality of life (70).

Size of the tumor also has it's own effect, small size tumors at the time of diagnosis have favorable outcomes and less detrimental effects on functional scales compared to large size tumors (70). If the grade of the tumor is low, it is less likely to advance quickly. Whereas high-grade tumor is more likely to advance aggressively and tend to result in poor treatment outcome (71). Age at the time of diagnosis also has its own effect; diagnosis at later age results in poorer quality of life as the presence of a number of co-morbidities as well as physiological deteriorations experienced by the elderly (24).

Type of treatment also affects QoL; poorer QoL is observed among participants undergoing chemotherapy; due to the severe treatment side effects chest pain, nausea/vomiting, stomatitis, diarrhea, constipation, fever, fatigue, anorexia, dyspnea, dermatitis, neurosensory or motor problems, bleeding, palmar-plantar syndrome, pain, bruising and extravasation, as well as other less common side effects. The presence of any or a combination of these side effects can have a detrimental effect on the patients' well-being (72). A study from Ethiopia revealed that patients in the second cycle of chemotherapy treatment showed that patients at their second cycle of chemotherapy had significantly QoL (73).

2.7 SGA as a tool for measuring nutritional status in cancer patients

Subjective global assessment (SGA) is a reference method used to determine the nutritional status of cancer patients. The best aspect of this tool is that it encompasses parameters other than just weight change and BMI alone to monitor nutritional status. Therefore, not making it confounded by alterations in body composition and fluid retention commonly associated with breast cancer. So SGA is the ideal tool used in assessment of nutritional status of breast cancer patients (14, 23, 34, 72, 74-78).

Malnutrition has been shown to have many unfavorable effects on health and quality of life (14, 18, 23, 79-81). To ensure appropriate nutrition care is provided, an in-depth assessment of a patient's nutrition status is needed, and the SGA has been developed for this purpose. The SGA was first created by Detsky et al (77) . It's an easy-to-use and a noninvasive clinical tool that combines data from subjective and objective aspects of medical history. In our setting the SGA tool has been validated by Batcho et al (82). SGA allows the early identification of malnourished

patients, especially those with altered body composition markers due to overweight and obesity (77).

2.8 The EORTC QLQ C-30 as a tool for measuring quality of life in cancer patients

The EORTC QLQ C-30 questionnaire is a multi-item questionnaire aimed to address the QOL of cancer patients in general. It has 30 questions, composed of five multi item functional subscales also called dimensions: physical, role, emotional, social and cognitive functioning; three multi item symptom scales measuring fatigue, pain, and nausea and vomiting; a global health status/overall QoL subscale; and six single items to assess financial impact and symptoms such as dyspnea, sleep disturbance, appetite, diarrhea, and constipation. All of the scales and single-item measures range in score from 0 to 100. A high scale score represents a higher confirmatory response level. Thus, a high score for a functional scale represents a high / healthy level of functioning, a high score for the global health status / QoL represents a high QoL, but a high score for a symptom scale / item represents a high level of symptomatology / problems (12). In our setting the EORTC QLQ C-30 tool has been validated by Ayana et al (83).

2.9 Conceptual Framework

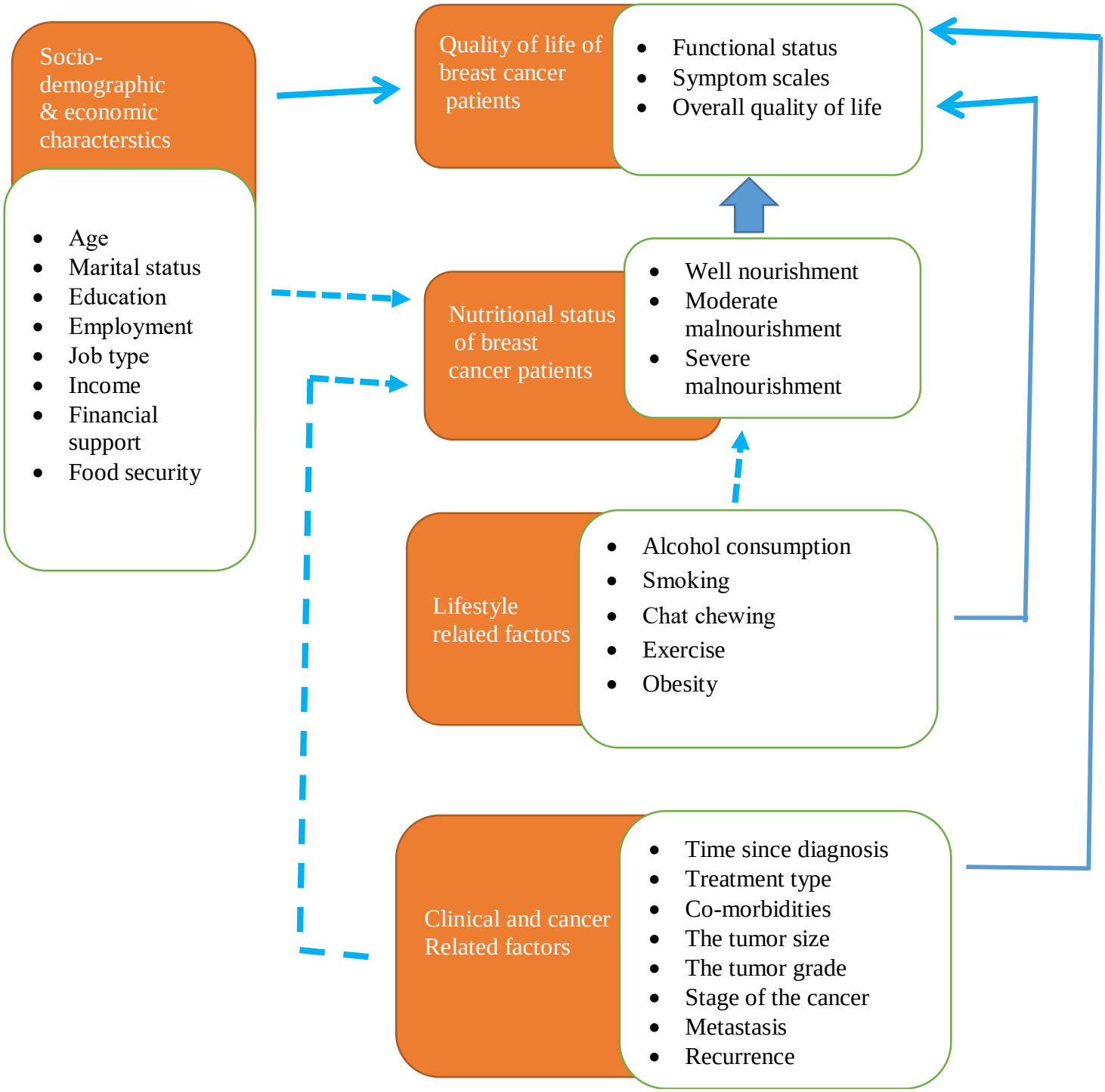

Figure 1Conceptual framework for the relationship between nutritional status and quality of life.

- Broken arrows are used to indicate relationships that exist between variables, but will not be assessed in this study.

2.10 Research questions

1. What is the magnitude of malnutrition in breast cancer patients treated at TASH and SPHMMC?
2. What is the level of quality of life of breast cancer patients treated at TASH and SPHMMC?
3. Is there a relationship between nutritional status and quality of life in breast cancer patients treated at TASH and SPHMMC?

3. RESEARCH OBJECTIVES

3.1 General Objective

To determine the nutritional status and level of quality of life of breast cancer patients and measure the association between nutritional status and quality of life of Breast Cancer patients in Ethiopia treated at TASH and SPHMMC Addis Ababa, 2020.

3.2 Specific Objectives

The specific objectives of this study are:

1. To determine the magnitude of malnutrition in breast cancer patients in Ethiopia treated at TASH and SPHMMC 2020.

2. To describe quality of life of breast cancer patients in Ethiopia treated at TASH and SPHMMC 2020.

3. To determine the association between nutritional status and quality of life among breast cancer patients in Ethiopia treated at TASH and SPHMMC 2020.

4. METHODS AND MATERIALS

4.1 Study area

The selected settings for this study are: Tikur Anbessa Specialized Teaching Hospital (TASH) oncology unit and St. Paul's Hospital Millennium Medical College (SPHMMC) oncology units. They are both public hospitals and provide care to referred patients from all over the country.

Tikur Anbessa's oncology unit, located in the capital, had once been the only cancer care providing center in the country. Most of the patients including breast cancer patients are from the capital and the rest are from nearby regions such as Oromia and Amhara. According to reports in 2010, the hospital received 260,000 patients of which 2200 were cancer patients (2000 adults and 200 children). There were 4 medical oncologists, 2 hematologists, 2 surgical oncologists, 1 pediatric oncologist and 3 palliative pain specialists delivering care to these patients. The care provided in the unit consists of administering anti-cancer medications, performing surgery and providing radiotherapy (only provided at this center until now) (44).

St. Paul's Hospital Millennium Medical College (SPHMMC) oncology unit has been established in recent years. The unit is established following the country's plans to expand cancer treatment centers and reach to major cities of the country such as Gondar, Mekelle, Hawassa and Harrar. The unit began with 1 oncologist, 12 general practitioners, and 14 nurses.

4.2 Study design and period

The study employed an institution based, cross-sectional design performed at Tikur Anbessa and St. Paul's Hospital Millennium Medical College both centers for chemotherapy for cancer patients in Addis Ababa Ethiopia from May-August 2020.

4.2 Population

All breast cancer patients in Ethiopia were considered to be the target population. While all breast cancer patients who were diagnosed and treated in TASH and SPMMC were considered to be source population, the study population were all breast cancer patients who were receiving treatment at TASH and SPMMC from March-June 2020. The study unit were all breast cancer patients diagnosed and treated in those selected hospitals and who fulfilled the inclusion criteria.

4.3.5 Inclusion and exclusion criteria

Inclusion criterias were; patients 18 or above year of age with histologically confirmed breast cancer who have, the cognitive and verbal ability to answer the questions on the data collection tool.

Exclusion criterias were; severe physical or mental illness that does not allow for the full participation of the patients in the study, functionally impairing substance abuse and primary tumor site other than the breast,

4.3 Sampling

4.4.1 Sample size determination

For the first objective, the sample size was determined using open Epi with the assumption of single population proportion and taking 40.12 prevalence of malnutrition from a study done in Philippines on quality of Life and nutritional status Among cancer patients on chemotherapy (34). At 95% confidence level and at 5 % margin of error and 10% non- response rate the sample size became 411.

The sample size for the second objective was determined using single mean population formula using epitools software (84) by taking the means and standard deviations of the domains of quality of life from a previously done study in Tikur Anbessa specialized hospital to assess the quality of life of breast cancer patients (85). with the assumption of 5% level of significance level and 80% power. The sample sizes were calculated for all domains and the highest sample size was that of insomnia =218 (Annex 5)

The sample size for the third objective was determined using G power software version 3.1 (86). The sample size calculations were based on linear multiple regression with effect size of 0.15, 95% confidence level and 90% power. Given these specifications the total sample size became 73 and after 10% non-response rate was adjusted the minimum sample size was 81 women. The first objective had the largest sample size, so the study was done on 411 breast cancer patients.

Being the only 2 current cancer treatment and referral centers in Addis Ababa, the TASH and SPMMC were selected for research purpose.

4.4.2 Sampling Procedure

In general, non-probability sampling technique was used to select the respondents from the two hospitals. The study areas were selected for the ease of data collection in terms TASH being the only cancer treatment and therapy center with both Radiotherapy and Chemotherapy and St. Paul's Hospital Millennium Medical College (SPHMMC) the second chemotherapy center. Breast cancer is selected because it is the leading cancer and most frequently diagnosed cancer type as per report. Selection of the study participants was done using the inclusion criteria and they have received and signed an informed consent. The recruitment of participants continued until the required sample size was reached.

4.4 Variables and measurement

Outcome variable

Quality of Life

The dependent variable of interst was QoL and it was measured using the EORTC QLQ C-30 Instrument. The validity and reliability of this instrument in measuring the QoL of cancer patients in multicultural clinical research settings like Ethiopia have been favorably reported (83). It is designed to be cancer specific, multi-dimensional in structure, applicable across a range of cultural settings and suitable for use with additional siteor treatment specific modules. The translated and validated version of EORTC QLQ C-30 in the Amharic language has been adapted in a previous study (83).

Independent Variables

The key independent variable was nutritional status of the subjects which assessed using the validated SGA tool that has two sections; Medical history and physical examination.

History: The following are components of the history: adequate nutrient intake, weight change, and functional capacity. In order to say adequate nutrient intake energy and protein ingestion has to meet the metabolic demands and functions (Basic metabolic rates). Being an important component (history), weight is often subjective and will remain valid despite the absence of objective measurements. Directions of weight change should be subject of interest in order to determine patterns such as turnaround to SGA A or continuation of a downward progression to SGA B. Functional capacity depends on two determinants: the individual nutritional status (presence of protein –calorie malnutrition) and overall clinical presentation i.e. the underlining condition. The body has the ability

to adapt to minor stress but the presence of high stressful conditions put the body into a state of significant metabolic demand, surpass the body's ability to adapt.

Physical Examination; There 2 physical examination components: body composition and edema. Body composition is defined as fat stores and muscle mass and factors including: disuse (loss of functions), cachexia and sarcopenia (age related) have effects. The power of SGA is that multiple body sites can be considered for determination of fat or muscle wasting. Edema or ascites are collections of fluid in "the third space" may be the result of an underling condition (for e.g. congestive heart failure, liver or kidney disease) or severe protein-energy malnutrition. As this leads to false elevation of weight measurements, it should be taken into account and adjusted.

Control variables

Demographic and socioeconomic characteristics

Socio-demographic characteristics such as age, level of school attended, family size, living arrangements and socio-economic status were included. Age is measured in years. Education levels were measured using scales ranging from: 1. (Unable to read and write 2) Able to read and write Primary level (1 -8) 3) Secondary level (9-12) 4) Technical/Vocational 5) Higher (University) graduate and above were assessed. Occupation of their fathers were assessed using choices: 1) Government or private employee 2) Merchant 3) Daily laborer 4) Unemployed. Occupation were assessed using choices 1). House wife 2) Farmer 3) Civil Servant 4) Merchant 5) Daily Labourer 6) Student. Marital Status is also categorized as 1) unmarried 2) married 3) separated 4) Divorced 5) Widowed.

Socioeconomic index was assessed using wealth index in which participants were asked about their household fixed asset and housing condition questions a score "1" given to those who own/have and score of "0" given to those who did not. Food security was also assessed and categorized as 1) Food secure 2) Mildly food insecure 3) Moderately food insecure 4) Severely food insecure.

Cancer related Factors

Cancer related Factors such as: tumor size, tumour grade, cancer stage, metastasis at the time of initial diagnosis, treatment type and number of chemotherapy cycles taken were measured. We used the Tumour- Node-Metastasis (TNM) classification of stage of breast cancer at diagnosis (87) which consists of 3 components: (T) tumour size, (N) absence or presence and extent of regional lymph node metastasis and (M) absence or presence of distant metastasis. Tumor size is classified as (1) < 2cm (2)

2-5 cm (3) > 5cm. Tumour grade was measured as (1) Low grade (2) Intermediate grade (3) High grade (4) Highest grade and Stage of the cancer was also classified as (1) Stage 1 (2) Stage 2 (3) Stage 3 (4) stage 4. The presence or absence of metastasis at the the time of initial diagnosis is also assessed and previous as well as currently undergoing treatment type was also assessed. Presence of other co-morbidities were also assessed.

4.8 Data Collection procedure

Interviewer-based questionnaires were used to assess socio demographic status, nutritional status, quality of life, other disease and clinical factors. Weight measurement was also taken. socioeconomic status was assessed using household fixed asset and housing condition questions. Standard and validated data collection tools were used to collect the data. Prior to data collection pre-test was conducted at both data collection centers and subjects that were included in pre-test study were excluded from the actual study.

Information on clinical variables on tumor size, tumor grade, cancer stage, presence of metastasis, time since diagnosis, treatment intent, previous treatments, co-morbidities were obtained from medical records.

Data were collected over 3 and a half months' duration from May to August 2020. Three nurses participated in the data collection process. The principal investigator also supervised the process and ensured a proper weight measurement was taken. Patients' were approached in the oncology waiting rooms and wards were explained the aims and objectives of the study, and those who agreed to participate signed the informed consent form and thumb prints were used for those who couldn't sign. Finally, the parents completed an anonymous interview-based questionnaire, and physical assessment was taken in private examining rooms as well as weight measurement.

Weight measurement

Weight was measured using digital weight scales. To measure weight, the scale was placed on flat surface and participants were measured with minimum clothes and no shoes. It was recorded to the nearest 0.1 kg. Measurement scales were carefully handled and calibrated every day by placing iron bars before the beginning of data collection and data collectors check whether the scales are at 0.00

reading before taking each measurement. Each participant was standing on the scale feet slightly apart in the middle of the platform of the scale and the data collector recorded the weight reading.

4.9 Data quality control

Recruitment and training of research assistants

Research assistants with a medical background (2 BSc and 1 MSc degree holder nurses), currently working in the study units, were recruited and trained theoretically and practically for 4 days on the protocol, study procedures including the how to get informed consent, study tools and on proper data collection using pre-tested data collection tools. Training on sociodemographic/economic status, disease related, quality of life related and SGA and weight measurements was also provided. Before the administration of the questionnaires the medical staff registered, for each patient, the clinical variables, the duration of the disease, the presence of distant metastases, and tumour burden according to TNM (tumor, node, metastasis) staging (88) from the medical records.

The pre-test was conducted to identify questions which were confusing, upsetting or containing difficult vocabulary, difficult to answer questions and to identify any other problems that the patients encountered. The respondents had some difficulty of understanding questions and ratings stated in last 2 global health status questions like: “how would you rate your overall health status in the past week?” and “how would you rate your overall QoL in the past week?” so when these items were asked additional explanations were given. There were no upsetting questions.

All data collectors from both centers participated in standardization exercise in which they took repeated measurements of ten patients. Each measurer took two weight measurements for ten patients. Measuring equipments’ were tested regularly during data collection. Faulty equipment’s were replaced. Each scale was checked daily with a standard scale. Technical error of measurement (TEM) was calculated and the Intra observer technical error of measurement for weight was found 0.12 and 0.19 and the inter observer technical error of measurement was 0.21. In addition, the coefficient of reliability was calculated for weight was within the acceptable range ($\geq$ 96%) (75).

Pre-testing of the whole questionnaire was made. On the spot checking and review of completed questionnaires to ensure completeness and consistency of the information was done and immediate actions were taken. To keep accuracy of data, data entry was done by the principal investigator.

4.10. Operational Definitions and standard definitions

Standard definitions

Cancer stage- The stage of a cancer describes the size of the cancer and how far it has spread (87).

Cognitive function- Had a lot of difficulty concentrating and remembering things when the score is 0 and no difficulty of concentrating and remembering things when score is 100 (89).

Emotional functions- felt intense, irritable, depressed and worried a lot when the score is 0 and don't feel intense, irritable and do not worry when the score is 100 (90).

Fatigue-did not feel at all weak or tired and did not need to rest at all when the score is 0 and did feel very weak and tired and needed to rest a lot when the score is 100 (90).

Pain-did not have pain and pain did not interfere with daily activities when the sore is 0 and had a lot of pain; interfere very much with daily activities of the day when the score is 100 (89).

Physical function- Was confined to bed, needed help dressing, washing and eating when the score is 0 and able to do strenuous activities when the score is 100 (89).

QoL - a multidimensional construction that measures patients' perception of the positive and negative aspects associated with their disease and its treatment, in at least 4 aspects: physical, emotional, psychological, and treatment-related (89).

Role functions- is completely unable to work at a job or do household jobs when the score is 0 and able to do work at house hold and at work when the score is 100 (89).

Social Function- when physical function and medical treatment interfered very much with family life and social activities when the score is 0 and physical function and medical treatment do not interfere with family and social activities when the sore is 100 (89).

Tumor grade- Cancer cells are given a grade according to how different they are to normal breast cells and how quickly they are growing (87).

Operational definitions

Well-nourished

- ✓ No decrease in food/nutrient intake; Consumption of full or >¾ – < 1 share of usual meal
- ✓ weight loss < 5% in the past six months and
- ✓ No/very few intermittent symptoms affecting food intake and
- ✓ Full functional capacity and
- ✓ No/very low increase in metabolic demand and
- ✓ No deficit in fat or muscle mass
- ✓ OR *an individual with criteria for SGA B but with recent adequate food intake; significant recent improvement in symptoms allowing adequate food intake; significant recent improvement in function. (77).

Moderately malnourished

A patient fulfilling at least 2-3 criterias from the symptoms listed below; data collectors were instructed to place most of their judgement on weight loss and poor dietary intake and loss of fat mass and/or muscle loss.

- ✓ Definite decrease in food/nutrient intake- leading to consumption of 1/2–3/4 share of usual meal or < 1/2 share of usual meal but increasing appetite and consumption;
- ✓ 5% - 10% weight loss in the past 6 months without stabilization or gain and
- ✓ mild/some symptoms persisting for 2-3 times per day in the past week affecting food intake but alleviating and
- ✓ moderate functional deficit, loss of stamina
- ✓ mild/moderate loss of fat mass; while assessing triceps (muscle that runs down the back of the long bone of the upper arm) using fingers; fingers are closer than normal and presence of loose fiting skin around the triceps.
- ✓ mild/moderate loss of muscle mass; some protrusion of the clavicle (collar bone) but not all the way along. Slight depression on temple area. Slight protrusion of the acrominon process on shoulder area (91).

- ✓ OR *an individual meeting criterion for SGA C but with improvement (but not adequate) of oral intake, recent stabilization of weight, decrease in symptoms affecting oral intake, and stabilization of functional status (77).

Severely malnourished

A patient fulfilling at least 2-3 criterias from the symptoms listed below; data collectors were instructed to place most of their judgement on weight loss and poor dietary intake and loss of fat mass and/or muscle loss. If the patient had considerable edema, ascites, or tumor mass, data collectors were told to be less influenced by the amount of weight loss.

- ✓ Severe deficit in food/nutrient intake; consumption of < 1/2 share of usual meal, no change or decreasing or Starvation (< 1/4 of usual meal).
- ✓ weight loss > 10% which is ongoing;
- ✓ Some or all symptoms affecting food/ nutrient intake experienced 3 times a day or above in the past week or
- ✓ Severe loss of functional ability or bedridden
- ✓ Mild to moderate increase in metabolic demand (moderate stress).
- ✓ OR *recent significant signs of fat and/or muscle loss; very little space between fingers or fingers touch while assessing triceps, hollowed or depressed temple, protruding/prominent clavicle, prominent /square looking shoulder bones (77, 91).

The raters were instructed to be less sensitive and more specific in their assignment of rankings. That is, if the features which might influence the rater to assign a B rank (as opposed to an A rank) are equivocal or doubtful, an A rank is appropriate. Similarly, a C rank implied definite findings of severe malnutrition.

4.11 Data management and analysis

4.11.1. Data summary and description

After data collection, data was entered and cleaned using epi data version 4.6.0 and completeness and consistency was checked and data was exported to the STATA software (release 16.0, Stata Corporation, College Station, TX, USA). for data cleaning and analysis. Data was cleaned for

inconsistencies and missing values. All variables with missing data were reported. Variables were assessed for normality, linearity, homoscedasticity, multicollinearity and for outliers. Descriptive statistical analysis was conducted using frequency, percentage and mean (SD) to describe the study population by explanatory variables. Feasibility of conducting SGA and quality of life interviews was evaluated by examining the presence of missing item responses, and the time and ease of administration.

4.11.2. Wealth index construction

Principal component analysis (PCA) was conducted by first asking all study participants about their household fixed asset and housing condition questions a score "1" given to those who own/have and score of "0" given to those who did not. Then, all the items asked were assessed for internal consistency to transfer the asset information into latent factors and the first PCA explaining most of the variation based on the objective of the study was taken as a wealth score. Wealth index was by rank ordered into quintiles to give poorest, poor, medium, wealthy and wealthiest status.

4.11.3. Scoring procedure for the EORTC QLQ C-30

The Amharic version of EORTC QOL-C30 is composed of 30 questions. Of the 30 items, 24 are organized into nine scales: Physical functioning (questions 1 - 5), Role functioning (question 6 and 7), Emotional functioning (questions 21 -24), Cognitive functioning (question 20 -25), Social functioning (question 26 and 27), global health status/ quality of life (question 29 and 30), Fatigue (questions 10, 12 and 18), Nausea & vomiting (question 14 and 15), and Pain (question 9 and 19) and 6 single items assessing financial difficulties (question 28) and symptoms such as insomnia, appetite loss, constipation, dyspnea, and diarrhea questions 8, 11, 13, 16, and 17 respectively.

Scoring on items of functional and symptoms scales were using four-point Likert scale, ranging from 1 (not at all) to 4 (very much), whereas a seven-point Likert scale was used to rate the items of global health status scale, ranging from 1 (very poor) to 7 (excellent). The mean of component items for each scale was linearly transformed into a range of 0 – 100 point (83).

All scales and items were transformed in to a 0-100 score as per the manual (92) . According to the manual, higher score for functional and global health status show high level of functioning and high quality of life respectively. However, high score for symptom or item indicate high level of problems.

For all scales, the Raw Score (RS) is the mean of the component items.

Range is calculated by subtracting the minimum possible value from the maximum possible value of raw score.

Raw Score = RS = (I1 + I2 +...+ In)/ n

Then for Functional scales: Score = (1-(RS-1)/range) x 100

For Symptom scales / items and Global health status / QoL: Score = (RS-1)/range) x 100.

Table 1 Scoring of items in EORTC QLQ-C30 V3 with their analysis categories

Analysis Category	Scale	Number of items	Item range	Numbers of questions analyzed together
Global health status/QoL				
Global health status/QoL	QL	2	6	29,30
Functional scales				
Physical functioning	PF	5	3	1 to 5
Role functioning	RF	2	3	6 and 7
Emotional functioning	EF	4	3	21 to 24
Cognitive functioning	CF	2	3	20 and 25
Social functioning	SF	3	3	26 and 27
Symptom scales/items				
Fatigue	FA	3	3	10,12 and 18
Nausea and vomiting	NV	2	3	14 and 15
Pain	PA	2	3	9 and 19
Dyspnea	DY	1	3	8
Insomnia	SL	1	3	11
Appetite loss	AP	1	3	13
Constipation	CO	1	3	16
Diarrhea	DI	1	3	17
Financial difficulties	FI	1	3	28

- *Item range is the difference between the possible maximum and the minimum response to individual items; most items take values from 1 to 4, giving range = 3*

Range is the difference between the maximum possible value of RS and the minimum possible value. The QLQ-C30 has been designed so that all items in any scale take the same range of values. Therefore, the range of RS equals the range of the item values. Most items are scored 1 to 4, giving range = 3. The exceptions are the items contributing to the global health status / QoL, which are 7 point questions with range = 6 (92).

Magnitude of malnutrition interms of the SGA scale was determined. The level of Quality of life of the participants. All variables having a p value of ≤ 0.2 in the bivariate analysis were further entered in to multi variable regression. Multivariable linear regression was performed. The result of the β-coefcient was used for interpretation of strength of prediction of the independent variables to the domains of QoL. For all statistical signifcance tests, the cut- of value set was $p < 0.05$.

4.12 Ethical Considerations

This research was conducted to act in the best interests of study participants. In which ethical approval was obtained from the School of Public Health, Addis Ababa University Institutional Review Board of College of Health Sciences, AAU. After the ethical approval, formal letter of cooperation was written to the Department of Oncology to review records for the enrolment purpose. Written consent was also requested from all the participants during data collection. Only approved study personnel had access to this information. After completion of the study, identifier information was set aside and only study identification numbers (ID no.) was used during analysis. The right to withdraw from the research process at any point in time was respected. Efforts were made to link patients that were found to be malnourished to any available nutritional support unit or at the very least, advised on proper nutritional and physical exercise regimens.

4.13 Dissemination of the results

The results of this study will be disseminated to Addis Ababa University School of Public Health, and non-governmental organizations (NGOs) who are currently working on cancer care, any nutritional intervention facilities, other stakeholders and local and international journals.

5. RESULTS

5.1 Socio-Demographic characteristics of participants

There were 411 eligible respondents during the study period. Of these, only 9 (2.1%) participants refused to participate giving a response rate of 97.8%. The mean (± SD) age of the study participants was 44.34 ± 11.47 years in which the minimum age was 20 and the maximum 68. A great number of the respondents were females 393 (95.6%) and around a quarter (25.06 %) of the participants had no formal education, while only 43 (10.4%) had attended tertiary education. More than half of the patients were married (63.66%) and 242 (58.88%) came from Addis Ababa. (Table 2).

Table 2 Socio-demographic characterstics of breast cancer patients diagnosed at TASH and SPMMC 2020

Variables (n=411)	Category	Frequency (n)	Percent (%)
Gender	Male	18	4.3
	Female	393	95.6
Religion	Orthodox	246	59.5
	Protestant	96	23.3
	Muslim	54	2.4
	Catholic	10	13.1
	Other	5	0.9
Educational Status	No formal Education	103	25.0
	Primary Level (1-8)	90	21.9
	Secondary Level (9-12)	104	25.3
	Technical/Vocational	71	17.2
	Higher (university or above)	43	10.4
Marital Status	Married	261	63.6
	Single	69	14.6
	Widowed	45	10.9
	Divorced	35	8.5
	Separated	9	2.2
Occupation	Housewife	165	40

	Civil servant	96	23.4
	Non-government employee	48	11.7
	Merchant	42	10.2
	Farmer	28	6.8
	Daily Laborer	19	4.3
	Other	13	3.1
Residence	Addis Ababa	242	58.8
	Out of Addis Ababa	169	41.1
Living Arrangement	Living alone	28	6.8
	Living with a partner	258	62.7
	Living with a parent/s or siblings	59	14.3
	Living with children	66	16.0
Family size	< 5	218	53.0
	≥ 5	193	46.9
Wealth quantiles	Poorest	83	20.1
	Poor	82	19.9
	Middle	82	19.9
	Rich	82	19.9
	Richest	82	19.9
Food security	Food secure	174	42.3
	Mildly food insecure	63	15.3
	Moderately food insecure	123	29.9
	Severly food insecure	51	12.4

Clinical characteristics of participants

Among the study subjects, 357 (86.8%) were diagnosed for the first time while, 54 (13.1%) had recurrence (breast cancer that came back after the initial treatment). 236 (57.4%) of the subjects were diagnosed within the past year while 5 years have passed since the diagnosis of 19 (4.6%) patients. Three quarters of the patients (31.87) had stage 4 cancers while only 30 (7.3%) were diagnosed at

stage 1. Only 67 (16.30%) of the subjects had chronic co-morbidities and the most common was hypertension (37.31%) (Table 3).

Table 3 Clinical characteristics of breast cancer patients treated at TASH and SPMMC, 2020

Variables	Category	Frequency	Percent
Time since diagnosis (months)	< 12	236	57.4
	12-24	52	12.6
	25-36	58	14.1
	37-48	31	7.5
	49-60	15	3.6
	> 60	19	4.6
Cancer stage (n=372)	Stage I	30	7.3
	Stage II	87	21.1
	Stage III	124	30.1
	Stage IV	131	31.8
	Not reported	39	9.4
Tumor size	Tx (Not assessed)	10	2.4
	T1 (< 2 cm)	60	14.5
	T2 (2 cm-5 cm)	150	36.4
	T3 (> 5 cm)	78	18.9
	T4 (Any size with extension to chest wall)	113	27.4
Tumor Grade (n=287)	Grade I	53	12.9
	Grade II	83	20.1
	Grade III	116	28.2
	Grade IV	35	8.5
	Not reported	124	30.1
Comorbid disease (n=67)	Hypertension	25	37.3
	Diabetes mellitus	14	20.9
	HIV AIDS	15	22.3
	Asthma	6	8.9
	Hypertension and Diabetes mellitus	7	10.4

Treatment modalities	Surgery only	209	12.9
(previous)	Chemotherapy only	59	14.3
	Chemotherapy and radiotherapy	17	4.1
	Chemotherapy and surgery	69	50.8
	Chemotherapy, radiotherapy and surgery	142	16.7
Treatment patient is	Surgery	53	12.9
currently on	Chemotherapy	249	60.3
	Radiotherapy	21	4.8
	Hormonal therapy	51	12.4
	Follow up (anti-pain, zoledronic acid)	37	6.5
Treatment Intent	Palliative	134	33.8
	Curative	276	66.1
Metastasis at initial diagnosis	Present	149	36.2
	Absent	262	63.7
History of recurrence	Yes	54	13.1
	No	357	86.8

Nutritional status of breast cancer patients treated at TASH and SPMMC oncology units

According to their subjective global assessment scores, the patients were divided into 3 groups. 178 (43.31%) of the study participants were well nourished (SGA A) while 127 (30.90%) were moderately malnourished (SGA B) and 106 (25.79%) of them were severely malnourished (SGA C) (Figure 2). Weight loss was also prevalent in the study subjects with 21 (5.17%) having lost more than 15% of their body weight in the past six months followed by 28(6.9%) who'd lost between 10-15% and 52 (12.27%) subjects losing between 5-10% of their previous body weight. One hundred forty-eight patients were found to have gained weight in the past 6 months. The mean (± SD) weight gain of the

study participants was 3.83 (*SD*=0.48*)* in the past 6 months with minimum weight gain of 1.2 KG and maximum 18.6 KG.

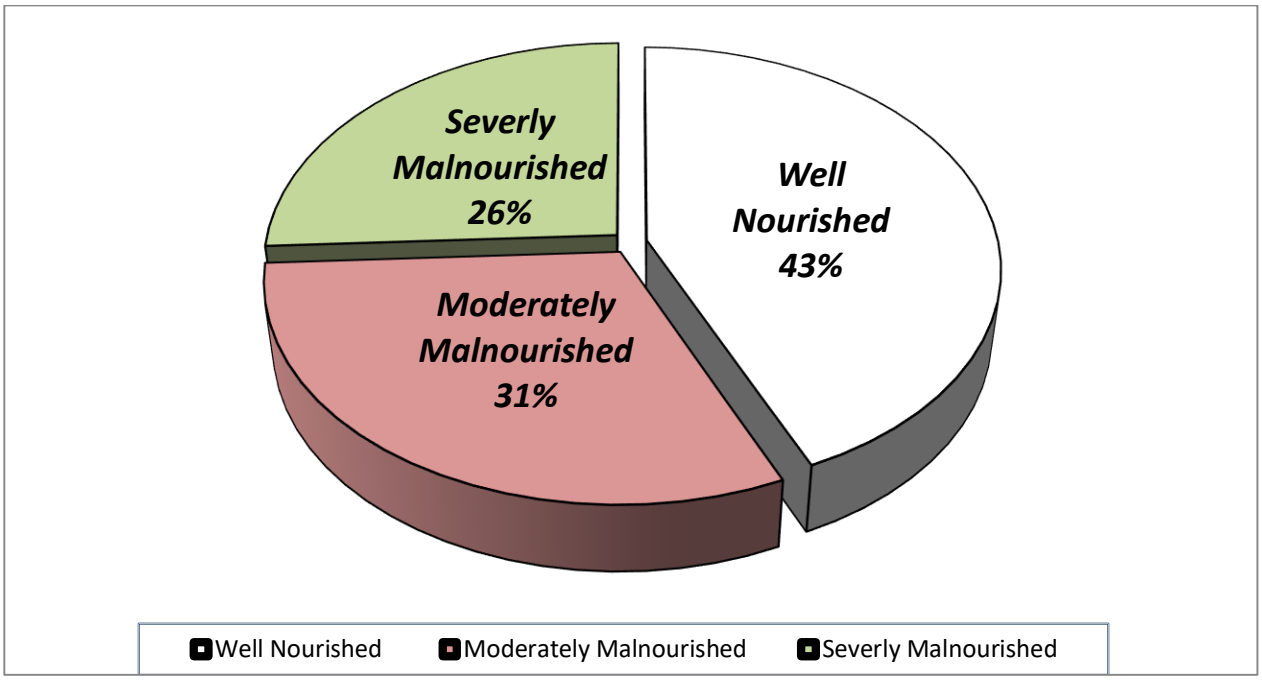

Figure 2 Magnitude of malnutrition in breast cancer patients treated at TASH and SPMMC, 2020.

Profile of quality of life scale scores of breast cancer patients treated at TASH and SPMMC

The QoL of the study participant was measured by the domains in the functional and symptom scales of the EORTC-QLQ C-30 and by one summary measure (GHS/QoL). Among the functional scale domains; the first domain with the highest mean score was cognitive functioning with mean and standard deviation of 76.85 (*SD*=26.87) followed by emotional functioning (M=70.42 (*SD*=28.95)) and physical functioning (M=61.75 (*SD*=26.73)). The lowest mean among functional scales was observed in social functioning (M=55.03 (*SD*=36.26)).

The domain with the highest mean among the symptom scales was fatigue with mean and standard deviation of 48.98 (*SD*=29.03) followed by pain (M=46.72 (SD=31.57)) and appetite loss (M=42.90 (*SD*=37.83)). The lowest and second lowest mean scores were observed in nausea and vomiting and dyspnea (M=21.65 (*SD*=31.60)) and (M=21.74 (*SD*=32.81)) respectively. The mean global health status of the study participants was 61.33 with standard deviation of 20.83.

Table 4 The level of quality of life of breast cancer patients treated at TASH and SPMMC,2020

Dimensions	Mean (n=411)	SD	CI for mean	
			Lower	Upper
Global health status/ overall quality of life				
GHS/QoL	61.3	20.8	59.3	63.3
Functional scales				
Physical functioning	61.7	26.7	59.1	64.3
Role functioning	58.0	35.7	54.5	61.4
Emotional functioning	70.4	28.9	67.6	73.2
Cognitive functioning	76.8	26.8	74.2	79.4
Social functioning	55.0	36.2	51.5	58.5
Symptom scales				
Fatigue	48.9	29.0	46.1	51.8
Nausea & vomiting	21.6	31.6	18.5	24.7
Pain	46.7	31.5	43.6	49.7
Dyspnea	21.7	32.8	18.5	24.9
Insomnia	24.3	34.9	20.9	27.7
Appetite loss	42.9	37.8	39.2	46.5
Constipation	25.6	35.8	22.1	29.1
Diarrhea	7.7	22.2	5.5	9.8
Financial difficulties	57.7	40.8	53.7	61.7

The relationship between nutritional status and quality of life of breast cancer patients treated at TASH and SPMMC

In table 5 we present a few separate multiple linear regression models carried out to investigate the relationship between nutritional status and each scales of quality of life. Separate multiple linear regression models were carried out to investigate the association between each groups of nutritional status assessments with each scale of quality of life. Confounder controlling was done in the multiple

regression models for sociodemographic characteristics, food security, life style factors, clinical and treatment characteristics. As described in the methods section variables with p-value < 0.2 in bivariable analyses were included in the final multivariable models. Confounding adjustment was done for age, sex, marital status, education level, occupation, family size, lifestyle factors, wealth status, monthly income, financial support, food security cancer stage tumor grade metastasis time since diagnosis treatment type comorbidities.

There was a significant relationship between nutritional status and quality of life. It was found that in terms of malnutrition mean QoL level of those who were moderately malnourished and severely malnourished was lower than those who were well nourished (β= −9.21 p<0.001) and (β =−17.89 p<0.001), respectively.

Among the functional scales the most significant association was observed between nutritional status and physical (PF), emotional (EF) and role functioning (RF). Negative associations were observed between moderate malnutrition and PF (β= −11.08 p<0.001) EF (β= −14.62 p<0.001) and RF (β= −14.10 p < 0.001) scores taking well-nourished as a referent group. Similarly, Severe malnutrition also showed strong negative relationship with PF (β= −20.01 p<0.001), EF (β= −15.99 p<0.001) and (β= −28.02 p < 0.001) taking well-nourished as a referent group.

The most noteworthy associations were also observed between nutritional status and fatigue, nausea and vomiting and appetite loss symptom scores. Results of the regressions showed that fatigue scores increased by 20.03 and 27.31 in moderately and severely malnourished patients (β= 20.03, p < 0.001) and (β= 27.31, p < 0.001) respectively as opposed to well-nourished ones. And patients in the moderately & severely malnourished groups had pain scores 18.54 & 31.73 higher than well-nourished groups (β= 18.54, p < 0.001) and (β= 31.73, p < 0.001) respectively. Appetite loss also showed negative association with moderate (β= 27.80, p < 0.001) and severe (β= 41.32, p < 0.001) malnutrition taking well-nourished as a referent group (Table 5).

Functional scales were also found to have associations with some characteristics of the study participants. According to the regression, for every 1-year increase in age, PF (β =-0.323 p=0.009) & RF (β = - 0.43 p=0.01) scores decreased and fatigue scores increased by 0.35 units (p = β =0.35 0.011). Patients who had primary level, Technical and university level education had more CF scores than

those who had no formal education (β =9.85 p=0.025), (β =14.42 p=0.004) & (β =16.14 p=0.006) respectively.

Household food security also showed significant associations with social and emotional functioning scales and financial difficulties. And, cognitive functioning and pain scores also showed significant associations with previous treatments the patient has had and chemotherapy cycles taken so far respectively. Inexplicably, Family size and living with a partner also showed significant negative associations with social functioning. Although, time since diagnosis, stage at diagnosis and presence of other co-morbidities showed associations with the quality of life domains on the bivariable analyses there were no associations observed in the multivariable analyses. Annex 7 provides detailed information of the multiple linear regression models.

Table 5 Bivariable and multivariate linear regressions models of nutritional status as a predictive factor of quality of life domain scores in breast cancer patients (n = 411) treated at TASH and SPMMC, 2020

	Moderately malnourished (vs well-nourished)		Severely malnourished (vs well nourished)	
	Bivariable analyses	Multivariable analyses	Bivariable analyses	Multivariable analyses
	β (95% CI)	β (95% CI) [a]	β (95% CI)	β (95% CI) [a]
Overall QOL	−14.2 (−18.29, −10.11)	−9.21 (−13.59, −4.67)	−26.16 (−30.48, −21.84)	−17.81 (−22.83, −12.95)
Physical functioning	−13.43 (−18.95, −7.9)	−11.08 (−16.87, −5.28)	−28.37 (−34.21, −22.54)	−17.89 (−26.53, −13.49)
Role functioning	−19.45 (−26.84, −12.05)	−14.10 (−21.75, −6.13)	−37.77 (−45.58, −29.96)	−28.02 (−37.01, −19.03)
Emotional functioning	−19.05 (−25.18, −12.93)	−14.62 (−21.99, −8.84)	−25.06 (−31.53, −18.59)	−15.99 (−25.52, −10.54)
Cognitive functioning	−15.04 (−20.79, −9.3)	−12.01 (−18.09, −5.93)	−22.73 (−28.8, −16.67)	−17.94 (−24.61, −11.27)
Social functioning	−22.83 (−30.61, −15.05)	−13.72 (−19.94, −4.29)	−27.93 (−36.15, −19.71)	−24.49 (−24.14, −6.68)
Fatigue	21.78 (15.89, 27.68)	20.03 (13.61, 26.45)	31.2 (24.97, 37.42)	27.31 (20.22, 34.39)
Nausea and Vomiting	16.63 (10.64, 22.62)	14.80 (8.2, 21.42)	44.06 (37.74, 50.38)	40.51 (33.23, 47.79)
Pain	22.23 (15.78, 28.68)	18.54 (11.45, 25.63)	33.6 (26.78, 40.41)	31.73 (23.84, 39.61)
Dyspnoea	15.57 (8.43, 22.7)	15.63 (7.68, 23.59)	24.23 (16.69, 31.77)	19.59 (10.62, 28.46)
Insomnia	13.36 (5.6, 21.12)	14.63 (6.07, 23.17)	20.23 (12.04, 28.43)	20.05 (10.68 , 29.42)
Appetite loss	30.28 (22.95, 37.61)	27.80 (19.87, 35.72)	48.02 (40.28, 55.76)	41.32 (32.64, 50.00)
Constipation	11.9 (3.9, 19.9)	13.26 (5.14, 21.38)	18.3 (9.85, 26.75)	17.03 (8.17, 25.88)

Diarrhea	7.08 (2.21, 11.95)	6.42 (1.30, 11.55)	16.29 (11.15, 21.44)	13.43 (7.69, 19.17)
Financial difficulties	24.08 (15.28, 32.87)	12.22 (4.56, 21.89)	30.94 (21.65, 40.23)	11.65 (1.94, 21.36)

β, regression coefficient; CI, confidential interval; QoL, quality of life.

[a] Adjusted for age (years) + sex+marietal status+ education level+ occupation+ family size+ lifestyle factors+ wealth status + monthly income + financial support + food security + cancer stage + tumor grade+ metastasis+ time since diagnosis + treatment type + comorbidity

p value < 0.05 considered significant

6. DISCUSSION

This study aimed to determine the magnitude of malnutrition and examine its association with the quality of life of breast cancer patients particularly those diagnosed at TASH and SPMMC. A facility based study was conducted on two of the largest hospitals with oncology units in the country. Findings of this study showed us that more than half of the patients were malnourished or were at risk of being malnourished, weight gain in these patients hindered the detection of malnutrition and malnutrition decreased the functional scores of quality of life while increasing/worsening of symptoms.

According to our study, moderate or severe malnutrition was prevalent in 57% of the patients which is much lower than a study conducted in Indonesia (45) Libya (26) Algeria (25) that exclusively used SGA and PG-SGA (patient generated- subjective global assessment) as an assessment tool who claimed 81.8%, 98.5% and 77.5% of their study participants were malnourished. But, higher than a study done in Brazil that had rate of moderately and severely malnourished (24%) using SGA tool (19) and a study in France on 1545 cancer patients of whom a quarter were breast cancer patients (37) which revealed that only 18.3% of the breast cancer patients were malnourished but the study only used BMI and weight loss as nutritional measurements which are not indicated as sole nutrition assessment tools for cancer patients (18, 21, 26, 31, 55) as they are prone to be highly affected by water retention affecting weight or presence of excess body fat masking the loss of lean body mass sometimes leading to malnourished cancer patients having a normal BMI despite having 10-20% weight loss in 6 months (26). But our findings are similar with studies from Latin America (93) and Korea (94) and Mexico (55)where 61% , 61.4% and 59.7% of the patients were malnourished.

Weight loss in the past 6 months was also prevalent among our study population with greater than 10% weight loss being recorded in 49 (12%) of the participants which happen to be in line with studies from New Mexico (55), and France (37). But, our results are much lower than a study done in Algeria (25) which found that 29.3% of its population had weight loss greater than 10%, but this could be due to the difference in time of seeking care between the populations, compared to the former population in which 86.6% of the study subjects had locally advanced or metastasized tumors at diagnosis, our population only had 36.2 % and it's well established that patients with more advanced cancers are more malnourished (25).

In our study, 148 (36%) participants were found to have gained weight in the past 6 months 118 (28%) had greater than 2kg gain. This is similar to studies that were conducted in the UK where 33% of the participants gained weight (29) but much lower than the results of studies conducted in the US & Malesia in which 47% & 63% of the patients reported weight gain (30, 31) In our study, the mean weight gain of the participants was 3.83 (ranging from 1.2 to 18.6 KG) which is similar to studies done in France (mean wt. gain =3.9 KG) (33). and Turkey (mean wt. gain =3 KG) (32). On the other hand, our finding was far higher than what was found in a study in Italy that found mean wt. gain of 2.73 kg (2 to 5.5 kg) (27) and Malesia (31)with mean wt. gain of 2.8 KG but these differences could be due to the large sample size difference between the studies and more than half of the patients in this study were on chemotherapy which is significantly associated with weight gain (21, 23, 52, 95). Even if there are demographic differences, most of the above studies postulate that excess weight gain could be a major factor for recurrence, poor prognosis, different metabolic complications, decreased physical mobility and quality of life (23, 27, 96). It has been demonstrated that weight gain greater than 5.9 kg involved resulted in a 1.5-times increase in the risk of recurrence and a 1.6-times increase in mortality in breast cancer patients (27).

The mean QoL score of the present study was (M=61.33, *SD*=20.83) which is similar with the EORTC QLQ C-30 reference values indicated on the manual for breast cancer patients (M=61.3, *SD*=24.2) indicating a reasonable/satisfactory overall quality of life among these women (97), and confirms the results of previous cross-sectional studies from Bahrain (98) and Nigeria (99). The results of the present study are also higher than those done in Nepal and Morocco (62, 65), but lower than results from India, Sweden and Portugal (100-102). These discrepancies may be due to the different patient recruitment methods and different study designs used. The mean QoL value of the current study was also found to be higher than a cross-sectional study done in Ethiopia (35), but while the current study included all breast cancer patients on treatment, the other one was done exclusively on patients taking chemotherapy, and patients on chemotherapy generally had worse quality of life than patients on any other treatment (35-37).

The mean score for all functional scales except emotional functioning was lower than the EORTC QLQ C-30 reference value manual for breast cancer patients indicating poor physical, role, cognitive & social functioning among the study population (97). The highest mean among the functional scales was observed on cognitive functioning, this is consistent with results obtained from studies in France

(18), Iran (103), Sweden (102), Portugal (101) and Morocco (62). The lowest functional score was observed on social functioning which is different from a cross-sectional surveys conducted in Iran (103) and India (100) in which emotional functioning had the lowest value and social functioning had one of the highest values.

Contrary to studies from Iran, France and Sweden (18, 102, 103), financial difficulty was the highest observed symptom score in the present study. This is attributed to the fact that more than half of the patients were currently on chemotherapy treatment which increased their out-of-pocket spending for drugs and transportation (for those coming out of Addis) as chemotherapy is an overly long treatment that lasts for months, this substantially increased their financial burden (85).

The most distressing physical symptom among the study subjects was fatigue followed by pain and appetite loss, all three values are much higher than the recommended reference values according to the EORTC manual (97) indicating worse symptoms experienced by the patients. This was also evidenced by studies from Ethiopia and Bahrain (85, 98).

As nutritional status is a determining factor for quality of life (23), the present study highlighted the importance of nutritional assessment among breast cancer patients in light of its associations with functional status, medical symptoms experienced and overall quality of life. Malnutrition, either in its moderate or severe form measured by SGA showed a direct and significant association with worse functional & symptom scores as well as QoL. The negative association of malnutrition and unintentional weight loss > 10%, with functional scales and QoL was demonstrated in many previous literatures (14, 18, 55, 59, 104).

Overall quality of life/ global health status showed a significant relationship with nutritional status. Moderately and severely malnourished patients had 9.21, 17.81 ($p<0.001$) lower QoL scores compared to not malnourished patients. Studies from U.S, Mexico, Austria, France, Malaysia (18, 50, 55, 105) all confirm that impaired quality of life has association with malnutrition. It is also important to emphasize a prospective randomized control trial where the linear association ($P = 0{\cdot}05$) between an improvement in nutritional status and increase in QoL scores was demonstrated (36). A research that also assessed the relationship between SGA and QoL values in patients on radiotherapy determined that 26 % ($P=0{\cdot}001$) of the observed variation in QoL is explained by changes in nutritional status of

the patients and A change in SGA score of 9 resulted in a change of 17 in the QoL score. (14). However, in a study from Malesia (40), it was found that dietary intake was not associated with QoL.

Physical functioning was negatively associated with malnutrition according to our results. This was consistent with results from a study in Indonesia (45) and Brazil in which malnutrition was related to decreased physical function and increased loss of energy. A systematic review by Hidding et al (95) also suggested that initial treatments involving mastectomy & axillary lymph node dissection can contribute to muscle dysfunction and limitations in doing daily activities pointing out the long term decrease in physical functioning.

A particular aspect of our study worth considering is the association between role functioning and malnutrition similar with study from Belgium (106). Malnourished breast cancer women are also susceptible to more infections, decreased physical mobility & fatigue. These symptoms added with the burden imposed by the cancer diagnosis on their jobs and domestic tasks force them to require prolonged sick leaves, early retirements etc. Making them unable to continue their employment and diminish their ability to do domestic work around the house and care for their loved ones inturn limiting the role they play in their familyand place of work. For most this change from being needed to needing someone is very difficult to accept and leads to decreased feelings of autonomy (107).

Another noteworthy association was also observed between cognitive functioning and malnutrition. Malnourished patients had much lower cognitive scores compared to well-nourished subjects. This finding is supported by studies from France, Malesia (18, 21). It is all too well known that improvised nutritional status decreases physiologic functions, leading to cognitive impairment (81). However, a prospective study that evaluated the association of nutritional parameters with QoL found associations between nutritional status and all other functional scales except cognitive functioning (57).

Emotional functioning, as one study indicated, meant the capability to enjoy life (107). In the current study malnourished patients had significantly reduced emotional functioning scores concurrent with the findings from study done in Brazil (108) and China (109). Treatment induced side effects dispose breast cancer patients to decreased appetite, energy intake and eventually cause malnutrition, which has negative consequences on their physical and emotional function (96). These complications deprive the patients of their ability and willingness to continue treatments. Patients admitted to occasions in which they had lost the will to live, with most under-nourished patients reporting feeling down,

irritated at the smallest things and depressed. This feelings are an indicator of emotional instability (107, 109).

Social functioning was negatively associated with malnutrition published data have highlighted that the incidence of GI symptoms such as anorexia, nausea and vomiting, stomatitis, mucositis are related to the cancer as well as treatments major causes of malnutrition in these patient groups but this relationship could also be bi-directional, meaning malnutrition could also in turn cause this symptoms (79). It is also likely that the manifestations of the above mentions symptoms could be a reason for lack of motivation to perform daily activities making them unable to successfully care for themselves, Malnutrition could also restrict these individuals in different social activities by inducing fatigue and mood disorders (53). These findings are similar to the significant negative relationship observed between malnutrition & social functioning in the present study.

Concerning symptom scores, fatigue was found to be another distressing symptom next to appetite loss that showed a significant linear relationship with malnutrition ($P<0.001$) which is also true for a study done in brazil that explained it as when nutritional status is compromised muscle mass loss leads to body weakening. And when this is topped with the naturally expected physiological and functional decline caused by aging reducing capability of movement while increasing fatigue dramatically (53). Appetite loss, nausea and vomiting, fatigue and diarrhea could be causes or effects of malnutrition in breast cancer patients and could lead to consequent deterioration in overall quality of life and functional scales, treatment side effects such a s toxicity leading to a dosage reduction, delay or suspension of treatment, and, finally, in worse prognosis (55, 79).

A cross-sectional study conducted on gynaecological cancer patients from which 68.7% were with breast cancer diagnosis found that out of all the symptom scales, appetite loss and fatigue were strongly associated with malnutrition. Especially in those patients currently on chemotherapy regimen as the drugs used caused significant taste alterations which put the patients at risk of losing weight and developing many kinds of nutritional deficits (105). An Algerian study also classified appetite loss as the most common symptom in breast cancer patients affecting the their food intake and was present in 15–25% of the patients with advanced stage (25).

Similar results in all symptom scores except diarrhea and dyspnoea were demonstrated in a previous study in patients with cancer (110). However, different findings were also seen in a Malesian study

where dyspnea, diarrhea and nausea & vomiting were the least complained symptoms with values almost close to zero (21). But, it should be remarked that quality of life domains rely very much on personal values or perceptions, whereby each domain could be regarded differently across individuals as well as populations and different types of treatment regimens and drugs are used across different countries resulting in different symptom severities.

A bidirectional relationship between malnutrition and symptom scores is possible as the symptoms such as nausea and vomiting, appetite loss and diarrhea that predict a decreased quality of life are also the symptoms that predispose the breast cancer patients to be malnourished (25)

7. STRENGTH AND LIMITATIONS OF THE STUDY

7.1 Strengths of the study

As a significant strength, this study attempted to address a major public health problem on malnutrition and quality of life interaction. The study incorporated all dimensions of quality of life scales which helped to assess its association with nutritional status on a wider scope. The study also used locally validated and well known standard tools which made it easier to compare its findings with other international studies. It also included a homogeneous population (one cancer type) which made it possible to the findings to represent that cancer type.

7.2 Limitations of the study

However, the results of this study should be interpreted with caution due to the following limitations. First and foremost, the crosssection design nature of the study makes it not possible identify which is the cause and which is the consequence: nutritional status and quality of life. Secondly, previous weight measurements found on the medical records and sometimes asked from the patients' when there are no records are not properly done using calibrated measurement scales, clothes weren't removed, possible presence of edema was not recorded etc. making these weight measurements below standard and known only approximately. But, to correct this problem weight loss or gain greater than 2kg was considered significant. Third, the nutritional status as well as qol measures were based on the patients' self-report rather than direct observation of dietary intakes, presence of symptoms and living conditions making most assessments subjective. This might introduce some bias. Although there are many advantages to employing observations and laboratory tests instead of questionnaires,

these techniques are not cost effective especially in large samples like the present study. which is why these studies relied on patient reports and physical examinations.

8. CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

This study revealed that the magnitude of malnutrition in the breast cancer population is very large, in addition to the common problems that affect women diagnosed with breast cancer, such as a recurrence of the disease, loss of bone density, cardiovascular disease, cognitive dysfunction and so on; the compromization of their nutritional status also playes a significant role in decreasing their quality of life.

8.2 Recommendations

For medical care providers

The high prevalence of nutritional decline found in breast patients entering treatments in our oncology settings calls for more focus on nutrition in a patient's course of the disease. There is an urgent need to agree on how only weight measurements are not enough because weight loss does not discriminate cachexia from undernutrition or vice versa. Nutritional support should be included as a therapeutic regimen during active oncology treatments. The main objectives would be to prevent early death, decrease complications, and improve quality of life.

When diagnosed, most patients fall into emotional states such as disbelief that they have cancer as well as shock, fear, anger, fatigue, depression, loneliness, and despair. So, the assessment of their emotional, cognitive and social functions on top of symptom assessments should be done to provide care for those in need from the initiation of their treatment to avoid complications.

For researchers

To broaden our understanding, a longitudinal study investigating changes in body weight and body composition during the course of disease, from initial diagnosis, and through surgery, radiation, and chemotherapy might bring more insight into the natural course of fluctuations in body composition. In such a study, it would be crucial to measure muscle mass and muscle strength and include measures of physical activity and dietary intake.

9. REFERENCES

1. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: a cancer journal for clinicians. 2018;68(6):394-424.
2. Ferlay J SI EM, Dikshit R, Eser S, Mathers C, Rebelo M, Parkin DM, Forman D, Bray, F. . Cancer incidence and mortality worldwide. GLOBOCAN (IARC). 2012; 2012;1.1(11).
3. Muscaritoli M, Lucia S, Farcomeni A, Lorusso V, Saracino V, Barone C, et al. Prevalence of malnutrition in patients at first medical oncology visit: the PreMiO study. Oncotarget. 2017;8(45):79884-96.
4. Ryan AM, Power DG, Daly L, Cushen SJ, Ní Bhuachalla Ē, Prado CM. Cancer-associated malnutrition, cachexia and sarcopenia: the skeleton in the hospital closet 40 years later. The Proceedings of the Nutrition Society. 2016;75(2):199-211.
5. Demling RH. Nutrition, anabolism, and the wound healing process: an overview. Eplasty. 2009;9:e9.
6. Ottery FD. Cancer cachexia: prevention, early diagnosis, and management. Cancer practice.2(2):123-31.
7. Büntzel J, Micke O, Kisters K, Büntzel J, Mücke R. Malnutrition and Survival - Bioimpedance Data in Head Neck Cancer Patients. In vivo (Athens, Greece). 2019;33(3):979-82.
8. E. S. Adherence to long term therapies: Evidence for action. World health organization (WHO). . 2003;2003:110.
9. Kantelhardt EJ, Zerche P, Mathewos A, Trocchi P, Addissie A, Aynalem A, et al. Breast cancer survival in Ethiopia: a cohort study of 1,070 women. International journal of cancer. 2014;135(3):702-9.
10. Capra S, Ferguson M, Ried K. Cancer: impact of nutrition intervention outcome--nutrition issues for patients. Nutrition (Burbank, Los Angeles County, Calif). 2001;17(9):769-72.
11. Ravasco P, Monteiro-Grillo I, Vidal PM, Camilo ME. Cancer: disease and nutrition are key determinants of patients' quality of life. Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer. 2004;12(4):246-52.
12. Aaronson NK, Ahmedzai S, Bergman B, Bullinger M, Cull A, Duez NJ, et al. The European Organization for Research and Treatment of Cancer QLQ-C30: a quality-of-life instrument for use in international clinical trials in oncology. Journal of the National Cancer Institute. 1993;85(5):365-76.
13. Sanz Ortiz J, Moreno Nogueira JA, García de Lorenzo y Mateos A. Protein energy malnutrition (PEM) in cancer patients. Clinical & translational oncology : official publication of the Federation of Spanish Oncology Societies and of the National Cancer Institute of Mexico. 2008;10(9):579-82.
14. Isenring E, Bauer J, Capra S. The scored Patient-generated Subjective Global Assessment (PG-SGA) and its association with quality of life in ambulatory patients receiving radiotherapy. European journal of clinical nutrition.57(2):305-9.
15. Ferlay J, Colombet M, Soerjomataram I, Mathers C, Parkin DM, Piñeros M, et al. Estimating the global cancer incidence and mortality in 2018: GLOBOCAN sources and methods. International journal of cancer. 2019;144(8):1941-53.
16. Registry AAC, Top 10 female cancer in Addis Ababa. 2015.
17. Baracos VE. Cancer-associated malnutrition. European journal of clinical nutrition. 2018;72(9):1255-9.

18. Nourissat A, Vasson MP, Merrouche Y, Bouteloup C, Goutte M, Mille D, et al. Relationship between nutritional status and quality of life in patients with cancer. European journal of cancer (Oxford, England : 1990). 2008;44(9):1238-42.
19. Zorlini R, Akemi Abe Cairo A, Salete Costa Gurgel M. Nutritional status of patients with gynecologic and breast cancer. Nutricion hospitalaria. 2008;23(6):577-83.
20. Bering T, Maurício SF, Silva JB, Correia MI. Nutritional and metabolic status of breast cancer women. Nutricion hospitalaria. 2014;31(2):751-8.
21. Lu Shin KN, Mun CY, Shariff ZM. Nutrition Indicators, Physical Function, and Health-Related Quality of Life in Breast Cancer Patients. Asian Pac J Cancer Prev [Internet]. 2020 2020/07//; 21(7):[1939-50 pp.].
22. Firouzbakht M, Hajian-Tilaki K, Moslemi D. Analysis of quality of life in breast cancer survivors using structural equation modelling: the role of spirituality, social support and psychological well-being. International Health. 2020;12(4):354-63.
23. Lis CG, Gupta D, Lammersfeld CA, Markman M, Vashi PG. Role of nutritional status in predicting quality of life outcomes in cancer--a systematic review of the epidemiological literature. Nutrition journal. 2012;11:27.
24. Ganz PA, Guadagnoli E, Landrum MB, Lash TL, Rakowski W, Silliman RA. Breast cancer in older women: quality of life and psychosocial adjustment in the 15 months after diagnosis. Journal of clinical oncology : official journal of the American Society of Clinical Oncology. 2003;21(21):4027-33.
25. Mansour F, Mekhancha D-E, Kadi H, Yagoubi-Benatallah L, Karoune R, Colette-Dahel-Mekhancha C, et al. Malnutrition in patients with breast cancer during treatments (Algeria, 2016). Nutrition Clinique et Métabolisme. 2018;32(2):129-37.
26. Nouh F, Omar M, Alshukri A, Younis M, Elmabsout A, Salem M, et al. Nutritional Status of Female Breast Cancer Patients in Benghazi City of Libya. 2017;5:2179-87.
27. Del Rio G, Zironi S, Valeriani L, Menozzi R, Bondi M, Bertolini M, et al. Weight gain in women with breast cancer treated with adjuvant cyclophosphomide, methotrexate and 5-fluorouracil. Analysis of resting energy expenditure and body composition. Breast cancer research and treatment. 2002;73(3):267-73.
28. Camoriano JK LC, Ingle JN, Therneau TM, Krook JE, Veeder MH:. Weight change in women treated with adjuvant therapy or observed following mastectomy for nodepositive breast cancer. . J Clin Oncol 8: 1327–1334, 1990.
29. Lankester KJ PJ, Lawton PA. . Weight gain during adjuvant and neoadjuvant chemotherapy for breast cancer: an audit of 100 women receiving FEC or CMF chemotherapy. . Clinical oncology (Royal College of Radiologists (Great Britain)) 2002;;14(1):64-7.
30. Halbert CH WB, Esteve R, Audrain-McGovern J, Kumanyika S, DeMichele A, et al. Experiences with weight change in African-American breast cancer survivors. . Breast J 2008;;14:182–187.
31. Yaw YH SZ, Kandiah M, Mun CY, Yusof RM, Othman Z, et al. Weight changes and lifestyle behaviors in women after breast cancer diagnosis: a cross-sectional study. . BMC Public Health 2011;;11:309.
32. Basaran G TN, Cabuk D, Yurt N, Yurtseven G, et al. Weight gain after adjuvant chemotherapy in patients with early breast cancer in Istanbul Turkey. . Med Oncol 2011;;28:409–415. .

33. Trédan O BA, Meunier A, Roux P, Fiorletta I, Gargi T, Bachelot T, Guastalla JP, Lallemand Y, Faure C, et al. Body weight change in women receiving adjuvant chemotherapy for breast cancer: a French prospective study. Clin Nutr 2010;29:187–191.
34. Vergara N, Montoya JE, Luna HG, Amparo JR, Cristal-Luna G. Quality of life and nutritional status among cancer patients on chemotherapy. Oman medical journal. 2013;28(4):270-4.
35. Dye TD, Bogale S, Hobden C, Tilahun Y, Deressa T, Reeler A. Experience of initial symptoms of breast cancer and triggers for action in ethiopia. International journal of breast cancer. 2012;2012:908547.
36. Ravasco P, Monteiro-Grillo I, Vidal PM, Camilo ME. Dietary counseling improves patient outcomes: a prospective, randomized, controlled trial in cancer patients undergoing radiotherapy. Journal of clinical oncology : official journal of the American Society of Clinical Oncology.23(7):1431-8.
37. Pressoir M, Desné S, Berchery D, Rossignol G, Poiree B, Meslier M, et al. Prevalence, risk factors and clinical implications of malnutrition in French Comprehensive Cancer Centres. Br J Cancer. 2010;102(6):966-71.
38. Maasberg S, Knappe-Drzikova B, Vonderbeck D, Jann H, Weylandt KH, Grieser C, et al. Malnutrition Predicts Clinical Outcome in Patients with Neuroendocrine Neoplasia. Neuroendocrinology. 2017;104(1):11-25.
39. Marín Caro MM, Laviano A, Pichard C. Impact of nutrition on quality of life during cancer. 2007;10(4):480-7.
40. Lua PL, Salihah NZ, Mazlan N. Nutritional status and health-related quality of life of breast cancer patients on chemotherapy. Malaysian journal of nutrition. 2012;18(2):173-84.
41. Benson JR, Jatoi I. The global breast cancer burden. Future oncology (London, England). 2012;8(6):697-702.
42. Grayson M. Breast cancer. Nature. 2012;485(7400):S49.
43. Akarolo-Anthony SN, Temidayo O. Ogundiran, and Clement A. Adebamowo. Emerging breast cancer epidemic: Evidence from Africa. Breast Cancer Research 12(Suppl 4): S8. 2010.
44. Abate SM YZ AM, Tigeneh W. Trends of Breast Cancer in Ethiopia. International Journal of Cancer Research and Molecular Mechanisms. . 2016;;Volume: 2.1.
45. Andree K, Nata Pratama Hardjo L. Nutritional Status and Quality of Life in Breast Cancer Patients in Karawaci General Hospital. Indonesian Journal of Cancer. 2016;10(1):1-4.
46. de Vries YC, van den Berg M, de Vries JHM, Boesveldt S, de Kruif J, Buist N, et al. Differences in dietary intake during chemotherapy in breast cancer patients compared to women without cancer. Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer. 2017;25(8):2581-91.
47. Ge T, Lin T, Yang J, Wang M. Nutritional status and related factors of patients with advanced cancer in northern China: a retrospective study. Cancer management and research. 2019;11:2225-31.
48. Silva FRdM, de Oliveira MGOA, Souza ASR, Figueroa JN, Santos CS. Factors associated with malnutrition in hospitalized cancer patients: a croos-sectional study. Nutrition journal. 2015;14(1):123.
49. Demark-Wahnefried W, Winer EP, Rimer BK. Why women gain weight with adjuvant chemotherapy for breast cancer. Journal of clinical oncology : official journal of the American Society of Clinical Oncology. 1993;11(7):1418-29.

50. Dow KH, Ferrell BR, Leigh S, Ly J, Gulasekaram P. An evaluation of the quality of life among long-term survivors of breast cancer. Breast cancer research and treatment. 1996;39(3):261-73.
51. Iwase T, Sangai T, Nagashima T, Sakakibara M, Sakakibara J, Hayama S, et al. Impact of body fat distribution on neoadjuvant chemotherapy outcomes in advanced breast cancer patients. Cancer medicine. 2016;5(1):41-8.
52. Saquib N, Flatt SW, Natarajan L, Thomson CA, Bardwell WA, Caan B, et al. Weight gain and recovery of pre-cancer weight after breast cancer treatments: evidence from the women's healthy eating and living (WHEL) study. Breast cancer research and treatment. 2007;105(2):177-86.
53. Custódio ID, Marinho Eda C, Gontijo CA, Pereira TS, Paiva CE, Maia YC. Impact of Chemotherapy on Diet and Nutritional Status of Women with Breast Cancer: A Prospective Study. PloS one. 2016;11(6):e0157113.
54. de Oliveira LC AG, Lima LC, Aredes MA, Wiegert EVM. . Quality of life and its relation with nutritional status in patients with incurable cancer in palliative care. Supportive care in cancer :. official journal of the Multinational Association of Supportive Care in Cancer. 2020; 2020;28(10):4971-8.
55. Sánchez-Lara K, Turcott JG, Juárez E, Guevara P, Núñez-Valencia C, Oñate-Ocaña LF, et al. Association of nutrition parameters including bioelectrical impedance and systemic inflammatory response with quality of life and prognosis in patients with advanced cancer: a prospective study. Nutrition and cancer. 2012;64(4):526-34.
56. Borges LR, Paiva SI, Silveira DH, Assunção MCF, Gonzalez MC. Can nutritional status influence the quality of life of cancer patients? %J Revista de Nutrição. 2010;23:745-53.
57. Trabal J, Leyes P, Forga MT, Hervás S. Quality of life, dietary intake and nutritional status assessment in hospital admitted cancer patients. Nutricion hospitalaria. 2006;21(4):505-10.
58. Mohammadi S SS, Koon PB, Amani R, Hosseini SM. Association of nutritional status with quality of life in breast cancer survivors. . Asian Pac J Cancer Prev. 2013;APJCP. 2013;14(12):7749-55.
59. Pisegna J, Xu M, Spees C, Krok-Schoen JL. Mental health-related quality of life is associated with diet quality among survivors of breast cancer. Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer. 2020.
60. Janz NK, Mujahid M, Lantz PM, Fagerlin A, Salem B, Morrow M, et al. Population-based study of the relationship of treatment and sociodemographics on quality of life for early stage breast cancer. Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation. 2005;14(6):1467-79.
61. Yan B, Yang LM, Hao LP, Yang C, Quan L, Wang LH, et al. Determinants of Quality of Life for Breast Cancer Patients in Shanghai, China. PloS one. 2016;11(4):e0153714.
62. Bouchra Haddou Rahou KER, Zaki Hanchi, Fatima Ouasmani, Bouchra Benazzouz, & Samir Ahid. Quality of Life among Moroccan Women Undergoing Treatment of Breast Cancer. . British Journal of Medicine & Medical Research,. 2017; 21(8), 1–11. http://doi.org/10.9734/BJMMR/2017/33772.
63. Safaee A, Moghimi-Dehkordi B, Zeighami B, Tabatabaee H, Pourhoseingholi M. Predictors of quality of life in breast cancer patients under chemotherapy. Indian journal of cancer. 2008;45(3):107-11.
64. Üstündağ S, Zencirci AD. Factors affecting the quality of life of cancer patients undergoing chemotherapy: A questionnaire study. Asia-Pacific journal of oncology nursing. 2015;2(1):17-25.

65. Manandhar S, Shrestha DS, Taechaboonsermsk P, Siri S, Suparp J. Quality of life among breast cancer patients undergoing treatment in national cancer centers in Nepal. Asian Pac J Cancer Prev. 2014;15(22):9753-7.
66. MA. B. Assessing The Quality Of Life Among Patients With Breast Cancer At Tikur Anbassa Specialized Hospital, Addis Ababa, Ethiopia: Oslo and Akershus University;. 2016.
67. Janz NK, Mujahid M, Lantz PM, Fagerlin A, Salem B, Morrow M, et al. Population-based study of the relationship of treatment and sociodemographics on quality of life for early stage breast cancer. Quality of Life Research. 2005;14(6):1467-79.
68. SK. N. Health Related Quality of Life of Breast Cancer Patients at Kenyatta National Hospital. . 2002;2002:78.
69. Güneş Z, Çalışır H (2016) Quality of Life and Social Support in Cancer Patients Undergoing Outpatient Chemotherapy in Turkey. Ann Nurs Pract 3(7): 1070.
70. Deshpande GU, Rai R. AN OVERVIEW OF PROGNOSTIC MARKERS IN BREAST CANCER. Medical journal, Armed Forces India. 1999;55(2):129-32.
71. Gökmen-Polar Y, Badve S. Breast cancer prognostic markers: an overview of a changing menu. MLO: medical laboratory observer. 2015;47(10):8, 10, 2-3; quiz 4.
72. Roe H, Lennan E. Role of nurses in the assessment and management of chemotherapy-related side effects in cancer patients. Nursing: Research and Reviews. 2014;4:103-115 https://doi.org/10.2147/NRR.S41845.
73. Tadele N. Evaluation of quality of life of adult cancer patients attending Tikur Anbessa specialized referral hospital, Addis Ababa Ethiopia. Ethiopian journal of health sciences. 2015;25(1):53-62.
74. Waitzberg DL, Caiaffa WT, Correia MI. Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition (Burbank, Los Angeles County, Calif). 2001;17(7-8):573-80.
75. Ulijaszek SJ, Kerr DA. Anthropometric measurement error and the assessment of nutritional status. The British journal of nutrition. 1999;82(3):165-77.
76. Lim SL, Lin XH, Daniels L. Seven-Point Subjective Global Assessment Is More Time Sensitive Than Conventional Subjective Global Assessment in Detecting Nutrition Changes. JPEN Journal of parenteral and enteral nutrition. 2016;40(7):966-72.
77. Detsky AS, McLaughlin JR, Baker JP, Johnston N, Whittaker S, Mendelson RA, et al. What is subjective global assessment of nutritional status? JPEN Journal of parenteral and enteral nutrition. 1987;11(1):8-13.
78. Segura A, Pardo J, Jara C, Zugazabeitia L, Carulla J, de Las Peñas R, et al. An epidemiological evaluation of the prevalence of malnutrition in Spanish patients with locally advanced or metastatic cancer. Clinical nutrition (Edinburgh, Scotland). 2005;24(5):801-14.
79. Salas S, Mercier S, Moheng B, Olivet S, Garcia ME, Hamon S, et al. Nutritional status and quality of life of cancer patients needing exclusive chemotherapy: a longitudinal study. Health and quality of life outcomes. 2017;15(1):85.
80. Luoma ML, Hakamies-Blomqvist L. The meaning of quality of life in patients being treated for advanced breast cancer: a qualitative study. Psycho-oncology.13(10):729-39.
81. Wanden-Berghe C, Sanz-Valero J, Escribà-Agüir V, Castelló-Botia I, Guardiola-Wanden-Berghe R. Evaluation of quality of life related to nutritional status. The British journal of nutrition. 2009;101(7):950-60.
82. B A. . Validation of the SGA screeening tool among surgical patients in TASH Addis Ababa , Ethiopia. . June 2018. .

83. Ayana BA, Negash S, Yusuf L, Tigeneh W, Haile D. Reliability and Validity of Amharic Version of EORTC QLQ-C 30 Questionnaire among Gynecological Cancer Patients in Ethiopia. PloS one. 2016;11(6):e0157359.
84. Villarta RL, Asaad AS. Sample size determination in an epidemiologic study using the epitools web-based calculator. Acta Medica Philippina. 2014;48:42-6.
85. Hassen AM, Taye G, Gizaw M, Hussien FM. Quality of life and associated factors among patients with breast cancer under chemotherapy at Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia. PloS one. 2019;14(9):e0222629.
86. Faul F, Erdfelder E, Lang A-G, Buchner A. G*Power 3.1.7: A flexible statistical power analysis program for the social, Behavioral and Biomedical sciences, Beh. Res Meths. 2013;39:175-91.
87. Rakha EA, Reis-Filho JS, Baehner F, Dabbs DJ, Decker T, Eusebi V, et al. Breast cancer prognostic classification in the molecular era: the role of histological grade. Breast Cancer Research. 2010;12(4):207.
88. J Brierley MGaCW, Wiley Blackwell,. TNM Classification of Malignant Tumours (8th edition)

Union for International Cancer Control. 2017.
89. King MT. The interpretation of scores from the EORTC quality of life questionnaire QLQ-C30. Quality of life research : an international journal of quality of life aspects of treatment, care and rehabilitation. 1996;5(6):555-67.
90. Bray F, Jemal A, Grey N, Ferlay J, Forman D. Global cancer transitions according to the Human Development Index (2008-2030): a population-based study. The Lancet Oncology. 2012;13(8):790-801.
91. force Cmt. Subjective Global Assessment Form. 2017.
92. AS. AN. EORTC QLQ-C30 Scoring Manual. . 2001.
93. Correia MI, Campos AC. Prevalence of hospital malnutrition in Latin America: the multicenter ELAN study. Nutrition (Burbank, Los Angeles County, Calif). 2003;19(10):823-5.
94. Wie GA, Cho YA, Kim SY, Kim SM, Bae JM, Joung H. Prevalence and risk factors of malnutrition among cancer patients according to tumor location and stage in the National Cancer Center in Korea. Nutrition (Burbank, Los Angeles County, Calif). 2010;26(3):263-8.
95. Hidding JT, Beurskens CH, van der Wees PJ, van Laarhoven HW, Nijhuis-van der Sanden MW. Treatment related impairments in arm and shoulder in patients with breast cancer: a systematic review. PloS one. 2014;9(5):e96748.
96. Arends J, Baracos V, Bertz H, Bozzetti F, Calder PC, Deutz NEP, et al. ESPEN expert group recommendations for action against cancer-related malnutrition. Clinical nutrition (Edinburgh, Scotland). 2017;36(5):1187-96.
97. Scott NW PMF, Neil K. Aaronson., Andrew Bottomley., Alexander de Graeff, Mogens Grønvold., et al. EORTC QLQ-C30 Reference Values 2008(2008:427.).
98. Jassim GA, Whitford DL. Quality of life of Bahraini women with breast cancer: a cross sectional study. BMC Cancer. 2013;13(1):212.
99. Jaiyesimi AO, Sofela EA, Rufai AA. Health related quality of life and its determinants in Nigerian breast cancer patients. African journal of medicine and medical sciences. 2007;36(3):259-65.
100. Dubashi B, Vidhubala E, Cyriac S, Sagar T. Quality of life among young women with breast cancer: Study from a tertiary cancer institute in south India. 2010;47(2):142-7.

101. Lôbo SA, Fernandes AFC, Almeida PCd, Carvalho CMdL, Sawada NO. Quality of life in women with breast cancer undergoing chemotherapy %J Acta Paulista de Enfermagem. 2014;27(6):554-9.
102. Høyer M, Johansson B, Nordin K, Bergkvist L, Ahlgren J, Lidin-Lindqvist A, et al. Health-related quality of life among women with breast cancer – a population-based study. Acta Oncologica. 2011;50(7):1015-26.
103. Firouzbakht M, Hajian-Tilaki K, Moslemi D. Corrigendum to: Analysis of quality of life in breast cancer survivors using structural equation modelling: the role of spirituality, social support and psychological well-being. Int Health. 2020;12(4):364.
104. Deeg HJ, Seidel K, Bruemmer B, Pepe MS, Appelbaum FR. Impact of patient weight on non-relapse mortality after marrow transplantation. Bone marrow transplantation. 1995;15(3):461-8.
105. Gamper EM, Giesinger JM, Oberguggenberger A, Kemmler G, Wintner LM, Gattringer K, et al. Taste alterations in breast and gynaecological cancer patients receiving chemotherapy: prevalence, course of severity, and quality of life correlates. Acta oncologica (Stockholm, Sweden). 2012;51(4):490-6.
106. Van Cutsem E, Arends J. The causes and consequences of cancer-associated malnutrition. European journal of oncology nursing : the official journal of European Oncology Nursing Society. 2005;9 Suppl 2:S51-63.
107. Luoma ML, Hakamies-Blomqvist L. The meaning of quality of life in patients being treated for advanced breast cancer: a qualitative study. Psycho-oncology. 2004;13(10):729-39.
108. de Oliveira LC, Abreu GT, Lima LC, Aredes MA, Wiegert EVM. Quality of life and its relation with nutritional status in patients with incurable cancer in palliative care. Supportive care in cancer : official journal of the Multinational Association of Supportive Care in Cancer. 2020;28(10):4971-8.
109. Zhu C, Wang B, Gao Y, Ma X. Prevalence and relationship of malnutrition and distress in patients with Cancer using questionnaires. BMC Cancer. 2018;18(1):1272.
110. Xará S, Amaral TF, Parente B. [Undernutrition and quality of life in cancer patients]. Revista portuguesa de pneumologia. 2011;17(4):153-8.

ANNEXES

Annex 1: Data collection Tools

Study informant sheet-1

Hello,

My name is ———————————————— I am here on behalf of Ruth Adam, a student in Addis Ababa University School of public health nutrition unit. She is conducting a research on *"*Nutritional status and Quality of life among breast cancer patients in Tikur Anbessa specialized hospital and St. Paul Millennium Medical college". She has received permission from Addis Ababa university school of public health. You are selected by consecutive sampling technique to participate in this study because you are currently receiving antineoplastic treatment on the research conducting period. Your participation on this study will only be on based on your willingness. You have the right to choose not to take part in this study. If you choose to take part, you have the right to stop at any time. If you are willing to participate or refuse or decide to withdraw later, you will not be subjected to any ill-treatment.

If you agree to participate in the study, your weight will be measured. Only light closes will be wearing during weight measurement. You will also be interviewed about sociodemographic status, base line clinical data and your nutritional status using subjective global assessment. You can stop at any time if you don't feel comfortable during an interview and measurement process. The measurement and filling the questionnaire will take about 15 minutes. This study will help in designing a policy for hospitalized patients in term of nutritional management. The information that you provide will be kept confidential by using only code numbers and locking the data. Your name will not be written on the questionnaire. No one will have access to the non-coded data except the principal investigator and the data will not be used for purposes other than the study. Your willingness and active participation is very important for the success of this study.

Annex 2 Informed Consent Form

Based on the understanding of the above information, are you willing to participate in this study?

A) Yes

B) No

If yes, I will continue and

If no, I will skip to next participant after writing the reasons of refusal

Respondent

Signature_____Date_____

Data collector

Name_____Signature_____

Questionnaires ID number_____

Name of hospital _____ Date of data collected_____

Result of data collected ***(Tick in the box):***

Complete	
Incomplete	
Refused	

Checked by Supervisor: Name_____Signature_____ For further explanation, use the Principal Investigator's Address;

Name: Ruth Adam

Email:ruthadam27@gmail.co

m phone:

+251 923794061

Part 1 : Socio-Demographic Data Questionnaire

Instruction: Now I am going to ask you questions about your socio-demographic information
Ask the following questions carefully and circle the response unless there is no specific instruction.

No.	Questions	CODING CATEGORIES	skip
101	How old are you now?	Age in completed years….....	
102	Sex of respondent	Female……..1 Male …….2	
103	What is your religion?	Orthodox ……1 Muslim ……2 Protestant…….....3 Catholic……....4 Other(specify): _____5	
104	What is the highest level of school you attended?	Unable to read and write…….....1 Able to read and write.……....2 Primary level (1-8) ……..3 Secondary level (9-12) ……....4 Technical/Vocational……5 Higher (University) ……6	
105	What is your marital status?	Single……1 Married ……2 Separated……...3 Divorced ……...4 Widowed……5	
106	What is your occupation?	House wife……...1 Farmer …….…….....2 Civil Servant …….…...3 Merchant…….……..…4 Daily Laborer……....5 Student…….…….....6 Teacher……7 Private Company……8 Pension……..9 Other (specify)_____10	
107.	Place of Residence	Urban……....1 Rural…….…2	
108	Address	Region City _____ _____	

108.	How is your living arrangement prior to admission? (please **read the options)**	Living alone……..1 Living with a partner…….2 Living with a parent/s…….3 Living with siblings……4 Living with children……...5 Other……..…….6	
109	Family Size	☐☐	

Household socio economic status (Wealth Index)
I am going to ask you questions about your household assets, services, housing and related conditions.

1 Housing condition-please answer the following questions thinking about the housing condition of your household			
No.	Questions	CODING CATEGORIES	skip
201.	Home ownership	Private ……1 Government…….2 Rent ……..3 Other (specify)_____4	
202	Number of rooms in the house?	ROOMS . . . . . ☐☐	
203	How many rooms in the household are used for sleeping?	ROOMS . . . . . ☐☐	
204	Main construction material used for the roof: **CIRCLE ALL THAT APPLY**	**Natural roof** Thatch/mud...……...……1 **Rudimentary roof** Rustic mat/ plastic sheet…….……2 Reed/bamboo ...……...…….……3 Wood planks...……..4 Cardboard ...…….……...….5 **Finished roof** Metal/corrugated iron...…….……6 Wood ...…….…….....7	

		Cement ...…….……....8 Ceramic tiles ...……9 Other(specify): _____10	
205	Main construction material used for the floor: **CIRCLE ALL THAT APPLY**	**Natural floor** Earth/sand……1 Dung……2 **Rudimentary floor** Wood planks……. ….3 Palm/bamboo……...4 **Finished floor** parquet or polished wood.…….5 vinyl or asphalt strips/plastic tile…… ..6 Ceramic Tiles……...7 Cement……..……. 8 Carpet…….…….…….……9 Other(specify):_____10	
206	Main construction material used for exterior walls: **CIRCLE ALL THAT APPLY**	**Natural walls** No walls ..... 1 Cane/Trunks/Bamboo/Reed ..... 2 **Rudimentary walls** Wood with Mud ..... 3 Stone with mud ..... 4 **Finished walls** Cement…….……..5 Stone with lime/cement ..... 6 Bricks ..... 7 Cement blocks……8 Wood planks/shingles ..... .9 Other (specify)**:**_____10	
207	What kind of toilet facility does your household have? [**INTERVIEWER: LIMIT TO ONE RESPONSE; IF TWO TYPES ARE MENTIONED, RECORD THE TYPE CLOSEST TO THE TOP OF THE LIST]**	Pour flush toilet……....……...1 Ventilated improved pit latrine.... ……2 Pit latrine with slab…….……..…...3 Pit latrine without slab…….……4 No latrine……...5 Other (specify): _____6	
208	Does the household have its own water source within	Yes, unprotected well……....……1 Yes, protected well…….…2	

	the compound? **(Multiple Response is possible)**	Yes, pipe water ……..…….3 No, Community shared pipe…….4 Other……5	
209	What is the **main source** of drinking water for members of your household? **(Do not read the options, just ask and circle what they told you)**	Piped water ..... 1 Protected well ..... 2 Unprotected well ..... 3 Protected spring ..... 4 Unprotected spring ..... 5 Surface water (River/stream/ Pond/lake//Dam) ..... 6 Tanker ..... 7 Bottled water ..... 8 Community shared pipe……9 Other (specify) _____10	

2. Household assets and services- In answering the questions below please think of assets and services available in your household			
210	Does any member of this house hold own any agricultural land?	Yes ……1 No……2 →	**312**
211	How many (LOCAL UNITS) of agricultural land do members of this house hold own?	Local units ☐☐	
212	Does your house hold own any livestock, herds, other farm animal or poultry?	Yes ……1 No ……2 →	**314**
213	How many of the following animals do your household own? **If none, record '00'.** **If 95 or more, record '95'.** **If unknown, record '99'.**	a. Cows, ☐☐ b. oxen or bulls ☐☐ c. Horses ☐☐ d. mules ☐☐ e. Goats ☐☐ f. Sheep ☐☐ g. Chickens or other poultry ☐☐ h. Beehives? ☐☐ i. donkeys ☐☐	

214	Does your house hold have?	Yes No **a.** Electricity? 1 2 **b.** A radio? 1 2 **c.** A television? 1 2 **d.** A non-mobile telephone? 1 2 **e.** A computer? 1 2 **f.** A refrigerator? 1 2 **g.** A table? 1 2 **h.** A chair? 1 2 **i.** A bed with cotton/ sponge/ spring mattress? 1 2 **j.** An electric mitad? 1 2 **k.** A kerosene lamp/ pressure lamp? 1 2 **l**. Solar? 1 2 **m.** Sofa? 1 2	
215	Do any members of this household own?	**Yes No** a. A watch? 1 2 b. A mobile phone? 1 2 c. A bicycle? 1 2 d. A motorcycle? 1 2 e. An animal-drawn cart? 1 2 f. A car or truck? 1 2 g. A Bajaj? 1 2	
216	What type of fuel does your household **mainly use** for cooking? **(Multiple Response is possible)**	Electricity…….……..1 Biogas……2 Kerosene……3 Wood…….4 Charcoal…….5 Straw/shrubs/grass…….6 Animal Dung…….7 Agricultural crop……8 Other (specify): _____9	

217	Does any members of this household have a bank/microfinance account?	Yes ……1 No……...2	

Part 3: Life Style related questionnaire

No	**Question**	**Response**	**Skip**
301	Have you ever smoked cigarette?	1. Yes sometimes 2.Yes, I still smoke 3.I have never smoked →	303
302	In the last 24 hours, how many cigarettes did you smoke?	Cigarettes…..☐☐	
303	Have you ever chewed chat?	Yes……1 No ……2 →	305
304	During the last 30 days, how many days did you chew chat?	Days……☐☐	
305	Have you ever taken a drink that contains alcohol (Tella/Tegi/ Areke/Beer/Wine, etc...)?	Yes……1 No…….2 →	307
306	During the past 30 days, how many days did you drink alcohol?	Days…….. ☐☐	
307	Do you frequently Exercise?	1. Yes 2.No	
308.	If your answer is yes, how frequently have you exercised during the past 30 days?	1.Twice a week 2.Three times a week 3.Four times a week 4.Everyday	

Part 4: Subjective global assessment data (SGA) (circle one rating for each)

Instruction: Now I am going to ask you questions about your nutritional status

No.	Questions	**Coding category**	skip
401	Have you lost weight in the past 6 months?	Yes……1 No……2	
	What was your usual weight before the disease?	☐☐.☐☐ Kg	
402	Weight change in the past month	Increase……..1 The same…….2 Decrease…….3	
403	Current weight (Please measure the current weight of the respondent)	1st measurent ☐☐☐ Kg 2nd measurement ☐☐☐ Kg	
404	Is there any change in your dietary intake in the past two weeks?	Yes…… 1 No……2 →	406
405	What kind of dietary intake change is there	Borderline or improving or declining…….1 Poor and decreasing ……..2 Starvation, unable to eat …….3	
	How much share of your usual meal do you consume now?	_____	
406	What type of diet are you currently taking?	Solid (usual diet) ……1 suboptimal liquid diet……2 Full liquid diet……3 Starvation……4	
407	Which of the following gastrointestinal symptoms has persisted for the past 2 weeks and more? **(Multiple Response is possible)**	None……1 Nausea……2 Vomiting……3 Diarrhea……4 Anorexia……5	
	How many times per day do you experience the symptom? _____		
408	Is there a change in your functional capacity?	Yes……. 1 No……. 2 →	411
409	What is the type of your functional capacity change?	Working sub optimal…1 Ambulatory…….2 Bedridden……...3	
410	**Skip the following question, it will be filled by the**	No stress ……1 Low stress……2 moderate stress…….3	

	principal investigator Metabolic demand (stress)	High stress ……4	
	Physical Assessment		
411	Loss of subcutaneous fat (triceps,) **Remark** **None (Fingers don't touch)** **Low to moderate (Fingers nearly meet)** **Severe (Fingers touch)**	None ……1 Low to moderate…….2 Severe……3	
412	Muscle wasting (clavicle, temple and shoulder area) **Remark** **(Low to moderate)** **Muscle loss not presenting; visible, but prominent in females** **In males: a portion of the clavicle is visible** **In females: the clavicle is prominent deltoid and chest muscle is still intact** **(Severe)** **Evident protrusion**	None ……1 Low to moderate…….2 Severe……3	
413	Edema **(Please review the chart of the patient)** **(Remark)** **Mild edema…. localized to lower extremities (Ankle, pedal, tibial), possible sacral edema if bedridden** **Severe edema…… Pitting beyond knees, sacral edema if bedridden, may also have generalized edema**	No edema …….1 Mild edema…….2 Severe edema……3	

Well-nourished……..A

Moderately malnourished…….B

Severely malnourished…….C

Part 5: Financial Support related questionnaire

No.	Question	Response	Skip
501.	Do you have any source of income?	1. Yes 2.No	
502.	Monthly income		
503.	Do you have any financial support?	1. Yes 2.No →	**601**
504.	If your answer is yes, from whom do you get the support?	1. Family member 2. From relative 3. From neighbour 4. From health professional 5. From Friends 6. Other	
505.	If your answer is yes for question 1, do you get the support regularly?	1. Yes 2.No	
506.	Do you think the support that you get is enough?	1.Not Enough 2.Fair 3.Enough	

Part 6 : Nutritional Support related questionnaire

S. NO	Question	Response options	Code
601	In the past four weeks, did you worry that your HH would not have enough food?	0 = No (skip to Q2) 1=Yes	|___|
601.a	How often did this happen?	1 = Rarely (once or twice in the last 4 weeks) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
602.	In the past four weeks, were you or any HH	0 = No (skip to Q3)	|___|

	member not able to eat the kinds of foods you preferred because of a lack of resources?	1=Yes	
602.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
603.	In the past four weeks, did you or any HH member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes	|___|
603.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times	|___|
604.	In the past four weeks, did you or any HH member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes	|___|
604.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
605.	In the past four weeks, did you or any HH member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1 = Yes	|___|
605.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|

606.	In the past four weeks, did you or any other HH member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes	|___|
606.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
607.	In the past four weeks, was there ever no food to eat of any kind in your HH because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes	|___|
607.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
608.	In the past four weeks, did you or any HH member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes	|___|
608.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
609.	In the past four weeks, did you or any HH member go a whole day and night without eating anything because there was not enough food?	0 = No (skip to section 3) 1 = Yes	|___|
609.a	How often did this happen?	1 = Rarely (once or twice) 2 = Sometimes (3-10 times) 3 = Often (more than ten times)	|___|
***Derivd from version 3 of the Household Food Insecurity**		***Access Scale (HFIAS) measurement guide***	
6010	In the 4 weeks, do you believe that all member of your household have feed the type of food they want both in quality and quantity	0= no 1= yes (skip to Q 3.3)	|___|
60.11	If you say no, what do you think is the reason for? Because:	1. Of illness and loss of appetite 2. Unable to prepare due to lack of time 3. Food is not available at home and market 4. We couldn't by food due to increased in price 5. We couldn't by food due to loss of my income 6. Others (specify):_____	|___|
60.12	Different people take different actions to cope with increase in food price, what about you and your family member did?	1. Reduce the amount of consumed diet per meal 2. Cut the number of meals consumed per day 3. Shift to less expensive and poor quality diet 4. Reduce on non food expenditures 5. Receive for food or cash aid 6. Taking a loan from bank or other person 7. Selling any house hold assets 8. Others (specify)_____	|___|

Part 7: Cancer related condition of the patient

No.	Question	Response	Skip
701.	The tumor size	(1) < 2cm (2) 2-5 cm (3) > 5cm (4) unknown T____ N____ M_____ ____ cm * ____ cm* _____ cm (infiltrating mass on breast tissue)	
702	The tumor grade	(1) Grade 1 (2) Grade 2 (3) Grade 3 (4) Grade 4 (5) unknown	
703.	Stage of the cancer	1. Stage 1 2.Stage 2 3. Stage 3 4.Stage 4 5. unknown	
704.	Presence of metastasis at the time of initial diagnosis	1.Metastasis present 2. Metastasis absent	
705.	Where was the metastasis?	1. Vertebrae 2. Bone 3. Lung 4. Liver 5. Axillary 6. Clavicle/supraclavicle 7. Other	
706.	Treatment intent	1. Palliative 2. Curative	
707.	Kind of treatment that the patient has had	1. Chemotherapy 2. Radiotherapy 3. Chemotherapy and Radiotherapy	

		4. Chemotherapy and surgery 5. Chemotherapy, Radiotherapy and surgery 6.Radiotherapy and surgery 7.Hormonal therapy 8. Palliative 9. Surgery 10. Follow up	
708.	Treatment patient is now on	1. Chemotherapy 2. Radiotherapy 3. Surgery 4. Hormonal therapy 5. Follow up	
709.	If patient is on chemotherapy, lines of chemotherapy patient has had so far _____		
710.	If patient is on radiotherapy, lines of radiotherapy patient has had so far _____		
711.	How many months have passed since first diagnosis? ☐☐		

Part 8: Other disease condition related questionnaire

No.	Question	Response	Skip
801.	Have the patient been diagnosed with any other disease condition recently?	1.Yes 2.No	
802	If the answer is yes please state the disease in the space provided	----------	

Part 9: Quality of life related Questionnaire

EORTC QLQ-C30 (version 3)

We are interested in some things about you and your health. Please answer all of the questions yourself by circling the number that best applies to you. There are no "right" or "wrong" answers. The information that you provide will remain strictly confidential.

Please fill in your initials: · · · ·

Your birthdate (Day, Month, Year): · · · · · · · ·

Today's date (Day, Month, Year): 31 · · · · · · · · ·

_____

____

No	Questionnaire	Not at all	A little	Quite a bit	Very much
901.	Do you have any trouble doing strenuous activities, like carrying a heavy shopping bag or a suitcase?	**1**	**2**	**3**	**4**
902.	Do you have any trouble taking a long walk?	**1**	**2**	**3**	**4**
903.	Do you have any trouble taking a short walk outside of the house?	**1**	**2**	**3**	**4**
904.	Do you need to stay in bed or a chair during the day?	**1**	**2**	**3**	**4**
905.	Do you need help with eating, dressing, washing yourself or using the toilet?	**1**	**2**	**3**	**4**
During the past week		**Not at all**	**A little**	**Quite a bit**	**Very much**
906.	Were you limited in doing either your work or other daily activities?	**1**	**2**	**3**	**4**
907.	Were you limited in pursuing your hobbies or other leisure time activities?	**1**	**2**	**3**	**4**
908.	Were you short of breath?	**1**	**2**	**3**	**4**
909.	Have you had pain?	**1**	**2**	**3**	**4**
910.	Did you need to rest?	**1**	**2**	**3**	**4**
911.	Have you had trouble sleeping?	**1**	**2**	**3**	**4**
912.	Have you felt weak?	**1**	**2**	**3**	**4**
913.	Have you lacked appetite?	**1**	**2**	**3**	**4**
914.	Have you felt nauseated?	**1**	**2**	**3**	**4**
915.	Have you vomited?	**1**	**2**	**3**	**4**
916.	Have you been constipated?	**1**	**2**	**3**	**4**
During the past week:		**1**	**2**	**3**	**4**
917.	Have you had diarrhea?	**1**	**2**	**3**	**4**
918.	Were you tired?	**1**	**2**	**3**	**4**
919.	Did pain interfere with your daily activities?	**1**	**2**	**3**	**4**
920.	Have you had difficulty in concentrating on things, like reading a newspaper or watching television?	**1**	**2**	**3**	**4**
921.	Did you feel tense?	**1**	**2**	**3**	**4**
922.	Did you worry?	**1**	**2**	**3**	**4**

923.	Did you feel irritable?	**1**	**2**	**3**	**4**
924.	Did you feel depressed?	**1**	**2**	**3**	**4**
925.	Have you had difficulty remembering things?	**1**	**2**	**3**	**4**
926.	Has your physical condition or medical treatment interfered with your family life?	**1**	**2**	**3**	**4**
927.	Has your physical condition or medical treatment interfered with your social activities?	**1**	**2**	**3**	**4**
928.	Has your physical condition or medical treatment caused you financial difficulties?	**1**	**2**	**3**	**4**
For the following questions please circle the number between 1 and 7 that best applies to you					
929.	How would you rate your overall health during the past week? Very poor Excellent 1 2 3 4 5 6 7				
930	How would you rate your overall quality of life during the past week? Very poor Excellent 1 2 3 4 5 6 7				

<u>Please double-check that all sections are fully completed!</u>

Completed by:	
Checked by:	
Date:	
Pt ID number	

Annex 3: Amharic version of the Information sheet

አዲስ አበባ ዩኒቨርስቲ ጤና ሣይንስ ኮሌጅ የህብረተሰብ ጤና አጠባበቅ ትምህርት ክፍል

ክፍል 1 የተጠያቂው / የመላሾች የመረጃ ቅፅ

ጤና ይስጥልኝ ስሜ————ይባላል የመጣሁት ከአዲስ አበባ ዩኒቨርስቲ የህብረተሰብ ጤና አጠባበቅ የስነምግብ ትምህርት ክፍል ተማሪ የሆነችውን ሩት አዳምን ወክዬ ነው። የምግብ ሁነታ በካንሰር ታካሚዋች የኑሮ ሁኔታ ጥራት ላይ የለውን ተጽእኖ ለማወቅ በጥቁር አንበሳና በዱስ ጽውሎስ ስፔሻላይዝድ ሆስፒታሎች ተኝተው በሚታከሙ ህሙማን ላይ የሚደረግ ጥናት ነው። እርስዎ በዚህ ጥናት ላይ እንዲሳተፉ የተመረጡት ጥናቱ በሚካሄድበት ወቅት ላይ የሚገቡ ታማሚዎችን በሙሉ ስለሚካተቱ ነው። በጥናቱ ላይ ያለመሳተፍ ሙሉ መብት አለዎት። የእርስዎ ተሳትፎ ሙሉ በሙሉ በእርስዎ ሙሉ ፈቃድኝነት ላይ የተመሰረተ ነው።

ለመሳተፍ ፍቃደኛ ከሆኑ በኋላም በፈለጉት ጊዜ ማቆም ወይም ማቋረጥ ይችላሉ። በጥናቱ ባለመሳተፎ የሚደርስቦት ምንም አይነት ችግር አይኖርም በጥናቱ ለመሳተፍ ከተስማሙ ክብደት በመሳሪያ እንለካለን፡ ክብደትዎ በሚለካበት ጊዜ ቀለልያሉ ልብሶች እና በባዶ እግር ይሆናሉ። በተጨማሪም የተወሰኑ ጥያቄዎችን እንጠይቆታለን። በመጠይቁ ጊዜ ጥሩ ስሜት ካልተሰማዎት በማንኛውም ጊዜ አቋርጠው መሄድ ይችላሉ። መጠይቁና ልኬቱ 15 ደቂቃ ይህል ይፈጃል። የጥናቱ የመጨረሻ ውጤት የሆስፒታል ታካሚዎች የስነምግብ ድጋፍ እና ክትትል እንዲደረግላቸው የሚያበርታታ ፖሊሲ ለማዘጋጀት ይጠቅማል ። በመጨረሻም ከእርስዎ የምንሰበስበው መረጃ ከስምዎ ጋር አይያያዝም ስምዎ እንደማይጠቀስና ለማንም አካል ተላልፎ እንደማይሰጥ ልናረጋግጥልዎት እንወዳለን። የዚህ ጥናት ውጤት ግን ተጠርዞ እና ተዘጋጅቶ ጉዳዩ ለሚመለከታቸው የጤና ድርጅቶች እና ባላድርሻ አካላት ሊሰጥ ይችላል።

Annex 4 :

4.1 Amharic consent form

የስምምነት መጠየቂያ/ማረጋገጫ ቅፅ

ከላይ በሰጠንዎት መረጃ መሰረት በጥናቱ ላይ ለመሳተፍ ፈቃደኛ ነዎት?

ሀ. አዎ ☐ አመስግንና መጠይቁን ቀጥል

ለ. አይደለሁም ☐ ወደ ቀጣዩ ተጠያቂ ሂድ

ፈቃደኛ ካልሆኑ ምክንያቱን ፅፈው ወደሚቀጥለው ተሳታፊ እለፍ————————————————

የተሳታፊ ፊርማ _____ቀን_____

የመረጃ ሰብሳቢ ስም_____ ፉርማ_____

የመጠይቁ ቁጥር_____

መጠይቁ የተካሄደበት ቀን_____

የመጠይቁ ውጤት (በሳጥኑ ዉስጥ ምልክት አድርግ):

1. ሙለ በሙለ የተሞላ	
2. በከፊል የተሞላ	
3.ምንም ያልተሞላ	

በተቆጣጣሪዎች ተረጋግጧል ፡ስም————————ፉርማ————

ለተጨማሪ ማብራሪያ የዋና አጥኚውን አድራሻ ይጠቀሙ

ስም፡ ሩት አዳም

ኢሜይል: ruthadam27@gmail.com

ስልክ: +251 923794061

የአማርኛ መጠይቅ

ክፍል 1. መሰረታዊ እና የስነ-ህዝብ መረጃን የተመለከቱ ጥያቄዎች

አሁን የርስዎን መሰረታዊ እና የስነ-ህዝብ መረጃዎች የተመለከቱ ጥያቄዎችን እጠይቅዎታለሁ። የሚከተሉትን ጥያቄዎች በጥንቃቄ በመጠየቅ ምርጫ ከሆነ መልሱን ያክብቡ፤ነፃ ጥያቄ ከሆነ የመላሹን መልስ ይፃፉ።

ቁጥር	ጥያቄ	ኮድ	ዝለል
101	ዕድሜህ/ሽ ስንት ነው?	እድሜ በሙሉ ዓመት …….	
102	ሀይማኖት	1.ኦርቶዶክስ 2. ካቶሊክ 3.ፕሮቴስታንት 4. ሙስሊም 5. ሌላይቅስ----------	
103	የትምህርትደረጃ	1.ያልተማረ (ማንበብናመፃፍየማይችል) 2.ማንበብና መፃፍ የሚችል 3.የመጀመሪያ ደረጃ ያጠናቀቀ(ክፍል1-8) 4.ሁለተኛ ደረጃ ያጠናቀቀ (9-12) 5.ኮሌጅ ወይም የሙያት/ት 6.የዩኒቨርስቲ ምሩቅ ወይም ከዛ በላይ	
104	የጋብቻ ሁኔታዎ ምንድን ነዉ?	ያላገባ/ች……1 የተፋታ/ች .....4 ያገባ/ች.....2 የሞተባት/የሞተበት.....5 ተጋብተዉ ተለያይተው የሚኖሩ.....3	
105	የትዳር አጋር የትምህርትደረጃ	1.ያልተማረ (ማንበብናመፃፍየማይችል) 2.ማንበብና መፃፍ የሚችል 3.የመጀመሪያ ደረጃ ያጠናቀቀ(ክፍል1-8) 4.ሁለተኛ ደረጃ ያጠናቀቀ (9-12) 5.ኮሌጅ ወይም የሙያት/ት 6.የዩኒቨርስቲ ምሩቅ ወይም ከዛ በላይ	
106	ስራዎ ምንድን ነዉ?	የቤት እመቤት.....1 ገበሬ……2 የመንግስት ሰራተኛ.....3 ነጋዴ.....4 የቀን ሰራተኛ.....5 ተማሪ.....6 የግል ስራ.....7 ሌላ (ይገለፅ)፡_____8	
107	የመኖሪያ አድራሻ	ዞን	

		ከተማ.....2	
108.	ከመታመሞ በፊት የነበሮት የአኖኖር ሁኔታ እንዴት **ነዉ? (የተዘረዘሩትን ምርጫዎች ያንብቡላቸው)**	ለብቻ.....1 ከትዳር አጋር ጋር.....2 ከቤተሰብ ጋር.....3 ከልጆች ጋር.....4 **ሌላ (ይገለፅ)፡_____5**	
109	የቤተሰቡ አባላት በቁጥር ስንት ናችዉ?		

ክፍል-2. የቤተሰብን የሀብት ደረጃ የተመለከቱ ጥያቄዎች

1. የቤት አሰራር ሁኔታ፡- እባክዎ የሚቀጥሉትን ጥያቄዎች ስለሚኖሩበት ቤት አሰራርና ሁኔታ እያሰቡ ይመልሱ			
ቁጥር	**ጥያቄ**	**መልስ**	**ዝለል**
201.	የሚኖሩበት ቤት ባለቤትነቱ የማን ነው?	የግል.....1 ከግለሰብ ኪራይ.....3 የመንግስት (የቀበሌ).....2 ሌላ ካለ ይገለፅ------4	
202	የሚኖሩበት ቤት ስንት ክፍል አለው?	ክፍል	
203	በመኖሪያ ቤቶ ውስጥ ለመኝታ የሚያገለግል ስንት ክፍል አለ?	ክፍል	
204	የሚኖሩበት ቤት ጣሪያው ምንድነው? የተሰራበትን ሁሉ ያክብቡ	**ተፈጥሮ ጣሪያ** ሳር/ጭቃ.....1 **በቅጡ ያልተጠናቀቀ ጣሪያ** ፕላስቲክ/ሸራ .....2 ቀርቀሃ/ሸምበቆ.....3 የእንጨት ሳንቃ/ጣዉላ.....4 ካርቶን.....5 **የተጠናቀቀ ጣሪያ** ቆርቆሮ.....6 ዉብ የጣሪያ ጣዉላ.....7 ሲሚንቶ.....8 ሴራሚክ ጣሪያ.....9 ሌላ (ይገለፅ)፡_____10	
205	የሚኖሩበት ቤት ወለል ምንድነው?	**የተፈጥሮ ወለል** አፈር/አሸዋ.....1 ፍግ.....2 **በቅጡ ያልተጠናቀቀ ወለል** **የተጠናቀቀ ወለል** የተጠላለፈ ዉብ የወለል ጣዉላ...5 ፕላስቲክ ንጣፍ..... 6 በሴራሚክ ንጣፍ 7	

		የእንጨት ሳንቃ/ጣዉላ**....**3 ሲሚንቶ............................8 ሸምበቆ ....4 ስጋጃ ምንጣፍ.......................9 **ሌላ (ይገለፅ)፡**______________10	
206	የቤቱ የዉጨኛዉ ግድግዳ በዋነኛነት ከምንድነው የተሰራው?	**የተፈጥሮ ግድግዳ** **የተጠናቀቀ ግድግዳ** የሌለዉ....................1 ሲሚንቶ.............................5 አገዳ/ግንድ/ሸምበቆ........2 ድንጋይና ሲሚንቶ.......6 **በቅጡ ያልተጠናቀቀ ግድግዳ** የሸክላ ጡብ............7 እንጨትና ጭቃ..............3 ብሎኬት..................8 ድንጋይና ጭቃ................4 የእንጨት ሳንቃ/ጣዉላ........9 **ሌላ (ይገለፅ)፡**_____10	
207	ቤቱ ምን ዓይነት የመፀዳጃ ቤት አለዉ? **ከአንድ በለይ መልስ ከተሰጠ በዋናነት የሚጠቀሙትን ይመዝግቡ**	በዉሀ የሚዉርድ ሽንት ቤት.............1 ርብራብ የሌለዉ ሽንት ቤት....4 የአየር ማስወጫ ቱቦ ያለዉ ሽንት ቤት....2 መፀዳጃ ቤት የለዉም......5 ርብራብ ያለዉ ሽንት ቤት..................3 **ሌላ (ይገለፅ)፡**_________6	
208	በግቢያችሁ ዉስጥ የራሳችሁ የመጠጥ ዉሃ አለ? **(ከአንድ በላይ መመለስ ይቻላል)**	አዎ፤ያልተጠበቀ የጉድጓድ.......1 አዎ፤የቧንቧ ዉሃ.................3 አዎ፤የተጠበቀ የጉድጓድ..........2 የለም 4	
209	ቤተሰቡ በዋነኛነት የመጠጥ ዉሃ የሚያገኘዉ ከምንድን ነዉ?	የቧንቧዉሃ..........1 የከርሰምድር ዉሃ (ወንዝ፣ኩሬ፣ሃይቅ, ግድብ) ....6 የተጠበቀ ጉድጓድ.......2 ታንከር.....................7 ያልተጠበቀ ጉድጓድ....3 የታሸገ ዉሃ...............8 ምንጭ የተጠበቀ........4 **ሌላ (ይገለፅ): ____________9** ምንጭ ያልተጠበቀ.....5	
210	ከቤተሰቡ አባላት ዉስጥ ሊለማ የሚችል መሬት ያለዉ አለ?	አዎ.....................1 የለም.......................2	
211	በአጠቃላይ ምን ያህል ጥማድ መሬት አላችሁ?	የመሬት ብዛት በጥማድ	
212	ቤተሰቡ የቀንድ ከብት፣ ሌላ የእርሻ እንስሳ ፣በግ ፣ ፍየል ፣ ወይም ዶሮ አለዉ?	አዎ......................................1 የለም...2	
213	ቤተሰቡ ከሚከተሉት የቤት እንስሳት ዉስጥ ምን	በሬ፣ አህያ ወይፈን ፈረስ የወተትላም በቅሎ	

	ያህል አለዉ? **ከሌለ '00' ይሞላ** **ካልታወቀ** **'99' ይሞላ**	በግ ☐☐ ፍየል ዶሮ ☐☐ የንብ ቀፎ ☐☐ ሌላየቀንድ /ከብት	
214	ቤተሰቡ የሚከተሉት ቁሳቁሶች አሉት?	አዎ የለም ሀ. የኤሌክትሪክ መብራት..1.....2 ለ. ሬድዮ ..... 1.....2 ሐ. ቴሌቪዝን.....1……2 መ. የቤት ስልክ... .....1….2 ሠ. ኮምፒዉተር.....1……2 ረ. ፈሪጅ.....1.....2 ሰ. ጠረንፔዛ.....1.....2 አዎ የለም ሸ. ወንበር..... 1 ……2 ቀ. አልጋ ከነፍራሹ..... 1.....2 በ. የኤሌክትሪክ ምጣድ.. 1.....2 ተ. የኩራዝ መብራት.... 1.....2 ቸ. ሶላር..... 1.....2 ኃ. ሶፋ..... 1.....2	
215	ከቤተሰቡ አባላት ዉስጥ የሚከተሉት ቁሳቁሶች ያለዉ አለ?	አዎ የለም ሀ. ሰዓት.....1.....2 ለ. የስልክ ቀፎ....1.....2 ሐ. ብስክሌት.....1.....2 መ. ሞተር.....1.....2 አዎ የለም ሠ. ጋሪ.....1.....2 ረ. መኪና.....1.....2 ሰ. ባጃጅ.....1.....2	
216	ቤቱ ባብዛኛዉ ለምግብ ማብሰያነት የሚጠቀመዉ ምንድን ነዉ?	የኤሌክትሪክ ኃይል.....1 ባዮጋዝ.....2 ናፍታ.....3 እንጨት.....4 ከሰል.....5 ሳር.....6 የከብት ተረፈ ምርት (ኩበት).....7 የሰብል ተረፈ ምርት (ገለባ).....8 ሌላ (ይገለፅ)፡_____9	
217	ከቤተሰቡ አባላት ዉስጥ የቁጠባ ደብተር (የባንክ ወ.ዘ.ተ) ያለዉ አለ?	አዎ.....1 የለም.....2	

ክፍል-3 ከአኖኖርዘይቤጋርበተያያዘበተያያዘየሚሰጥጥያቄዎች

ተ.ቁ	**ጥያቄ**	**መልስ**	**ይዘለል**
301	እስከዛሬ ድረስ የትኛዉንም አይነት አልኮል መጠጥ (ጠላ/አረቄ/ጠጅ/ቢራ/ወይን/በፋብሪካ የተመረቱ) ቢያንስ አንድ የአልኮል መጠጥ ለአንድ ጊዜም ቢሆን ጠጥተዉ ያዉቃሉ?	አዎ.....1 **የለም**.....2	303
302	ባለፉት 30 ቀናት ዉስጥ ስንት ቀን የአልኮል መጠጥ ጠጥተዉ ያዉቃሉ? **(ካልጠጡ 00 ይሞላ)**	ቀን…… ☐☐	

303	በአሁኑ ሰአት ሲጋራ ያጨሳሉ	አለ.....**1** የለም……..**2** →	305
304	ባለፉት 24 ሰአት ውስጥ ምን ያክል ሲጋራ አጭሰዋል	ሲጋራ……	
305	ጫት ቅመው ያውቃሉ	አዎ.....**1** የለም……..**2** →	307
306	ባለፉት 30 ቀናት ዉስጥ ስንት ቀን ጫት ቅመው ያውቃሉ	ቀን.....	
307	አዘውትረው እንቅስቃሴ ያደርጋሉ ?	አዎ……..1 አይ አላደርግም……...2 →	401
308.	ከላይ ለተጠየቁት ጥያቄ አዎ ብለው ከመለሱ በየስንት ጊዜ እንቅስቃሴ ያደርጋሉ?	በሳምንት ሁለትጊዜ……..1 በሳምንት ሶስትጊዜ……2 በሳምንት አራትጊዜ……..3 በየቀኑ……4	

ክፍል 4 ሰብጀክቲቭግሎባልአሰስመንት

ቁጥር	ጥያቄ	ኮድ	ዝለል
401	ከስድስት ወር በፊት የነበረ ክብደት		
402	በስድስት ወር ውስጥ ያጋጠመ የክብደት መቀነስ		
403	ከአንድ ወር በፊት የነበረ ክብደት		
404	አሁን ያለ የሰውነት ክብደት **(እባኮንአሁንያለውንየሰውነት ክብደት ይለኩ)**	የመጀመሪያ ልኬት ሁለተኛ ልኬት	
405	ከተለመደው የምግብ አወሳሰድ ለውጥ አለ?	አለ……1 የለም……2 →	407

406	የምግብ አወሳሰድ ለውጡ ምን አይነት ነው?	መካከለኛ አመጋገብ ግን በመሻሻል ላይ ያለ……1 ደካማ እና የምግብ ፍላጎቱ በመቀነስ ላይ ያለ……..2 አለመመገብ……3	
	ከድሮው አንፅር አሁን ምን ያህል ምግብ በአንዴ ይወስዳሉ?		
407	አሁን የሚወስዱት የምግብ አይነት	ለስለስ ያለምግብ……1 ፈሳሽ……2 አለመመገብ……..3	
408	ከሁለት ሳምንት በላይ የቆየ የሆድ ህመም ምልክቶች አሉ **(ከአንድ በላይ መመለሰ ይቻላል)?**	ምንም የለም……1 ተቅማጥ……4 ማቅለሽለሽ……2 የምግብ ፍላጎት መቀነስ……5 ማስታወክ……3	
	በቀን ለስንት ግዜ ነዉ ምልክቶቹ የሚታዩት?		
409	የለት ተለት እንቅስቃሴን የማከናወን አቅም ለውጥ አለ?	ለውጥ የለም(ሙሉ በሙሉ ማከናወን እችላላሁ)……1 ለውጥ አለ……2	411
	ምን አይነት ለውጥ አለ?	ትንሽ ትንሽ መስራት……1 የአልጋ ቁራኛ……3 መንቀሳቀስ ብቻ……2	
410	**(ማስታወሻ ይህ ጥያቄ በ ዋና ተመራማሪው የሚሞላ ስለሆን ወስሚቀጥለው ጥያቄ ይለፉ)** የህመሙ አይነት ከአመጋገብ ጋር ያለው ቁርኝት እና ጫና	ጫና የለውም……1 ትንሽ ጫና……2 መካከለኛ ጫና……3 ከፍተኛ ጫና አለው ……4	
411	በሰውነት ምርመራ ላይ የተገኘ 1. ***የላይኛው የእጅ ጡንቻ መቀጨጭ***	የለም……1 ትንሽ ወይም መካከለኛ ……2 ከፍተኛ ……3	
412	2. ***የጡንቻ መሳሳት*** (**የደረት አጥንት፣ ትከሸአ**) ***መጋለጥ***	የለም……1 ትንሽ ወይም መካከለኛ ……2 ከፍተኛ ……3	
413	3. ውሃ መቆጠር ምልክት (ቁርጭምጭሚት፣በፈሳሽ የተወጠረ ሆድ)	የለም……1 ትንሽ ወይም መካከለኛ……2 ከፍተኛ……3	

የተመጣጠነ አመጋገብ ያለው ……A

መካከለኛ የምግብ እጥረት ያለበት(ጥርጣሬ)……B

በከፍተኛ ደረጃ የምግብ እጥረት ያለበ……C

<u>እባክዎን ብትክክል ሁሉም ክፍል መሞላቱን በድጋሚ ያረጋግጡ!</u>

ሰብሳቢ ስም:	
ተቆጣጣሪ ስም:	
ቀን:	

ክፍል-5: ከገንዘብ ድጋፍ ጋር በተያያዘ የሚሰጥ ጥያቄዎች

ቁጥር	ጥያቄዎች	መልስ	ይዘለል
501.	ማንኛውም አይነት የራሶት የገቢ ምንጭ አለዎት?	1.አለኝ 2.የለኝም	
502	ወርሃዊ ገቢ		
503	የገንዘብ ድጋፍ ያገኛሉ?	1.አዎ 2.የለም →	601
504	መልሶ አዎ ከሆነ ከማን ነው ድጋፍ የሚያገኙት?	1.ከቤተሰብአባል 2.ከዘመድ 3.ከጎረቤት 4.ከጤናባለሙያ 5.ሌላ	
505	መልሱ አዎ ከሆነየሚያገኙትድጋፍቋሚነው?	1.አዎ 2.የለም	
506	የሚያገኙት ድጋፍ በቂ ነው ብለው ያስባሉ?	1. በቂአይደለም 2. ምንምአይልም 3.በቂ ነው	

ክፍል-6 : ስለ ስነ-ምግብ ድጋፍ በተያያዙ የሚሰጥ ጥያቄዎች

ቁጥር	ጥያቄዎች	መልስ
601	ባለፈው አንድ ወር ውስጥ በቤትዎ ውስጥ የምግብ እጥረት እንዳያጋጥሞት ተጨንቀዉ ያውቃሉ?	0 = የለም (የለም ካሉ ጥያቄ 601.a ይዝለሉት) 1=አዎ

601.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
602	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት የሚፈልጉትን ምግብ ሳይመገቡ ቀርተዋል?	0 = የለም (የለም ካሉ ጥያቄ 602.a ይዝለሉት) 1=አዎ
602.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
603	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ አቅርቦት ምክንያት የሚመገቧቸዉን የምግብ አይነቶች ቀንሰዋል?	0 = የለም (የለም ካሉ ጥያቄ 603.a ይዝለሉት) 1=አዎ
603.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
604.	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ አቅርቦት ምክንያት የማይፈልጉትን የምግብ አይነት ተመግበዋል?	0 = የለም (የለም ካሉ ጥያቄ 604.a ይዝለሉት) 1=አዎ
604.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
605	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት የሚመገቡትን የምግብ መጠን ቀንሰዋል?	0 = የለም (የለም ካሉ ጥያቄ 605.a ይዝለሉት) 1=አዎ
605.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
606	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት በቀን ምግብ የሚበሉባቸውን ግዚያቶች ቀንሰዋል?	0 = የለም (የለም ካሉ ጥያቄ 606.a ይዝለሉት) 1=አዎ
606.a	ልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
607	ባለፈው አንድ ወር ውስጥ ማንኘዉም የሚበላ ምግብ ከቤት ጠፍቶ ያውቃል?	0 = የለም (የለም ካሉ ጥያቄ 607.a ይዝለሉት) 1=አዎ
607.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)

608	ባለፈው አንድ ወር ውስጥ እርሶ ወይም ሌላ የቤተሰብ አባል በምግብ እጥረት ምክንያት እየተራቡ ምግብ ሳይበሉ ተኝተው ያውቃሉ?	0 = የለም (የለም ካሉ ጥያቄ 608.a ይዝለሉት) 1=አዎ
608.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
609	ባለፈው አንድ ወር ውስጥ ማንኛውም የቤተሰብ አባል በምግብ እጥረት ምክንያት እየተራቡ ቀንና ሌሊት ሙሉ ምግብ ሳይበሉ ቀርተው ያውቃሉ?	0 = የለም (የለም ካሉ ጥያቄ 609.a ይዝለሉት) 1=አዎ
609.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
610	ባጠቃላይ ባለፉት አራት ሳምንታት ዉስጥ ሁሉም የቤተሰቦ አባላት የሚፈልጉትን የምግብ አይነትና መጥን ተመግበዋል ብለው ያምናሉ?	0 = የለም (የለም ካሉ ጥያቄ 610.a ይዝለሉት) 1=አዎ
610.a	መልስዎ አዎ ከሆነ ይህ ለምን ያህል ግዜ ተከስቷል?	1. አልፎ አልፎ (አንዴ ወይም ሁለቴ) 2.የተወሰነ ግዜ (3-10) 3. ብዙ ግዜ (ከ 10 ግዜ በላይ)
611	አልተመገቡም ብለው ካመኑ ምክንያቱ ምንድን ነዉ ብለዉ ያስባሉ? (ከአንድ በላይ መልስ መስጠት ይቻላል)	1. በህመም ወይም የምግብ ፍላጎት በመቀነስ 2. በጊዜ አጥረት ምግብ አለማዘጋጀት 3. የምግብ ዋጋ በመጨመሩ መግዛት ስላልቻልን 4. ገቢያችን በመቀነሱ መግዛት ስላልቻልን 5. ሌላ ካለ ይጥቀሱ
612	ኣርሶና ቤተሰብዎ የምግብ እጥረት በሚያጋጥሞት ግዜ ምን አይነት የመቋቋሚያ ስልቶች ተጠቅመው ያውቃሉ?	1. የምንመገበውን ምግብ መጠን መቀነሰ 2. በቀን የምንመገብበትን ግዜ መቀነስ 3. ጥራታቸውና ዋጋቸው የቀነሱ ምግቦችን በመቀየር 4. ተጨማሪ ስራ በመስራት ገቢያችንን በመጨመር 5. ምግብ ነክ ያልሆኑ ወጪዎችን በመቀነስ 6. የቤት አቃዎችን/ንብረቶችን በመሸጥ 7. የምግብ ወይም የገንዘብ አርዳታ በመቀበል

		8. ከባንክ ወይም ከሌላ ብድር በመውሰድ 9. ሌላ ካለ ይጥቀሱ

ክፍል-7: ከህመምተኛው የካንሰር ሁኔታ ጋር በተያያዘ የሚሰጥ መጠይቅ

ቁጥር	ጥያቄ	መልስ	ይዘለል
701	የእባጩ መጠን	——— N——— M ——— ——— cm ——— cm ——— cm	
702	የእባጩ ክፍል	1. Grade 1 2. Grade 2 3. Grade 3 4. Grade 4	
703	የእባጩ ደረጃ	1. ደረጃ 1 2. ደረጃ 2 3. ደረጃ 3 4. ደረጃ 4	
704	መጀመሪያ ያወቁ ጊዜ የስርጭት ሁኔታ	1. ተሰራጭቶ ነበር 2. ስርጭት አልነበረም	
705	ስርጭቱ የት ነበር	———	
706.	የህክምናው ዓላማ	1. ፈዋሽ (curative) 2. ማስታገሻ (palliative)	
707.	ህመምተኛው አሁን የሚወስደዉ የህክምና አይነት	1. Surgery 2. Chemotherapy 3.Radiotherapy 4. Hormonal therapy 5. Zoledronic acid 6. follow up	
708	ህመምተኛው ከዚህ በፊት ሌላ የወስደዉ የካንሰር ህክምና	1.Chemotherapy 2.Radiotherapy 3.Chemotherapy and Radiotherapy 4.Chemotherapyand Surgery	

		5.Chemotherapy, Radiotherapy and Surgery 6. Radiotherapy and Surgery 7.Hormonal therapy 8. Surgery	
709	ምርመራ ተደርጎ በሽታው ከታወቀ ያለፉ ወራት ☐☐		
710.	ህመምተኛው ከዚህ በፊት የወሰደዉ ኬሞቴራፒ ብዛት ☐☐ **(ካልወሰደ 00 ተብሎ ይሞላ)**		
711	ህመምተኛው ከዚህ በፊት የወሰደዉ ጨረር ህክምና ብዛት ☐☐ **(ካልወሰደ 00 ተብሎ ይሞላ)**		

ክፍል-8: ሌሎች የህመም ሁኔታዎችን የተመለከተ መጠይቅ

ቁጥር	ጥያቄ	መልስ	ይዘለል
801.	ህመምተኛው ለሌላ የበሽታ ሁኔታ ተመርምረው ያውቃሉ?	1. አዎ 2.የለም →	1001
802.	መልስዎ አዎ ከሆነ የበሽታው አይነት ይገለጥ	----------	

ክፍል-9 :EORTC QLQ-C30 (እትም3)

እርስዎንና ጤንነትዎን በተመለከተ የተወሰኑ ነገሮችን ለማወቅ እንፈልጋለን።እባክዎትን የሚከተሉትን ጥያቄዎች በሙሉ እርስዎ ትክክለኛ ነው ብለው ያመኑበትን ይመልሱ። «ትክክለኛ» መልስ ወይም «የተሳሳተ» መልስ የሚባል የለም። የሚሰጡት መረጃ ሁሉ ምስጢራዊነቱ በደንብ የተጠበቀ ይሆናል።እባክዎን የእርስዎን የአባትዎንና የአያትዎን የስም መጀመሪያ ፊደል ይጻፉ፡- ----------፣የዛሬው ዕለት (ቀን፣ወር፣ዓም)፡- ----------

		በጭራሽ	በትንሹ	በመጠኑ	በጣምበብዛት
901.	እንደ ከባድ ዘንቢል ወይም ሻንጣ መሸከም የመሳሰሉ ጉልበት የሚጠይቁ እንቅስቃሴዎችን ለማድረግ ችግር አለብዎት?	**1**	**2**	**3**	**4**
902.	ረዥም የእግር ጉዞ ለማድረግ ችግር አለብዎ?	**1**	**2**	**3**	**4**
903.	ከቤትዎ ውጭ አጭር የእግር ጎዞ ለማድረግ ችግር አለብዎ?	**1**	**2**	**3**	**4**
904.	በህመምዎ የተነሳ በቀ አልጋ ላይ ወይም ወንበር ላይ ሆነው ረዘም ላለ ሰዓት ያሳልፋሉ?	**1**	**2**	**3**	**4**
905.	ሲመገቡ፣ሲለብሱ፣ሲታጠቡ ወይም ሽንት ቤት ሲጠቀሙ እገዛ ያስፈልግዎታል?	**1**	**2**	**3**	**4**
ባለፈው ሳምንት ውስጥ፡-		በጭራሽ	በትንሹ	በመጠኑ	በጣምበብዛት

906.	ስራዎትን ወይንም የዕለትተለት እንቅስቃሴዎትን ለማከናወን ተገድበው ነበር?	**1**	**2**	**3**	**4**
907.	በትርፍ ጊዜ የሚከናወኑ ስራዎችን ወይንም ሌሎች የመዝናኛ ጊዜዎችን ለማሳለፍ ገድቦዎት ነበር?	**1**	**2**	**3**	**4**
908.	ሲተነፍሱ የትንፋሽ ማጠር አጋጥሞት ነበር?	**1**	**2**	**3**	**4**
909.	የህመም ስሜት ነበረብዎ?	**1**	**2**	**3**	**4**
910.	ከወትሮው የተለየ ዕረፍት አስፈልጎዎት ነበር?	**1**	**2**	**3**	**4**
911.	የዕንቅልፍ ችግር ነበረብዎ?	**1**	**2**	**3**	**4**
912.	አቅም ያንስዎት ነበር?	**1**	**2**	**3**	**4**
913.	የምግብ ፍላጎትዎ ቀንሷል?	**1**	**2**	**3**	**4**
914.	የማቅለሽለሽ ስሜት ነበረብዎ?	**1**	**2**	**3**	**4**
915.	አስመልሶዎት ነበር?	**1**	**2**	**3**	**4**
916.	የሰገራ ድርቀት ነበረብዎ?	**1**	**2**	**3**	**4**
ባለፈው ሳምንት ውስጥ፦					
917.	ተቅማጥ ነበረብዎ?	**1**	**2**	**3**	**4**
918.	የድካም ስሜት ነበረዎ?	**1**	**2**	**3**	**4**
919.	ህመሙ የዕለትተዕለት እንቅስቃሴዎትን ያውክብዎ ነበር?	**1**	**2**	**3**	**4**
920.	አንድአንድ ነገሮችን ትኩረት ሰጥተው ለመስራት ያውክዎት ነበር (ለምሳሌ፤ጋዜጣ ለማንበብ፣ራዲዮ ለማዳመጥ)?	**1**	**2**	**3**	**4**
921.	የውጥረት ስሜት ነበረብዎ?	**1**	**2**	**3**	**4**
922.	የመጨነቅ ስሜትነ በረብዎ?	**1**	**2**	**3**	**4**
923	የመነጨነጭ ስሜት ነበረብዎ?	**1**	**2**	**3**	**4**
924.	የመደበር ስሜት ነበረብዎ?	**1**	**2**	**3**	**4**
925.	ነገሮችን የማስታወስ ችግር ነበረብዎ?	**1**	**2**	**3**	**4**
926.	አካላዊ ሁኔታዎ ወይም የሚከታተሉት ህክምና በቤተሰባዊ ህይወትዎ ላይ ያሳደረው ተጽዕኖ ነበር?	**1**	**2**	**3**	**4**
927.	የጤናዎ ሁኔታ ወይም የሚከታተሉት ህክምና በማህበራዊ ሕይወትዎ በሚደርጉት እንቅስቃሴዎ ላይ ያሳደረው ተጽዕኖ ነበር?	**1**	**2**	**3**	**4**
928.	የጤናዎ ሁኔታ ወይም የሚከታተሉት ህክምና ገንዘብ እንዲያጥርዎ /እንዲችግርዎ/ አድርጓል?	**1**	**2**	**3**	**4**

ለሚከተሉት ጥያቄዎችከ1-7 ካሉት ቁጥሮች ውስጥ እርስዎን በደንብ የሚገልጽዎን አንዱን ቁጥር ያክብቡ	
929.	በአጠቃላይ ባለፈው ሳምንት የነበረዎን የጤንነት ሁኔታ እንዴት ይመዝኑታል? በጣምመጥፎ1 2 3 4 5 6 7 እጅግ በጣምጥሩ
930.	በአጠቃላይ ባለፈው ሳምንት የነበረዎን የኑሮ ሁኔታ ጥራት እንዴት ይመዝኑታል? በጣምመጥፎ1 2 3 4 5 6 7 እጅግ በጣምጥሩ

<u>እባክዎን ብትክክል ሁሉም ክፍል መሞላቱን በድጋሚ ያረጋግጡ!</u>

ሰብሳቢ ስም:	
ቀን:	
የታካሚ መለያ ቁጥር	

4.2. Pre-test sample of patient response sheet

Questionnaire number----------

	yes,	No	Comment
A, difficulty			
B, confusing			
C, difficult words			
D, upsetting words			
E, how would you ask this question			

4.3. Pre-test respondents socio-demographic and clinical characteristics

Socio-Demographic characteristics of pre-test respondents in TASH and SPMMC, Addis Ababa, 2020

Variable	**Category**	**Frequency (n=20)**	**Per cent (%)**
Sex	Male	9	45
	Female	11	55
Educational status	No formal education	5	25

	Able to read and write	3	15
	Primary education	6	30
	Secondary education	3	15
	College and above	3	15
Occupation	Farmer	3	15
	Civil servant	5	25
	House wives	6	30
	Non-government employee	1	5
	Student	2	10
	Merchant	3	15
Region	Addis Ababa	12	60
	Out of Addis Ababa	8	40

Clinical characteristics of pre-test respondents in TASH and SPMMC, Addis Ababa, 2020

Variables	Category	Frequency(n=20)	Percent (%)
Tumor grade	Grade 1	5	25
	Grade 2	5	25
	Grade 3	4	20
	Grade 4	6	30
Type of treatment	Chemotherapy	4	20
	Surgery	6	30
	Chemotherapy and surgery	2	10
	Chemotherapy and Radiotherapy	2	10
	Chemotherapy, Surgery, and Radiotherapy	6	30
Stage	Stage I	4	20
	Stage II	2	10
	Stage III	2	10
	Stage IV	12	60
Treatment intent	Curative	5	25
	Palliative	15	75
Marital status	Married	11	55
	Single	3	15
	Divorced	5	25
	Widowed	1	5
Age, mean(SD)		45.50(10.75)	

Annex 5: Technical error of measurement for weight

TASH

Measurer: 1					Measurer: 2			
subject number	1st measurement	2nd measurement	Difference(d)	d^2	1st measurement	2nd measurement	Difference(d)	d^2
1	76.5	76.2	0.3	0.09	75.9	75.6	0.3	0.09
2	84.5	84.2	0.2	0.04	84.7	84.4	0.3	0.09
3	66.4	66.8	-0.4	0.16	66.1	65.8	0.3	0.09
4	60.3	60.0	0.3	0.09	60.6	60.2	0.4	0.16
5	94.3	94.0	0.3	0.09	94.0	94.3	-0.3	0.09
6	53.7	53.4	0.3	0.09	53.3	53.2	0.1	0.01
7	62.5	62.3	0.2	0.04	63.1	63.2	-0.1	0.01
8	59.2	59.0	0.2	0.04	59.3	59.1	0.2	0.04
9	45.3	45.6	-0.3	0.09	45.0	45.3	-0.3	0.09
10	63.7	63.4	0.3	0.09	63.9	63.6	0.3	0.09
Absolute Intra Observer TEM $\sqrt{\sum} di^2/ 2N = 0.2$ Kg					Absolute Intra Observer TEM = $\sqrt{\sum} d^2/ 2N = 0.19$ kg			

Inter observer TEM = 0.2156

Standard deviation = 1.48

Coefficient of reliability = 97.5 %

Where:
$\sum d2$ = summation of deviations raised to the second power
N = number of volunteers measured
i= the number of deviations

SPMMC

Measurer: 1					Measurer: 2			
subject number	1st measurement	2nd measurement	Difference(d)	d^2	1st measurement	2nd measurement	Difference(d)	d^2
1	66.3	66.5	-0.2	0.04	65.1	65.2	-0.1	0.01
2	57.8	57.7	0.1	0.01	57.6	57.4	0.2	0.04
3	63.5	63.7	-0.2	0.04	63.2	62.3	-0.1	0.01
4	80.6	80.7	0.1	0.01	80.5	80.7	-0.2	0.04
5	55.8	56.0	0.2	0.04	55.2	55.4	-0.2	0.04
6	48.6	48.8	-0.2	0.04	48.8	48.9	-0.1	0.01
7	62.5	62.1	0.4	0.16	63.1	63.0	0.1	0.01
8	59.6	59.3	0.3	0.09	59.9	59.0	-0.1	0.01
9	62.2	62.3	-0.1	0.01	62.6	62.5	0.1	0.01
10	58.7	58.8	-0.1	0.01	58.2	58.2	0	0
Absolute Intra Observer TEM $\sqrt{\sum} di^2/ 2N = 0.16$ kg					Absolute Intra Observer TEM = $\sqrt{\sum} d^2/ 2N = 0.096$kg			

Inter observer TEM = 0.2241

Standard deviation = 1.35

Coefficient of reliability = 98.42 %

Where:
$\sum d2$ = summation of deviations raised to the second power
N = number of volunteers measured
i= the number of deviations

Annex 6: Sample size determination procedure to determine the level of quality of life among Breast Cancer Patients in Ethiopia treated at TASH & SPMMC 2020.

Variable considered	Means	Standard Deviations	Estimated sample size with 10% non-response rate
Functional scales			
Physical functioning	63.46	22.78	89
Role functioning	60.92	33.12	188
Emotional functioning	47.61	25.83	114
Cognitive functioning	80.06	22.89	90
Social functioning	49.71	32.25	178
Symptom scales			
Fatigue	53.90	26.98	125
Nausea & vomiting	43.67	29.31	148
Pain	43.55	30.08	156
Dyspnea	37.97	34.96	209
Insomnia	37.79	35.69	218
Appetite loss	49.05	35.13	211
Constipation	49.96	34.82	208

Financial difficulties	74.19	34.01	198
Global health status	52.98	25.61	112

Annex 7: multi variable regression for each of QoL scales and independent variables

Physical Functioning	Coefficient	Standard error	95% confidence interval	P value
Age	-0.32	0.12	-0.56 to -0.08	0.009
Education				
Able to read and write	3.37	5.25	-6.95 to 13.71	0.521
Primary level (1-8)	-2.91	3.92	-10.62 to 4.79	0.457
Secondary level (9-12)	-2.56	4.21	- 10.85 to 5.73	0.544
Technical / vocational	-0.87	5.08	-10.86 to 9.12	0.864
Higher (University)	-3.58	6.02	-15.43 to 8.27	0.553
Marital status				
Married	6.87	10.14	-13.07 to 26.81	0.498
Separated	6.32	9.94	-13.23 to 25.88	0.525
Divorced	2.59	6.31	-9.82 to 15.01	0.681
Widowed	2.64	7.31	-11.74 to 17.02	0.718
Occupation				
Farmer	0.50	5.51	-10.35 to 11.36	0.927
Civil Servant	3.08	4.49	-5.76 to 11.92	0.493
Merchant	5.43	4.71	-3.85 to 14.71	0.251
Daily Laborer	8.31	6.31	-4.10 to 20.73	0.189
Non-government employee	3.59	4.99	-6.22 to 13.40	0.473
Other	-3.92	12.38	-28.28 to 20.43	0.752
Living arrangement				
Living with partner	-16.57	10.39	-37.00 to 3.86	0.112
Living with parents	-8.81	6.46	-21.52 to 3.89	0.174
Living with siblings	-11.36	8.61	-28.30 to 5.58	0.188
Living with children	-12.85	6.86	-26.35 to 0.65	0.062
other	4.79	12.79	-20.37 to 29.96	0.708
SGA rating				
Moderately malnourished	-11.08	2.94	-16.87 to -5.28	0.00
Severely malnourished	-20.01	3.32	-26.53 to -13.49	0.00
Presence of income	-5.28	3.40	-11.97 to 1.39	0.121
Monthly Income	0.00	0.00	3.89e-06 to 0.00	0.049
Food security				
Mildly food insecure	-2.90	3.63	-4.24 to 10.05	0.425
Moderately food insecure	-3.09	3.13	-9.25 to 3.07	0.324
The tumor grade				
Grade 2	-0.54	4.76	-9.92 to 8.83	0.909
Grade 3	2.09	4.85	-7.45 to 11.63	0.667
Grade 4	-0.08	6.27	-12.42 to 12.25	0.989

The stage of cancer				
Stage 2	-1.08	5.36	-11.64 to 9.48	0.841
Stage 3	2.37	5.68	-8.80 to 13.55	0.677
Stage 4	-1.33	6.73	-14.57 to 11.91	0.843
Treatment intent				
Palliative	2.10	4.08	-5.93 to 10.13	0.607
Time since diagnosis				
>1 year	-2.35	3.87	-9.96 to 5.26	0.544
>2 years	-1.71	3.92	-9.42 to 5.99	0.662
>3 years	-6.20	5.28	-16.58 to 4.18	0.241
>4years	-0.29	7.03	-14.13 to 13.55	0.967
>5 years	25.35	8.81	8.00 to 42.70	0.004
months since last chemotherapy	0.03	0.08	-0.14 to 0.20	0.731
Treatment currently undergoing				
Chemotherapy	-2.86	5.37	-13.44 to 7.70	0.594
Radiotherapy	-10.29	7.24	-24.55 to 3.95	0.156
Hormonal therapy	-9.55	5.82	-21.01 to 1.91	0.102
Follow up	-13.63	6.98	-27.36 to 0.10	0.052
Lines of chemotherapy taken	0.35	0.68	-0.99 to 1.69	0.607
Lines of radiotherapy taken	-0.30	0.34	-0.99 to 0.37	0.376
Wealth index				
Poor	6.53	6.79	-6.82 to 19.90	0.337
Medium	-6.43	3.30	-12.94 to 0.07	0.053
Wealthy	-5.71	3.51	-12.62 to 1.19	0.105
Wealthiest	-3.38	3.82	-10.90 to 4.12	0.376

Role Functioning	Coefficient	Standard error	95% confidence interval	P value
Age				
Education				
Able to read and write	0.84	7.01	-12.95 to 14.64	0.904
Primary level (1-8)	-2.96	5.28	-13.35 to 7.42	0.575
Secondary level (9-12)	1.21	5.53	-9.68 to 12.10	0.827
Technical/ Vocational	1.79	6.64	-11.27 to 14.86	0.787
Higher (University)	1.62	7.96	-14.04 to 17.29	0.839
Occupation				
Farmer	7.12	6.90	-6.44 to 20.70	0.302
Civil Servant	-3.16	5.46	-13.91 to 7.58	0.563
Merchant	0.00	5.78	-11.37 to 11.39	0.999
Daily laborer	12.58	8.08	-3.31 to 28.47	0.120
Private company	5.67	6.22	-6.58 to 17.92	0.363
Other	2.98	16.67	-29.82 to 35.79	0.858
Living arrangement				
Living with a partner	-11.36	7.19	-25.51 to 2.78	0.115
Living with parents	-17.12	8.26	-33.38 to -0.85	0.039
Living with siblings	-11.38	11.39	-33.79 to 11.02	0.318
Living with children	-13.15	8.17	-29.23 to 2.91	0.108
Other	-3.45	17.50	-37.88 to 30.96	0.843
SGA rating				
Moderately malnourished	-13.94	3.96	-21.75 to -6.13	0.001
Severely malnourished	-28.02	4.57	-37.01 to -19.03	0.000
Do you work out	-4.90	3.85	-12.49 to 2.67	0.204
Monthly income	0.00	0.00	-0.0006 to 0.001	0.498
Additional income	6.33	3.63	-0.81 to 13.49	0.082
Where do you get the food	-52.46	18.53	-88.92 to -15.99	0.005
Is it served on time	6.03	4.74	-3.29 to 15.36	0.204
Is it enough	-2.58	4.34	-11.13 to 5.96	0.553
Food security				
Mildly food insecure	7.64	4.90	-1.99 to 17.28	0.120
Moderately food insecure	-10.19	4.47	-18.99 to -1.39	0.023
Severely food insecure	0.53	6.08	-11.42 to 12.50	0.929
The tumor grade				
Grade 2	-5.66	6.50	-18.45 to 7.13	0.385
Grade 3	-10.39	6.61	-23.41 to 2.61	0.117
Grade 4	-20.30	8.63	-37.29 to -3.30	0.019
Unknown grade	-7.21	6.39	-19.78 to 5.36	0.260
The stage of cancer				
Stage 2	3.63	7.12	-10.38 to 17.64	0.611
Stage 3	4.43	7.71	-10.73 to 19.60	0.566
Stage 4	-1.29	10.60	-22.16 to 19.57	0.903
Unknown stage	18.49	8.73	1.30 to 35.68	0.035
Metastasis	-9.23	7.12	-23.25 to 4.77	0.196

Liver	8.38	6.34	-4.09 to 20.86	0.187
Lung	10.29	5.87	-1.26 to 21.84	0.081
Renal	40.96	24.61	-7.45 to 89.38	0.097
Chest	-7.81	9.29	-26.08 to 10.46	0.401
Surgical only	48.45	25.29	-1.29 to 98.20	0.056
Chemotherapy radiotherapy surgery	9.08	6.68	-4.05 to 22.22	0.175
Treatment intent				
Palliative	1.30	5.45	-9.43 to 12.03	0.812
Time since diagnosis				
>1 year	-7.95	6.16	-20.08 to 4.17	0.198
>2 years	1.96	8.17	-14.12 to 18.04	0.811
>3 years	-7.21	11.88	-30.59 to 16.17	0.545
>4 years	-6.81	16.79	-39.85 to 26.22	0.685
>5 years	21.13	21.68	-21.52 to 63.79	0.331
Lines of chemotherapy taken				
months since last chemotherapy	0.01	0.12	-0.21 to 0.25	0.888
Lines of radiotherapy taken	0.02	0.62	-1.20 to 1.25	0.968
Treatment -patient is now on				
Chemotherapy	-30.39	22.54	-74.74 to 13.94	0.178
Radiotherapy	-52.55	23.68	-99.13 to -5.96	0.027
Hormonal therapy	-35.01	23.09	-80.43 to 10.41	0.130
Follow up	-45.53	23.36	-91.50 to 0.42	0.052
Presence of other disease	-0.28	6.05	-12.20 to 11.63	0.962
Type of disease				
Hypertension	-10.17	10.52	-30.87 to 10.52	0.334
Retro viral infection	-11.73	12.55	-36.42 to 12.96	0.351
Asthma	-14.47	15.60	-45.16 to 16.21	0.354
Hypertension and diabetes mellitus	-14.48	14.89	-43.78 to 14.81	0.332

Emotional Functioning	Coefficient	Standard Error	95 % confidence interval	P value
Age	0.05	0.13	-0.20 to 0.31	0.690
Education				
Able to read and write	9.30	5.89	-2.28 to 20.90	0.115
Primary level (1-8)	3.73	4.36	-4.84 to 12.32	0.392
Secondary level (9-12)	5.61	4.54	-3.32 to 14.54	0.218
Technical/ Vocational	13.06	4.85	3.53 to 22.60	0.007
Higher (university)	9.90	5.77	-1.44 to 21.24	0.087
Residence	-0.57	3.44	-7.35 to 6.19	0.867
Living arrangement				
Living with a partner	-2.54	5.97	-14.29 to 9.20	0.670
Living with parents	-5.34	6.92	-18.95 to 8.27	0.441
Living with siblings	-14.88	9.59	-33.75 to 3.97	0.122
Living with children	-3.05	6.66	-16.16 to 10.05	0.647
Other	5.58	14.44	-22.82 to 34.00	0.699
SGA rating				
Moderately malnourished	-14.62	3.34	-21.99 to -8.84	0.000
Severely malnourished	-15.99	3.81	-25.52 to -10.54	0.000
Additional income	-1.03	3.03	-7.00 to 4.93	0.733
Presence of income	-3.71	3.18	-9.97 to 2.53	0.243
Monthly income	0.00	0.00	-0.0008 to 0.0009	0.936
Is food served on time	-4.29	4.04	-12.23 to 3.65	0.289
Is food enough	4.00	3.59	-3.06 to 11.07	0.266
Food security				
Mildly food insecure	-3.66	4.14	-11.81 to 4.47	0.376
Moderately food insecure	-8.93	3.70	-16.21 to -1.65	0.016
Severely food insecure	-12.71	5.08	-21.50 to -1.52	0.024
The tumor size				
2-5 cm	-8.16	4.34	-16.72 to 0.38	0.061
>5 cm	-6.21	4.86	-15.77 to 3.34	0.202
Metastasis	-2.16	4.48	-10.98 to 6.66	0.630
Liver	13.79	5.27	3.42 to 24.15	0.009
Lung	2.85	4.69	-6.38 to 12.09	0.544
Sternum	-10.38	15.64	-41.15 to 20.39	0.508
Surgical only	-11.05	24.30	-58.85 to 36.74	0.650
Treatment patient is now on				
Chemotherapy	15.51	18.96	-21.77 to 52.80	0.414
Radiotherapy	20.88	19.90	-18.26 to 60.03	0.295
Hormonal therapy	11.98	19.41	- 26.19 to 50.17	0.537
Follow up	5.09	19.75	- 33.75 to 43.93	0.797

Cognitive Functioning	Coefficient	Standard error	Confidence Interval	P value
Education				
Able to read and write	7.88	5.54	-3.01 to 18.78	0.156
Primary level (1-8)	9.85	4.37	1.24 to 18.46	0.025
Secondary level (9-12)	7.45	4.49	-1.39 to 16.30	0.098
Technical/Vocational	14.41	4.99	4.59 to 24.24	0.004
Higher (university)	16.13	5.86	4.59 to 27.67	0.006
Spouse education				
Able to read and write	7.73	7.61	-7.24 to 22.71	0.310
Primary level (1-8)	-1.01	6.17	-13.14 to 11.12	0.870
Secondary level (9-12)	-1.71	6.14	-13.79 to 10.35	0.780
Technical/Vocational	3.94	6.61	-9.07 to 16.95	0.552
Higher (university)	4.90	6.82	-8.50 to 18.31	0.473
Residence				
Rural	0.37	3.20	-5.91 to 6.67	0.906
Do you work out	-1.42	2.96	-7.25 to 4.39	0.630
SGA rating				
Moderately malnourished	-12.01	3.09	-18.09 to -5.93	0.000
Severely malnourished	-17.94	3.39	-24.61 to -11.27	0.000
Monthly income	-0.00	0.00	-0.001 to 0.0004	0.446
Is financial support enough	0.37	0.37	-0.36 to 1.12	0.320
Food security				
Mildly food insecure	-0.52	3.86	-8.12 to 7.07	0.892
Moderately food insecure	-14.83	3.39	-21.51 to -8.14	0.000
Severely food insecure	-4.59	4.70	-13.84 to 4.66	0.330
The tumor grade				
Grade 2	3.30	4.96	-6.46 to 13.07	0.506
Grade 3	4.35	4.92	-5.33 to 14.03	0.377
Grade 4	-1.66	6.35	-14.15 to 10.82	0.793
Unknown grade	1.36	4.85	-8.17 to 10.91	0.778
The stage of cancer				
Stage 2	-6.90	5.30	-17.34 to 3.52	0.194
Stage 3	-4.67	5.67	-15.83 to 6.48	0.410
Stage 4	-5.24	6.02	-17.09 to 6.60	0.384
Unknown stage	-6.59	6.65	-19.69 to 6.49	0.322
Chemotherapy radiotherapy surgery				
yes	-8.32	3.78	-15.77 to -0.88	0.028
Treatment patient is now on				
Chemotherapy	-1.99	3.91	-9.70 to 5.70	0.610
Radiotherapy	-15.15	7.14	-29.20 to -1.11	0.034
Hormonal Therapy	-9.42	4.98	-19.22 to 0.36	0.059
Follow up	-9.99	6.34	-22.46 to 2.48	0.116

Social Functioning	Coefficient	Standard error	P value	95 % confidence interval
Education				
Able to read and write	9.63	7.18	0.181	-4.50 to 23.77
Primary level (1-8)	12.46	5.25	0.018	2.13 to 22.79
Secondary level (9-12)	8.68	5.41	0.109	-1.95 to 19.32
Technical/ Vocational	10.29	5.81	0.077	-1.13 to 21.72
Higher (university)	6.29	6.58	0.340	-6.65 to 19.25
Marital status				
Married	16.08	13.48	0.234	-10.43 to 42.61
Separated	13.29	12.85	0.302	-11.98 to 38.57
Divorced	16.80	8.15	0.040	0.76 to 32.84
Widowed	5.97	9.45	0.528	-12.62 to 24.57
Residence	-5.54	4.14	0.182	-13.70 to 2.69
Living arrangement				
Living with a partner	-36.16	23.40	0.123	-82.19 to 9.86
Living with a parent/s	-23.32	24.45	0.341	-71.41 to 24.76
Living with siblings	-8.95	25.37	0.724	-58.85 to 40.93
Living with children	-6.66	23.52	0.777	-52.93 to 39.59
Other	8.58	28.06	0.761	-46.65 to 63.73
Family size	-1.92		0.048	
SGA rating				
Moderately malnourished	-13.72	3.97	0.002	-19.94 to -4.29
Severely malnourished	-24.49	4.43	0.001	-24.14 to -6.68
Presence Financial support	-4.92	25.47	0.847	-55.02 to 45.18
Is the money enough	1.40	3.48	0.688	-5.45 to 8.25
The stage of cancer				
Stage 2	-6.60	7.04	0.349	-20.45 to 7.25
Stage 3	-7.68	7.20	0.287	-21.85 to 6.47
Stage 4	-7.27	10.06	0.470	-27.05 to 12.51
Unknown stage	8.83	8.25	0.285	-7.39 to 25.06
Metastasis	6.00	6.95	0.389	-7.68 to 19.68
Liver	20.88	6.22	0.001	8.64 to 33.12
Axillary	-15.36	10.69	0.152	-36.39 to 5.66
Surgical only	11.84	23.27	0.611	-33.94 to 57.62
Lines of chemotherapy taken	-1.66	0.89	0.063	-3.42 to 0.09
Lines of radiotherapy taken	-0.86	0.57	0.135	-2.00 to 0.27
Palliative	-1.65	5.44	0.762	-12.35 to 9.05

Chemotherapy ,radiotherapy and surgery	-1.83	6.58	0.781	-14.78 to 11.12
Estimation of months since last	-0.01	0.11	0.928	-0.23 to 0.21
Treatment patient is now on				
Chemotherapy	-25.57	23.08	0.269	-70.97 to 19.83
Radiotherapy	-21.62	24.06	0.369	-68.94 to 25.69
Hormonal therapy	-32.10	23.53	0.173	-78.38 to 14.18
Follow up	-28.24	23.80	0.236	-75.05 to 18.56
Presence of other disease	-5.77	3.80	0.130	-13.26 to 1.71
The tumor size				
2-5 cm	0.21	5.67	0.969	-10.93 to 11.37
>5 cm	2.14	6.48	0.741	-10.61 to 14.89

Fatigue	Coefficient	Standard error	95 % confidence interval	P value
Age	0.35	0.13	-0.07 to 0.62	0.011
Education				
Able to read and write	-3.72	5.74	-15.02 to 7.58	0.518
Primary level (1-8)	1.45	4.31	-7.03 to 9.94	0.736
Secondary level	2.61	4.65	-6.54 to 11.78	0.574
Technical/ Vocational	-0.23	5.58	-11.22 to 10.75	0.966
Higher (University)	2.55	6.68	-10.58 to 15.69	0.702
Marital status				
Married	-15.23	11.08	-37.03 to 6.55	0.170
Separated	2.97	10.94	-18.55 to 24.51	0.786
Divorced	-4.47	7.00	-18.24 to 9.30	0.524
Widowed	0.06	8.00	-15.67 to 15.81	0.993
Occupation				
Farmer	-2.60	6.05	-14.51 to 9.30	0.668
Civil servant	1.19	4.40	-7.46 to 9.85	0.787
Merchant	-1.81	4.85	-11.35 to 7.72	0.708
Daily laborer	-14.17	6.85	-27.65 to -0.70	0.039
Non government emoloyee	-1.60	5.09	-11.62 to 8.42	0.754
Other	-2.43	13.40	-28.79 to 23.92	0.856
Residence	-3.10	4.03	-11.04 to 4.83	0.442
Living arrangement				
Living with a partner	18.43	11.25	-3.69 to 40.55	0.102
Living with a parent/s	6.09	7.18	-8.03 to 20.21	0.397
Living with siblings	5.02	9.57	-13.80 to 23.85	0.600
Living with children	6.45	7.47	-8.24 to 21.15	0.388
Other	-14.11	14.30	-42.25 to 14.02	0.325
SGA rating				
Moderately malnourished	20.03	3.26	13.61 to 26.45	0.000
Severely malnourished	27.31	3.60	20.22 to 34.39	0.000
Monthly income	-0.00	0.00	-0.0009 to 0.0007	0.805
Additional income	-0.14	2.94	-5.93 to 5.63	0.960
Food security				
Mildly food insecure	-0.11	4.02	-8.03 to 7.81	0.977
Moderately food insecure	7.08	3.45	0.28 to 13.88	0.041
Severely food insecure	6.06	4.76	-3.29 to 15.42	0.203
The tumor size				
2-5 cm	3.75	4.71	-5.51 to 13.01	0.427
>5 cm	8.36	5.42	-2.30 to 19.03	0.124
The tumor grade				
Grade 2	-4.05	5.34	-14.56 to 6.46	0.449
Grade 3	-3.96	5.41	-14.61 to 6.67	0.464

Grade 4	1.18	6.98	-12.54 to 14.91	0.865
The stage of cancer				
Stage 2	-5.74	6.01	-17.56 to 6.08	0.340
Stage 3	-4.59	6.41	-17.20 to 8.01	0.474
Stage 4	-1.20	8.81	-18.53 to 16.12	0.891
Metastasis	-1.67	5.65	-12.79 to 9.45	0.768
Surgical only	-20.17	19.23	-58.00 to 17.66	0.295
Treatment intent				
Palliative	-1.08	4.55	-10.03 to 7.86	0.812
Lung	-6.78	4.62	-15.89 to 2.31	0.144
Chemotherapy and surgery	-5.10	3.14	-11.28 to 1.06	0.105
Treatment patient is now on				
Chemotherapy	21.92	18.71	-14.87 to 58.73	0.242
Radiotherapy	25.04	19.82	-13.94 to 64.02	0.207
Hormonal therapy	16.78	19.07	-20.73 to 54.30	0.380
Follow up	20.83	19.41	-17.34 to 59.00	0.284
Wealth index				
poor	10.74	7.55	-4.11 to 25.60	0.156
medium	4.16	3.66	-3.04 to 11.37	0.257
wealthy	8.84	3.89	1.19 to 16.49	0.024
wealthiest	2.85	4.56	-6.11 to 11.83	0.532

Nausea & Vomiting	Coefficient	Standard error	95 % confidence interval	P value
Education				
Able to read and write	-6.86	6.04	-18.74 to 5.01	0.257
Primary level (1-8)	-1.19	4.72	-10.47 to 8.09	0.801
Secondary level (9-12)	0.28	4.87	-9.30 to 9.87	0.953
Technical/ Vocational	1.79	5.39	-8.82 to 12.40	0.740
Higher (university)	3.49	6.30	-8.90 to 15.90	0.580
Spouse education				
Able to read and write	4.06	8.27	-12.21 to 20.34	0.624
Primary level (1-8)	-0.94	6.64	-14.00 to 12.11	0.887
Secondary level (9-12)	-0.73	6.59	-13.70 to 12.24	0.912
Technical/ Vocational	-7.05	7.09	-21.00 to 6.90	0.321
Higher (university)	-8.06	7.31	-22.44 to 6.30	0.270
Residence	-0.70	3.44	-7.49 to 6.07	0.837
Exercise	-1.25	3.17	-7.50 to 4.98	0.692
Ever drank alcohol	-5.98	3.85	-13.55 to 1.58	0.121
SGA rating				
Moderately malnourished	14.80	3.35	8.20 to 21.41	0.000
Severely malnourished	40.51	3.70	33.23 to 47.79	0.000
Monthly income	-0.00	0.00	-0.001 to 0.0004	0.295
Financial support	2.91	3.00	-2.98 to 8.81	0.333
Food security				
Mildly food insecure	-3.70	4.14	-11.85 to 4.43	0.371
Moderately food insecure	8.79	3.71	1.48 to 16.09	0.018
Severely food insecure	-2.38	5.06	-12.34 to 7.57	0.638
The tumor size				
2-5 cm	-0.83	4.77	-10.22 to 8.55	0.862
>5cm	0.89	5.36	-9.64 to 11.44	0.867
The stage of cancer				
Stage 2	-6.89	5.98	-18.66 to 4.87	0.250
Stage 3	-5.51	6.11	-17.54 to 6.51	0.368
Stage 4	6.61	8.45	-10.01 to 23.24	0.435
Metastasis	8.36	5.80	-3.04 to 19.77	0.150
liver	-11.72	5.20	-21.95 to -1.48	0.025
lung	-0.09	4.54	-9.04 to 8.84	0.983
Chemotherapy only	-7.50	6.85	-20.97 to 5.96	0.274
Surgical only	-0.14	7.11	-14.13 to 13.84	0.984
Chemotherapy radiotherapy surgery	-11.01	6.76	-24.32 to 2.29	0.104
Chemotherapy and surgery	-0.61	6.16	-12.74 to 11.51	0.920
Palliative	3.29	4.49	-5.54 to 12.14	0.464
months since last chemotherapy	0.01	0.07	-0.14 to 0.16	0.884

Pain	Coefficient	Standard error	95 % confidence interval	P value
Education				
Able to read and write	-0.50	6.34	-12.98 to 11.97	0.937
Primary level (1-8)	0.67	4.74	-8.65 to 10.01	0.886
Secondary level (9-12)	-3.56	5.03	-13.47 to 6.33	0.479
Technical/ Vocational	-12.78	6.00	-24.58 to -0.97	0.034
Higher (university)	-13.76	7.16	-27.85 to 0.32	0.056
Occupation				
Farmer	-6.45	6.77	-19.78 to 6.87	0.342
Civil Servant	6.37	4.78	-3.03 to 15.77	0.184
Merchant	0.25	5.13	-9.84 to 10.35	0.961
Daily Laborer	-7.75	7.15	-21.83 to 6.33	0.280
Non government employee	0.96	5.36	-9.58 to 11.50	0.857
Other	16.27	14.63	-12.51 to 45.06	0.267
Residence				
Family size	6.02	8.05	-9.81 to 21.86	0.455
SGA rating				
Moderately malnourished	18.54	3.60	11.45 to 25.63	0.000
Severely malnourished	31.73	4.00	23.84 to 39.61	0.000
Monthly income	0.00	0.00	-0.0004 to 0.001	0.266
Financial support	-2.66	3.15	-8.86 to 3.53	0.399
Food security				
Mildly food insecure	-1.07	4.41	-9.70 to 7.66	0.818
Moderately food insecure	10.94	3.97	3.12 to 18.75	0.006
The tumor grade				
Grade 2	5.89	5.82	-5.56 to 17.34	0.313
Grade 3	10.96	5.83	-0.50 to 22.43	0.061
Grade 4	22.04	7.50	7.28 to 36.81	0.004
The stage of cancer				
Stage 2	-2.88	6.45	-15.57 to 9.81	0.656
Stage 3	-4.88	6.95	-18.56 to 8.78	0.483
Stage 4	-5.25	9.40	-23.74 to 13.24	0.577
Metastasis	-8.01	6.20	-20.21 to 4.17	0.197
Liver	5.86	5.59	-5.13 to 16.86	0.295
Treatment intent				
Palliative	-5.42	4.93	-15.13 to 4.29	0.273
Hormone	-2.89	5.19	-13.11 to 7.32	0.577
Surgical only	-16.87	6.49	-29.64 to -4.10	0.010
Chemotherapy and surgery	-5.57	3.37	-12.22 to 1.06	0.099
Time since diagnosis				
>1 year	6.34	4.69	-2.88 to 15.58	0.177
>2 years	-5.46	4.73	-14.78 to 3.84	0.249
>3 years	-7.49	5.84	-18.98 to 3.99	0.200
>4 years	-1.84	8.22	-18.02 to 14.33	0.823
>5 years	-36.23	10.74	-57.37 to -15.09	0.001
Lines Of chemotherapy taken	-2.01	0.70	-3.99 to -0.63	0.004

Dyspnoea	Coefficient	Standard error	95 % confidence interval	P value
Age	0.15	0.17	-0.17 to 0.49	0.353
Education				
Able to read and write	-4.04	7.14	-18.08 to 10.00	0.572
Primary level (1-8)	-6.94	5.36	-17.49 to 3.60	0.196
Secondary level (9-12)	0.17	5.78	-11.20 to 11.54	0.976
Technical/ Vocational	0.85	6.87	-12.66 to 14.38	0.901
Higher (university)	7.36	8.13	-8.63 to 23.35	0.366
Marital status				
Married	-18.29	13.71	-45.27 to 8.69	0.183
Separated	2.87	13.65	-23.97 to 29.73	0.833
Divorced	1.23	8.70	-15.89 to 18.36	0.888
Widowed	-0.89	10.07	-20.70 to 18.91	0.929
Occupation				
Farmer	-6.77	7.31	-21.15 to 7.60	0.355
Civil servant	-4.09	5.57	-15.06 to 6.87	0.464
Merchant	0.86	5.94	-10.82 to 12.55	0.884
Daily laborer	-4.09	8.56	-20.94 to 12.75	0.633
Non government employee	-8.64	6.35	-21.15 to 3.86	0.175
Other	16.83	16.82	-16.25 to 49.93	0.318
Living arrangement				
Living with a partner	23.30	14.03	-4.29 to 50.90	0.098
Living with a parent/s	3.65	8.83	-13.72 to 21.02	0.680
Living with siblings	12.83	11.77	-10.31 to 35.99	0.276
Living with children	6.76	9.46	-11.86 to 25.38	0.476
Other	-33.13	17.58	-67.71 to 1.44	0.060
Exercise	2.86	3.99	-4.99 to 10.73	0.474
SGA rating				
Moderately malnourished	15.63	3.87	7.68 to 23.59	0.000
Severely malnourished	19.54	4.31	10.62 to 28.46	0.000
Food security				
Mildly food insecure	2.26	4.93	-7.43 to 11.97	0.646
Moderately food insecure	4.05	4.21	-4.23 to 12.33	0.337
Severely food insecure	6.89	5.77	-4.47 to 18.25	0.234
The tumor size				
2-5 cm	4.03	5.79	-7.37 to 15.43	0.487
>5 cm	6.67	6.74	-6.59 to 19.95	0.323
Unknown	-23.82	12.56	-48.53 to 0.87	0.059
The tumor grade				
Grade 2	-6.91	6.54	-19.79 to 5.96	0.292
Grade 3	-10.50	6.69	-23.66 to 2.65	0.117
Grade 4	-15.14	8.64	-32.14 to 1.85	0.081
The stage of cancer				
Stage 2	-9.29	7.39	-23.84 to 5.25	0.210
Stage 3	-0.35	7.87	-15.83 to 15.12	0.964
Stage 4	-5.60	10.86	-26.98 to 15.77	0.606
Metastasis	-1.73	7.09	-15.70 to 12.22	0.807
Renal	-47.66	24.48	-95.81 to 0.48	0.052
Lung	-17.19	5.71	-28.43 to -5.95	0.003

Surgical only	-8.54	23.05	-53.88 to 36.79	0.711
Treatment intent				
Palliative	-2.69	5.60	-13.72 to 8.33	0.631
Chemotherapy, radiotherapy and surgery	-11.31	6.80	-24.69 to 2.06	0.097
months since last chemotherapy cycle	-0.04	0.12	-0.28 to 0.20	0.745
Lines of radiotherapy	-0.45	0.62	-1.67 to 0.76	0.466
Time since diagnosis				
>1 year	3.08	5.41	-7.57 to 13.73	0.570
>2 years	0.03	5.47	-10.72 to 10.79	0.995
>3 years	6.91	7.34	-7.52 to 21.35	0.347
>4 years	2.24	9.52	-16.48 to 20.97	0.814
>5 years	-5.86	12.08	-29.63 to 17.90	0.628
Presence of other disease	-6.89	3.96	-14.69 to 0.90	0.083
Treatment patient is now on				
Chemotherapy	6.58	22.79	-38.24 to 51.42	0.773
Radiotherapy	-5.28	24.10	-52.69 to 42.11	0.826
Hormonal therapy	4.03	23.70	-42.59 to 50.66	0.865
Follow up	10.25	24.03	-37.01 to 57.51	0.670
Wealth index				
poor	6.34	9.32	-11.99 to 24.69	0.497
Middle	-2.28	4.47	-11.08 to 6.51	0.610
Wealthy	3.05	4.66	-6.11 to 12.23	0.513
Wealthiest	2.00	5.11	-8.06 to 12.06	0.696

Insomnia	Coefficient	Standard error	95 % confidence interval	P value
Age	0.22	0.17	-0.11 to 0.56	0.196
Education				
Able to read and write	-2.64	7.65	-17.69 to 12.41	0.730
Primary level (1-8)	-2.76	5.71	-14.00 to 8.48	0.630
Secondary level (9-12)	-7.20	5.95	-18.91 to 4.50	0.227
Technical/ Vocational	-7.81	7.03	-21.64 to 6.00	0.267
Higher (University)	-9.31	8.31	-25.66 to 7.04	0.264
Occupation				
Farmer	-8.89	7.70	-24.04 to 6.26	0.249
Civil Servant	2.00	6.41	-10.59 to 14.61	0.754
Merchant	4.40	6.74	-8.84 to 17.66	0.514
Daily Laborer	4.88	8.84	-12.51 to 22.27	0.582
Non government employee	1.84	6.88	-11.68 to 15.37	0.789
Other	-15.10	17.78	-50.07 to 19.86	0.396
SGA rating				
Moderately malnourished	14.62	4.34	6.07 to 23.17	0.001
Severely malnourished	20.05	4.76	10.68 to 29.42	0.000
Food security				
Mildly food insecure	-3.57	5.30	-14.00 to 6.85	0.501
Moderately food insecure	-6.94	4.45	-15.70 to 1.80	0.119
Severely food insecure	-1.42	5.99	-13.20 to 10.35	0.812
Presence of income	4.77	4.85	-4.77 to 14.32	0.326
Is income enough	-0.19	0.52	-1.22 to 0.82	0.704
Metastasis	5.07	5.25	-5.25 to 15.40	0.334
Liver	-8.12	6.92	-21.73 to 5.47	0.241
Lung	-10.64	6.03	-22.50 to 1.21	0.079
Chest	5.60	10.16	-14.39 to 25.59	0.582
Previous treatments taken				
Chemotherapy only	-6.26	5.10	-16.30 to 3.76	0.220
Surgical only	2.60	5.49	-8.20 to 13.40	0.636
Radiotherapy only	42.72	35.52	-27.12 to 112.57	0.230
Radiotherapy surgery	-84.08	34.72	-152.36 to -15.79	0.016
The tumor size				
2-5 cm	-0.43	5.72	-11.68 to 10.81	0.939
>5cm	2.05	6.33	-10.40 to 14.51	0.746

Appetite loss	coefficient	Standard error	P value	[95 % confidence interval]
Age	0.18	0.167	0.266	-0.14 to 0.51
Education				
Able to read and write	3.50	7.08	0.621	-10.42 to 17.44
Primary level (1-8)	1.83	5.31	0.731	-8.62 to 12.28
Secondary level (9-12)	3.97	5.69	0.486	-7.23 to 15.17
Technical/ Vocational	-4.03	6.83	0.555	-17.46 to 9.39
Higher (University)	-7.00	8.08	0.387	-22.90 to 8.89
Occupation				
Farmer	-9.83	7.30	0.179	-24.20 to 4.52
Civil Servant	-4.10	5.42	0.449	-14.77 to 6.55
Merchant	-9.73	5.93	0.102	-21.41 to 1.94
Daily Laborer	-13.81	8.31	0.097	-30.15 to 2.53
Non-government employee	-7.54	6.15	0.222	-19.64 to 4.56
Other	-21.31	16.44	0.196	-53.64 to 11.01
Living arrangement				
Living with a partner	15.20	7.31	0.038	0.83 to 29.58
Living with a parent/s	19.54	8.56	0.023	2.69 to 36.39
Living siblings	6.10	11.50	0.596	-16.51 to 28.72
Living with children	16.76	8.03	0.038	0.95 to 32.56
Other	-16.87	17.53	0.336	-51.35 to 17.59
SGA rating				
Moderately malnourished	27.80	4.03	0.00	19.87 to 35.72
Severely malnourished	41.32	4.41	0.00	32.64 to 50.00
Monthly Income	-0.0006	0.0005	0.232	-0.0017 to 0.0004
Is it enough	0.21	0.49	0.669	-0.76 to 1.19
Food security				
Mildly food Insecure	-2.78	4.95	0.57	-12.53 to 6.96
Moderately food insecure	2.13	4.28	0.61	-6.28 to 10.56
Severely food insecure	-4.08	5.74	0.47	-15.38 to 7.21
The tumor size				
2-5 cm	4.45	5.74	0.439	-6.84 to 15.75
>5 cm	11.71	6.47	0.071	-1.01 to 24.45
The stage of cancer				
Stage 2	0.84	7.35	0.908	-13.61 to 15.31
Stage 3	-1.31	7.35	0.858	-15.78 to 13.14
Stage 4	6.9	8.3	0.403	-9.37 to 23.29
Wealth index				
poor	4.47	9.19	0.627	-13.59 to 22.54
Middle	0.82	4.45	0.854	-7.94 to 9.58
Wealthy	7.30	4.84	0.133	-2.23 to 16.83
Wealthiest	1.87	5.08	0.712	-8.11 to 11.87

Constipation	Coefficient	Standard error	95 % confidence interval	P value
Age	0.52	0.17	0.18 to 0.85	0.002
Education				
Read and write	-2.73	7.61	-17.70 to 12.24	0.720
Primary level (1-8)	-0.37	5.46	-11.11 to 10.36	0.945
Secondary level (9-12)	5.80	5.63	-5.27 to 16.88	0.304
Technical/ Vocational	-1.91	5.91	-13.54 to 9.71	0.746
Higher (university)	-0.49	6.89	-14.04 to 13.06	0.943
Marital status				
Married	6.18	5.26	-4.16 to 16.53	0.241
Separated	26.46	12.67	1.54 to 51.38	0.037
Divorced	10.44	7.58	-4.46 to 25.35	0.169
Widowed	-3.52	7.63	-18.53 to 11.47	0.644
SGA rating				
Moderately malnourished	13.26	4.12	5.14 to 21.38	0.001
Severely malnourished	17.03	4.50	8.17 to 25.88	0.000
Exercise				
Presence of income	-5.42	4.11	-13.51 to 2.67	0.188
Additional income	-7.58	3.91	-15.28 to 0.11	0.054
Metastasis	1.00	5.68	-10.18 to 12.19	0.860
Lung	-2.50	6.15	-14.59 to 9.59	0.684
Liver	-17.63	6.69	-30.81 to -4.46	0.009
Bone	15.60	6.69	2.44 to 28.76	0.020
Previous treatments taken				
Surgical only	-13.65	24.82	-62.46 to 35.14	0.583
Radiotherapy and surgery	-103.03	38.03	-177.81 to -28.25	0.007
Chemotherapy, radiotherapy and surgery	-2.30	5.43	-12.98 to 8.37	0.671
Hormone	-1.52	18.92	-38.72 to 35.67	0.936
Follow up (anti-pain)	8.44	14.26	-19.60 to 36.50	0.554
Estimation of since last	0.05	0.12	-0.18 to 0.30	0.625
Zole acid for bone	19.28	24.89	-29.66 to 68.22	0.439
Treatment patient is now on				
Chemotherapy	20.79	24.51	-27.41 to 69.00	0.397
Radiotherapy	29.68	26.06	-21.57 to 80.94	0.256
Hormonal therapy	31.76	35.07	-37.19 to 100.72	0.366
Follow up	32.08	29.47	-25.87 to 90.04	0.277

Diarrhea	Coefficient	Standard error	95 % confidence interval	P value
Education				
Able to write and write	-5.69	4.70	-14.93 to 3.54	0.227
Primary level (1-8)	0.49	3.46	-6.31 to 7.29	0.887
Secondary level (9-12)	3.31	3.49	-3.56 to 10.19	0.344
Technical/ Vocational	-4.76	3.83	-12.30 to 2.77	0.214
Higher (University)	-3.40	4.58	-12.43 to 5.61	0.458
Marital status				
Married	-11.65	8.68	-28.73 to 5.42	0.180
Separated	-5.56	8.77	-22.82 to 11.69	0.526
Divorced	-0.84	5.48	-11.63 to 9.93	0.877
Widowed	-8.06	6.30	-20.45 to 4.32	0.201
Living arrangement				
Living with a partner	15.11	9.01	-2.61 to 32.85	0.095
Living with a parent/s	5.75	5.86	-5.77 to 17.27	0.327
Living with siblings	-6.21	7.76	-21.48 to 9.05	0.424
Living with children	9.53	6.03	-2.32 to 21.38	0.115
Other	-0.574	11.85	-23.89 to 22.74	0.961
SGA rating				
Moderately malnourished	6.42	2.60	1.30 to 11.55	0.014
Severely malnourished	13.43	2.91	7.69 to 19.17	0.000
Monthly income	-0.00	0.00	-0.0009 to 0.0004	0.465
Food security				
Mildly Food insecure	-0.495	3.22	-6.83 to 5.84	0.878
Moderately food insecure	4.32	2.71	-1.01 to 9.65	0.112
Severely food insecure	-5.81	3.74	-13.18 to 1.55	0.122
family size	-3.96	2.30	-8.50 to 0.56	0.086
Stage of cancer				
Stage 2	-1.74	4.46	-10.52 to 7.04	0.696
Stage 3	1.80	4.39	-6.83 to 10.44	0.681
Stage 4	2.68	6.36	-9.83 to 15.21	0.673
Metastasis	6.35	4.75	-2.99 to 15.70	0.182
Liver	-4.94	4.24	-13.29 to 3.40	0.245
months since last chemotherapy	-0.029	0.07	-0.17 to 0.11	0.694
Lines of radiotherapy taken	0.11	0.39	-0.66 to 0.89	0.780
Treatment patient is now on				
Chemotherapy	-1.80	15.04	-31.38 to 27.78	0.905
Radiotherapy	3.35	15.89	-27.90 to 34.61	0.833
Hormonal therapy	13.24	21.46	-28.95 to 55.45	0.537
Follow up	-4.57	17.79	-39.57 to 30.41	0.797

Financial Difficulty	Coefficient	Standard Error	95 % Confidence interval	P value
Education				
Able to read and write	-20.65	8.05	-36.49 to -4.81	0.011
Primary level (1-8)	-15.23	5.88	-26.81 to -3.65	0.010
Secondary level (9-12)	-4.66	6.01	-16.48 to 7.15	0.438
Technical / Vocational	-9.24	6.65	-22.33 to 3.85	0.166
Higher (University)	-17.24	7.84	-32.68 to -1.81	0.029
Residence	4.36	4.76	-4.99 to 13.73	0.360
Living arrangement				
Living with a partner	33.18	24.87	-15.72 to 82.10	0.183
Living with parents	39.52	25.21	-10.06 to 89.12	0.118
Living with siblings	19.51	26.58	-32.76 to 71.79	0.463
Living with children	27.87	25.06	-21.41 to 77.16	0.267
Other	10.99	30.30	-48.61 to 70.60	0.717
Family size	-1.54	1.12	-3.76 to 0.67	0.172
Exercise	4.95	4.34	-3.5 to 13.49	0.255
SGA rating				
Moderately malnourished	12.22	4.40	4.56 to 21.89	0.003
Severely malnourished	11.65	4.93	1.94 to 21.36	0.019
Presence of income	-1.19	4.18	-9.42 to 7.04	0.776
Monthly income	-0.00	0.00	-0.002 to 0.0006	0.295
Food security				
Mildly food insecure	28.05	5.43	17.37 to 38.74	0.000
Moderately food insecure	28.77	4.58	19.76 to 37.78	0.000
Severely food insecure	33.68	6.16	21.55 to 45.81	0.000
The tumor grade				
Grade 2	-4.20	7.27	-18.51 to 10.10	0.564
Grade 3	-1.42	7.15	-15.49 to 12.64	0.842
Grade 4	-0.27	9.41	-18.79 to 18.23	0.976
The stage of cancer				
Stage 2	5.19	7.50	-9.55 to 19.94	0.489
Stage 3	13.23	8.14	-2.78 to 29.24	0.105
Stage 4	8.39	11.35	-13.92 to 30.72	0.460
Metastasis	6.59	7.75	-8.65 to 21.84	0.396
Liver	-20.76	7.03	-34.60 to -6.91	0.003
Previous treatments				
Radiotherapy	25.19	42.81	-59.01 to 109.39	0.557
Surgical only	-22.86	34.75	-91.21 to 45.47	0.511
Chemotherapy and surgery	-3.62	5.24	-13.95 to 6.69	0.490
Chemotherapy radiotherapy and surgery	2.76	8.07	-13.12 to 18.65	0.733
Palliative	-2.80	6.29	-15.17 to 9.57	0.656
months since last chemotherapy	0.21	0.13	-0.05 to 0.47	0.115
Treatment patient is now on				
Chemotherapy	15.32	25.66	-35.15 to 65.80	0.551
Radiotherapy	20.25	26.92	-32.70 to 73.20	0.452
Hormonal therapy	5.33	26.42	-46.63 to 57.29	0.840
Follow up	-1.32	26.64	-53.72 to 51.07	0.960
Lines of radiotherapy taken	0.95	0.65	-0.33 to 2.24	0.148

Lines of chemotherapy taken	2.12	1.00	0.15 to 4.09	0.035

HRQOL	coefficient	Standard error	95 % confidence interval	P value
Education				
Able to read and write	2.18	3.99	-5.67 to 10.03	0.585
Primary level (1-8)	156	3.14	-4.61 to 7.74	0.619
Secondary level (9-12)	0.90	3.45	-5.88 to 7.70	0.793
Technical / Vocational	2.10	4.06	-5.88 to 10.10	0.604
Higher (university)	-7.30	4.77	-16.68 to 2.08	0.127
Marital status				
Married	5.20	14.04	-22.41 to 32.83	0.711
Separated	-0.68	7.45	-15.34 to 13.97	0.927
Divorced	-1.51	4.70	-10.76 to 7.73	0.748
Widowed	4.00	5.36	-6.55 to 14.56	0.456
Spouse education				
Able to read and write	6.43	5.53	-4.44 to 17.31	0.245
Primary level (1-8)	2.65	4.47	-6.14 to 11.46	0.553
Secondary level (9-12)	-0.64	4.46	-9.42 to 8.13	0.885
Technical/ Vocational	1.29	4.84	-8.22 to 10.81	0.789
Higher (university)	2.79	5.01	-7.06 to 12.65	0.578
Occupation				
Farmer	1.71	4.16	-6.47 to 9.90	0.681
Civil servant	5.34	3.42	-1.38 to 12.08	0.119
Merchant	-2.28	3.53	-9.23 to 4.67	0.519
Daily laborer	4.42	4.62	-4.67 to 13.52	0.339
Non government employee	5.10	3.72	-2.22 to 12.42	0.171
Other	4.94	9.29	-13.34 to 23.23	0.595
Residence	1.47	2.51	-3.47 to 6.42	0.558
Living arrangement				
Living with a partner	-5.10	7.75	-20.34 to 10.13	0.510
Living with parents	-10.81	4.77	-20.20 to -1.42	0.024
Living with siblings	-7.25	6.55	-20.15 to 5.64	0.270
Living with children	-9.52	4.97	-19.31 to 0.26	0.057
Other	-10.47	9.57	-29.31 to 8.35	0.274
Ever drank alcohol	0.82	2.67	-4.43 to 6.08	0.758
Smoking	6.16	7.36	-8.31 to 20.64	0.403
SGA rating				
Moderately malnourished	-9.81	4.40	(−14.59, −4.67)	0.000
Severely malnourished	-17.84	4.93	-1.94 to -21.36	0.000
Presence of income	-0.06	2.52	-5.03 to 4.89	0.978
Monthly income	0.00	0.00	-0.00 to 0.001	0.083
Financial support	-6.39	40.03	-85.13 to 72.33	0.873
Who supports you financially	-2.20	1.53	-5.23 to 0.82	0.153
Food security				
Mildly food insecure	-1.78	2.81	-7.32 to 3.75	0.527
Moderately food insecure	-9.63	2.52	-14.59 to -4.67	0.000
Severely food insecure	-9.76	3.47	-16.60 to – 2.91	0.005
The tumor size				

2-5 cm	0.50	3.20	-5.79 to 6.79	0.875
>5cm	0.62	3.57	-6.41 to 7.66	0.861
The stage cancer				
Stage 2	2.80	3.98	-5.03 to 10.64	0.481
Stage 3	0.90	4.05	-7.07 to 8.88	0.824
Stage 4	0.06	5.69	-11.14 to 11.26	0.991
Metastasis	-0.12	3.83	-7.65 to 7.40	0.974
Liver	4.94	3.46	-1.86 to 11.75	0.154
Lung	3.69	3.09	-2.38 to 9.77	0.233
Treatment intent				
Palliative	-2.41	3.04	-8.40 to 3.57	0.429
Previous treatment taken				
Surgical only	-2.11	2.80	-7.64 to 3.40	0.452
Radiotherapy surgery	-17.23	17.57	-51.80 to 17.34	0.328
Chemotherapy radiotherapy surgery	3.09	2.53	-1.88 to 8.08	0.223
Presence of other disease	-1.93	2.09	-6.06 to 2.18	0.356

Curriculum Vitae: Ruth Adam

Last updated: December, 2020

Personal Information

First name: Ruth Middle name: Adam Last name: Deresso

Age: 25 years Sex: Female Marital status: Single

Place of Birth: Addis Ababa, Ethiopia

Date of Birth: 19 April, 1995

Nationality: Ethiopian

Language: Amharic and English: Speak, Read and Write

Email: ruthadam27@gmail.com

Phone number (mobile): +251923-79-40-61

Home Address : Nifas silk sub-city, Wereda 05 ,House number 4661, Addis Ababa, Ethiopia

I. Academic Qualification

1. Degree of Nursing:

Period of study: March 2013-July 2017 G.C

Program: Nursing

Institution: Addis Ababa university school of nursing.

2. Ethiopian Higher Education Entrance Certificate:

Period of study: September 2011-July 2013 G.C

Program: Preparatory Program

Institution: Nativity Girls′ School /Cathedral/, Addis Ababa, Ethiopia

3. Ethiopian General Secondary Education Certificate:

Period of study: September 2009-July 2011 G.C

Program: High School

Institution: Nativity Girls′ School /Cathedral/, Addis Ababa Ethiopia

4. Short trainings

1. Scientific writing for academic students

Program: training

Institution: Addis Ababa University

5. Work Experience

1. Junior Nurse Professional

Duration of employment:

October 2017 – March 2018

Institution: Jimma University Specialized Hospital

1. Junior Nurse Professional

Duration of employment:

April 2018 – November 2018

Institution: Landmark General Hospital

- **Professional Associations**

  Memberships

  • Ethiopian Public Health Association (EPHA)

- Ethiopian Nurses' Association (ENA)

Skills, interests and hobbies

• Know how on statistical software packages (SPSS, EPI INFO, WHO-Anthro,Epi data)

• Team leadership

• Good communication skills

• IT know how

• Public speech

Future Plans and Interests

• To upgrade my level of education to the next higher level

• Giving voluntary health services.

• To be an expert on my area of study.

Assurance of principal investigator

The undersigned agrees to accept responsibility for the scientific ethical and technical Conduct of the research.

Name of the student: _____

Date. _____ Signature _____

Approval of the primary Advisor

Name of the primary advisor: _____

Date. _____ Signature _____