UNIVERSITY OF GHANA

COLLEGE OF HEALTH SCIENCES

NUTRITIONAL ASSESSMENT OF PATIENTS UNDERGOING CHEMOTHERAPY: A STUDY AT THE NATIONAL RADIOTHERAPY ONCOLOGY AND NUCLEAR MEDICINE CENTRE (NRONMC), KORLE BU.

BY

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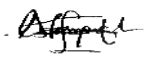
DECLARATION

I, Akpah C.I. Makafui hereby declare that this dissertation is the result of my own research work carried out in the Department of Nutrition and Dietetics, School of Biomedical and Allied Health Sciences, University of Ghana, under the supervision of Dr. Matilda Asante, Dr.Kofi Adesi Kyei and Mrs Olivera Kegey, and neither the whole nor any part of it has been or is being or is to be submitted for another degree at this or any other university. All references cited have been fully acknowledged.



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ABSTRACT

Background: Cancer is one of the diseases with high mortality rates and economic burden in the world especially within sub-Saharan Africa. Cancer has both local and systemic effects on the body which can compromise the nutritional status of patients. Treatment of cancer especially chemotherapy has several side effects which are detrimental to the nutritional status of the individual and can lead to treatment interruptions or termination as well as compromise clinical outcomes.

Cancer patients are at a higher risk of malnutrition since both the disease and the treatment can affect the nutritional status of the patients negatively. In order to improve tolerance to treatment and better clinical outcomes, early identification of patients at risk of malnutrition is essential. This will ensure that appropriate interventions are put in place for uninterrupted treatment and best possible clinical outcome.

Aim: To conduct nutritional assessment using the Patient Generated-Subjective Global Assessment tool to identify malnutrition in patients undergoing chemotherapy.

Methodology: A cross-sectional study design was used in this study. One hundred and twenty three (123) participants undergoing chemotherapy partook in the study within a two-month period. A structured questionnaire was used in assessing socio-demographic and medical history. The Patient Generated Subjective Global Assessment (PG-SGA) instrument which is a validated tool for nutritional assessment of cancer patients, was used to assess weight loss, food intake, nutrition impact symptoms and functional capacity. Statistical Package for Social Sciences (SPSS) Version 20.0 was used to analyse the data obtained. Categorical variables were presented using frequency distribution tables, graphs and bar charts and continuous variables were expressed as mean ± standard deviation. Correlation analysis was used to determine the relationship between

continuous variables. Analysis of variance was used to find the mean differences between the various cancer groups. Statistical significance was set as $p<0.05$.

Results: The study revealed that 5.7% (n= 7) of the patients were well nourished, 31.7% (n= 39) were suspected of being malnourished and 62.6% (n=77) were severely malnourished. Varying degrees of weight loss was experienced by approximately 48% (n=60) of participants undergoing chemotherapy. More than half (56.9%, n=70) of the participants were consuming less than their normal intake. The latter was more common in participants who had completed the second cycle of chemotherapy. The major nutritional symptoms experienced by the respondents were fatigue, pain and others (depression and financial constraints). Poor nutritional status was positively correlated with weight loss and nutritional symptoms ($r=0.747$, $p<0.001$).

Conclusion: The data presented in this study showed high prevalence of malnutrition in cancer patients undergoing chemotherapy which is of public health concern to all.

DEDICATION

I dedicate this work to the Almighty God for His grace, mercy, favour, presence, goodwill and blessings upon me throughout this period of study.

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I am very grateful to the Almighty God for His grace and mercy for a successful completion of this research and my Masters of Science Degree in Dietetics education. It has been Jesus Christ from the very beginning.

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My deepest gratitude goes to all the patients who participated in this study; this thesis would not have been possible without your help and cooperation. Thank you for opening your doors and sharing your experiences with me.

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LIST OF ABBREVIATIONS

ASPEN AMERICAN SOCIETY OF PARENTERAL AND ENTERAL NUTRITION

BMI BODY MASS INDEX

CINV CHEMOTHERAPY-INDUCED NAUSEA AND VOMITING

ECOG EASTERN CO-OPERATIVE ONCOLOGY GROUP

MUST MALNUTRITION UNIVERSAL SCREENING TOOL

NSCLC NON-SMALL CELL LUNG CANCER

KBTH KORLE BU TEACHING HOSPITAL

NRONMC NATIONAL RADIOTHERAPY ONCOLOGY AND NUCLEAR MEDICINE CENTRE

NHL NON-HODGKIN'S LYMPHOMA

PG-SGA PATIENT GENERATED SUBJECTIVE GLOBAL ASSESSMENT

SGA SUBJECTIVE GLOBAL ASSESSMENT (SGA)

WHO WORLD HEALTH ORGANIZATION

CHAPTER ONE

1.0 BACKGROUND

Cancer is a collective term for a large group of distinct diseases characterised by the growth of abnormal cells beyond their normal boundaries that can then invade adjoining parts of the body and/or spread to other organs (WHO, 2018a). Cancer which can also be called neoplasms and malignant tumours may affect almost any part of the body (WHO, 2018a). Global estimate of new cases of cancer in 2018 revealed about 18 millon with its related deaths of about 9.6 million (WHO, 2018b). Out of all these cases, more than half (70%) of these cases and deaths occur in less developed regions of the world (WHO, 2018a). In Africa, 847,000 new cases and 591,000 cancer death were estimated to have occurred in 2012 (Parkin, Bray, Ferlay, & Jemal, 2014). Authentic or dependable data on cancers are most often scarce and the readily available data are from reports of institutions like hospital reports. These reports are mostly narrow pertaining to the disease scope and coverage (Ministry of Health, 2011). Estimated annual cancer cases in Ghana is 16,600 signifying an age-specific mortality rate of 109.5 cases out of 100,000 (Ministry of Health, 2011). The most prevalent cancer in Ghana among men are prostate, liver, Non-Hodgkin's Lymphoma (NHL), stomach and colorectum whilst breast cancer, cervical cancer, ovarian cancer are common among women (Ministry of Health, 2011). In the Korle Bu Teaching Hospital annual report, breast cancers and other cancers were indicated as the two most common cause of death in the department of surgery (Annual Report, 2016). Late presentation, lack of confidence and trust in orthodox medicine but believe in alternate medicine are some of issues that lead poorer outcomes of treatment in Ghana (Donkor et al., 2015).

Malignant tumours can have local or systemic effects that may impact on the nutritional status of cancer patients. The nutritional status of the patient suffering from cancer might be affected by the tumour which may likely cause an automatic blockade in the digestive tract (oesophagus) (Bauer, 2007), causing dysphagia and impaired swallowing, early satiety, nausea, vomiting and abdominal pain (Santarpia, Contaldo, & Pasanisi, 2011). The tumours can also interfere with gastrointestinal function leading to diarrhoea, constipation and malabsorption (Marin Caro, Laviano, & Pichard, 2007). These nutrition related complications contributes to malnutrition which affects 30% to 85% of cancer patients (Bozzetti et al., 2012; Hebuterne et al., 2014).

Treatment modalities in cancer include surgical removal, destruction or shrinkage of cancer cells using high dose radiation (radiotherapy) and hormone therapy which is treating hormone-dependent cancers such as breast and prostate cancer. Targeted therapy which is aimed at disrupting specific cancer cell functions and chemotherapy, the use of antineoplastic agents or drugs to systemically destroy tumour cells (Jacobson et al., 2008; Khoukaz, 2006; Polovich, Olsen, & Lefebvre, 2014). Different routes of administering antineoplastic agents include intramuscular, oral, topical, intravenous, intramuscular, subcutaneous and arterial (Polovich et al., 2014). The mode of administration is determined by size, type, position of the tumour and the type of agent to be used and its dosage (Polovich et al., 2014). Chemotherapy is mostly administered in courses and cycles, followed by a recess for three weeks in between cycles which allows healthy cells to regenerate (Lawrence, 2012). Specific goals for cancer treatment include curative: complete destruction of malignant disease, palliative : alleviation of symptoms associated with the disease, confinement of cancer cell growth and lengthening survival (WHO, 2018a). It has been indicated that the earlier the diagnosis of cancer is made the higher the chances for successful treatment (WHO, 2018a).

Chemotherapy does not only act on malignant cells; healthy cells are also affected and may have a hand in nutritional problems (Lawrence, 2012). Chemotherapy may cause side effects or adverse effects like altered perceptions of taste and smell, anorexia, nausea and vomiting, food aversions, diarrhoea mucositis, constipation, and early satiety. Chemotherapy may also have a direct erosive effect on muscle thereby producing significant loss of body mass (Caillet et al., 2017). Cancer patients often experience weight loss at the time of diagnosis and during chemotherapy (Sanchez-lara, Ugalde-morales, Motola-kuba, & Green, 2013). Patients' tolerance to chemotherapy treatment might be affected, due to chemo-induced toxicity, which can lead to reduced chemotherapeutic dosage, treatment delays and possibly a definitive termination of treatment (Bozzetti, 2017; Fearon et al., 2011).The nutritional status of a cancer patient who is undergoing chemotherapy therefore can be impacted by both the tumour and the chemotherapy agent. The basic principle in solving the malnutrition problem is to identify it. Nutritional screening is therefore necessary to start the process of identifying malnutrition or individuals at high nutritional risk at medical care in a non-invasive, inexpensive and feasible way. Nutrition assessment is also needed to efficiently and precisely recognize those individuals with clinically obvious or serious malnutrition that need immediate nutrition intervention using a valid and standard assessment tool (Capra, 2007; Gorenc, Kozjek, & Strojan, 2015). Validated tools used for assessing the nutritional status of the cancer patients include the Subjective Global Assessment (SGA) Mini Nutritional Assessment (MNA), Malnutrition Screening Tool (MST), Malnutrition Universal Screening Tool but the Patient Generated Subjective Global Assessment (PG-SGA) is considered the gold standard for the nutritional assessment and screening (Andreoli, Delorenzo, Cadeddu, Iacopino, & Grande, 2011).

1.1 PROBLEM STATEMENT

Patients with cancer are at particularly high risk for malnutrition because both the disease and its treatments threaten their nutritional status (Arends, et al., 2017b). It is estimated that the deaths of 10-20% of cancer patients can be attributed to malnutrition rather than to the malignancy itself (Arends et al., 2017b). Cancer and cancer treatments impact on the nutritional status of cancer patients by altering the metabolic system and decreasing food intake (Arends et al., 2017a). Studies in hospitals in France and Italy have showed that malnutrition occurs in 30% to 85% cancer patients (Bozzetti et al., 2012; Hebuterne et al., 2014). Food aversions, xerostomia, mucositis, vomiting, diarrhoea are all side effects of chemotherapy which decreases food intake leading to low energy expenditure, weight loss especially lean body mass (Kuhn, Muscaritoli, Wischmeyer, & Stehle, 2010). All these side effects can lead to a drastic reduction in energy intake and in turn lead to malnutrition. Malnutrition in patients undergoing chemotherapy affects the adherence to chemotherapy regimen due to chemo-induced toxicity, which can lead to reduced chemotherapeutic dosage, treatment delays and possibly a definitive termination of treatment (Brinksma et al., 2015). It has been established that patients with stabilised weight during chemotherapy have a better progression-free period and overall survival (Hebuterne et al., 2014). Nutritional assessment of cancer patients undergoing chemotherapy has been carried out in different parts of the world (Davidson et al., 2012; Khoshnevis, Ahmadizar, Alizadeh, & Akbari, 2012; Parasa & Avvaru, 2016). In Ghana, however very little is known about nutritional risk and malnutrition in patients undergoing chemotherapy. This study therefore sought to assess the nutritional status of patients undergoing chemotherapy in Ghana.

1.2 SIGNIFICANCE OF THE STUDY

Nutritional assessment provides the opportunity to identify malnutrition or malnutrition risk in cancer patients and intervening to improve outcomes (Capra, 2007). There is limited information on nutritional assessment of cancer patients undergoing chemotherapy in Ghana. The findings of this study will therefore provide information on nutritional status of cancer patients undergoing chemotherapy in Ghana and thus adding to literature. It also contributes to knowledge by providing information that may assist health professionals to plan, develop and implement policies on nutritional interventions for patients undergoing chemotherapy.

1.3 AIM OF THE STUDY

To conduct nutritional assessment using the Patient Generated-Subjective Global Assessment tool to identify malnutrition in patients undergoing chemotherapy at the National Radiotherapy Oncology and Nuclear Medicine Centre of the Korle-Bu Teaching hospital (KBTH) in Accra, Ghana.

1.4 HYPOTHESIS

Patients undergoing chemotherapy at the National Radiotherapy Oncology and Nuclear Medicine Centre of the Korle-Bu Teaching Hospital are not malnourished.

1.5 SPECIFIC OBJECTIVES

1. To determine weight loss and percentage weight loss of patients undergoing chemotherapy.

2. To assess change in food intake within one month of patients undergoing chemotherapy.
3. To identify nutrition related symptoms of patients undergoing chemotherapy.
4. To determine functional capacity of patients undergoing chemotherapy using the Eastern Cooperative Oncology Group (ECOG) criteria.
5. To determine the relationship between chemotherapy related nutritional symptoms and nutritional status.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 MALNUTRITION IN CANCER PATIENTS

Malnutrition can be defined as "a state resulting from lack of intake or uptake of nutrition that leads to altered body composition (decreased fat free mass) and body cell mass leading to diminished physical and mental function and impaired clinical outcome from disease" (Sobotka, 2012). In general, malnutrition would also apply to state of a person being overweight and obesed. More significantly, the definition indicates that the weight loss is due to a reduction in food intake. However, it is both the poor nutrient intake and metabolic alteration in the case of cancer patients (Bozzetti, 2013). Additionally in referring to cancer patients the term cachexia is often used (Bozzetti, 2013). The European Society for Clinical Nutrition and Metabolism (ESPEN) came up with universally accepted term for cachexia explanation and appropriate steps in the management of cancer within Europe(Arends et al., 2017).

Cachexia is therefore defined as a multifaceted syndrome designated by continuous skeletal muscle mass loss (with or without fat mass loss) that cannot be entirely reversed by standard nutritional support and brings about gradual and escalating functional impairment (Fearon et al., 2011; Martin et al., 2011). Cancer cachexia is a sequence with three stages namely precachexia, cachexia, and refractory cachexia (Fearon et al., 2011). Pre-cachexia is defined on the basis of the following yardstick : the presence of a chronic disease, unintentional weight loss 5% of normal body weight in the course of 6 months, persistent or recurrent systemic inflammatory response and anorexia or anorexia-related symptoms (Aversa et al., 2010). For the diagnosis of cachexia to be made, the patient should have a weight loss of greater than 5% or greater than 2% weight loss in patients

with body mass index or quetlet index of less than 20kg/m² (Aversa et al., 2010; Fearon et al., 2011). In refractory cachexia, there is the existence of quick and continuous cancer growth which are very insensitive to anticancer therapy (Fearon et al., 2011). It is always accompanied by vigorous catabolism, or numerous factors that make effective management of weight-loss quite impossible or inappropriate. Refractory cachexia is marked by a low performance status and a longevity of less than 3 months (Fearon et al., 2011).

The American Society of Parenteral and Enteral Nutrition (ASPEN) and the Academy of Nutrition and Dietetics stated that for a potential diagnosis for malnutrition, the following criteria should be considered: weight loss, loss of muscle mass, loss of subcutaneous fat, low energy intake, fluid accumulation, and hand grip strength. At least two of the criteria should be fulfilled for the diagnosis of malnutrition (Cederholm et al., 2017). The European Society of Clinical Nutrition and Metabolism (ESPEN) further states that in individuals who have been identified to be at malnutrition risk, the diagnosis of malnutrition can be made or confirmed when there is the presence of reduced quetlet index of less than 18.5 kg/m^2 in unison with the definition of underweight given by the World Health Organization (WHO), or a combination of loss of weight and decreased body mass index (pertaining to age limits) or decreased gender-dependent fat free mass index (FFMI) (Cederholm et al., 2015).

2.2 INCIDENCE AND PREVALENCE OF MALNUTRITION IN CANCER PATIENTS

A study conducted by Ryan et al. (2016) indicated that malnutrition tends to more high and common in cancer patients than other patients with different medical diagnoses. The prevalence of malnutrition among cancer patients in two different studies conducted in kenya range from 13% to 50% (Kaduka et al., 2017; Opanga et al., 2017). Another cross

sectional study carried out on 277 hospitalized cancer patients in Brazil indicated that the prevalence rate of malnutrition among them (cancer patients) was 71% (Silva, de Oliveira, Souza, Figueroa, & Santos, 2015) whilst in a study in Iran involving 416 cancer patients, the prevalence rate was 53% (Khoshnevis et al., 2012).

Various studies carried out among cancer patients in three different countries France, Spain and Brazil indicated that the incidence of malnutrition was between 30% and 80% in hospitalized cancer patients (Attar et al., 2012; Silva et al., 2015; Planas et al., 2016) and 20% to > 70% globally (Arends et al., 2017b). Other studies have also elucidated that malnutrition occurs in about 30% to 87% of cancer patients (Laky et al., 2007; Wie et al., 2010).

The measure of malnutrition corresponds to the patient's age, cancer stage and cancer type (Arends, et al., 2017b; Wie et al., 2010). In a research survey performed in 154 hospital wards in France, it revealed that prevalence rate of malnutrition in cancer per site of disease was : 60.2% for oesophagus and/or stomach, 48.9% for head and neck, 66.7% for pancreas, 34.0% for leukemia/lymphoma,; 45.3% for lung, 39.3% for colon/rectum, 20.5% for breast, 44.8% for ovaries/uterus, and 13.9% for prostate, (Hebuterne et al., 2014). Malnutrition prevalence in liver and lung cancer in a study carried out in the National Cancer Center of Korea among hospitalized patients indicated 86.6% and 60.5% respectively and the study revealed that malnutrition was prevalent in the late stage of the cancers (Wie et al., 2010).There is a higher frequency of malnutrition in the elderly and late stages of cancer than in the younger ones and early stages of cancer (Aaldriks et al., 2013; Freijer et al., 2013). A comparable observational multicentre cross sectional study conducted in France between the young (1517) and the elderly(578) cancer patients revealed that malnutrition was more common and frequent in the elderly than in younger patients (Lacau St Guily et al., 2018). The severity of malnutrition was observed to have

a positive correlation with the stage of cancer: the earlier the stage the lesser the state of malnutrition, the advanced the stage the worse the state of malnutrition (Muscaritoli et al., 2017). It has also been observed in a prospective study carried out among 145 gynaecological cancer patients in Austrailia that prevalence of malnutrition in ovarian and endometrial cancers is 67% and 6% respectively (Laky et al., 2007) whilst in gastric and colorectal cancer it is indicated to be 48% (Wu et al., 2009). Others studies have indicated that greater than 64% of cancer patients are malnourished escalating to about 81% for those undergoing palliative treatment(Kumar et al., 2010; Paccagnella, Morassutti, & Rosti, 2011).

2.3 AETIOLOGY OF MALNUTRITION IN CANCER

The aetiology of malnutrition in cancer patients is multifaceted and may be attributed to determinants such as local effects and host response of a tumour, oncological treatments, decreased food intake due to local and systemic effect of treatment and changes in nutrient metabolism (Van Cutsem & Arends, 2005). A very important aspect of malnutrition in cancer patients is cachexia which may occur with other conditions or co-morbidities like End Stage Renal Failure, Chronic Obstructive Pulmonary Disease and Acquired Immune Deficiency Syndrome. Cancer sites have a profound consequence on the nutritional status of patients. It is well known by various studies that head and neck cancers, gastrointestinal cancers, liver and lung cancers are associated with an increased risk of malnutrition (Hebuterne et al., 2014; Wie et al., 2010). An observational research in 17 French Comprehensive cancer centres showed varying percentages of malnutrition per the cancer sites :18.3% - Breast, 31.2% - Colon-rectum, 45% -Head and neck, 34.2%- Haematological, 49.5% - Digestive, 32% - Gynaecological and 40.2% - Lung (Pressoir et al., 2010). In an exploratory study carried out on newly diagnosed head and neck cancer

patients, 4(15%) were precachectic and12(42%) were cachectic (Jager-wittenaar et al., 2017). It is noteworthy that cancer patients at an increased risk of malnutrition include liver, head and neck, lung and gastrointestinal cancers (Silva et al., 2015; Wie et al., 2010) especially upper gastrointestinal cancer patients due to obstructive symptoms, malabsorption and diarrhoea (Di Fiore et al., 2007). Head and neck cancers may mechanically impede the intake of foods or generate trismus and odynophagia that limit oral intake (Jager-wittenaar et al., 2017; Wendrich et al., 2017). The size of the tumour may also constitute a potential mechanical obstacle to the way in the digestive tract causing difficulty and impaired swallowing. This is common in head-neck and oesophageal cancer. In cancers of the stomach and small bowel there is vomiting, early satiety and nausea whilst intestinal cancer cause severe abdominal pain. The tumour may hinder the unique function of the organ, for example due to the lack of digestive enzymes most patients have diarrhoea (Mondello et al., 2014; Santarpia et al., 2011). Patients with oesophageal cancers frequently have dysphagia and anorexia which leads to inadequate intake. The existence of incessant or intermittent pain during food intake and digestion may constitute another essential factor that limits the oral intake of patients (Mondello et al., 2014; Santarpia et al., 2011).

Inadequate food intake has mostly been documented in cancer patients and is accompanied by weight loss which might be severe (Arends et al., 2017a). Patients with advanced cancer have a high frequency of changes in taste which is in connection with poor intakes and they consume as little as 900–1100 kilocalories per day (Blum et al., 2011). It has been established that weight loss is propelled in a varying magnitude by reduced intake of food which will diectly result in diverse symptoms like anorexia, swallowing difficulties, pain, impaired taste and fatigue (Blum et al., 2011). In a study conducted on one hundred and five patients diagnosed of locally advanced oesophageal

cancer (LAEC), it was established that the independent prognostic component for survival was dysphagia (Di Fiore et al., 2007). Thirty-seven different sypmtons were identified as the most common symptoms experienced by patients with incurable cancer (Teunissen et al., 2007). Out of these anorexia, pain, fatigue, weakness and lack of energy were experienced by more than fifty percent (50%) of the patients (Teunissen et al., 2007). In another study in patients with advanced cancers, more than 50% of the patients indicated issues pertaining to weight loss, anorexia and eating (Hopkinson, Wright, McDonald, & Corner, 2006). It has also been realised that anorexia, depression, taste changes, dry mouth, abdominal fullness were more common in patients with weight (Blum et al., 2011). The nutritional needs of cancer patients tend to be increased on account of poor organ function, more nutrient loses and hypermetabolism leading to malnutrition (Arends et al., 2017a).

The loss of weight in cancer patient can not only be attributed to inadequate nutrient intake. Activation of catabolic pathways, metabolic and endocrine changes results in some of the weight loss which far exceeds the amount of nutrient intake (Blum et al., 2011). Pro-inflammatory cytokines which are either secreted by the tumours or immune cells play a pivotal role in mediating the metabolic, physiologic and behavioural features of cancer-induced weight loss. They are key signals for lipolysis and proteolysis. Cytokines have three major effects on the body namely depression of appetite, alteration of macronutrient metabolism and the initiation of an acute phase protein response. It is worthy of note that even in individuals with the same type of tumour, one becomes cachectic whilst the other is not cachectic. This variation may relate to the individual's genotype. Single nucleotide polymorphisms in the interleukin 1 (IL-1), interleukin 6 (IL-6) and interleukin 10 (IL-10) genes that are linked to production rates of these cytokines have been associated with the prevalence of cachexia in both gastric and pancreatic cancer

(Tan & Fearon, 2010). After surgical removal of the cancer there are some gastrointestinal changes which can affect the digestive processes causing early satiety, dumping syndrome, or diarrhoea (Santarpia et al., 2011) Fig. 2.1.

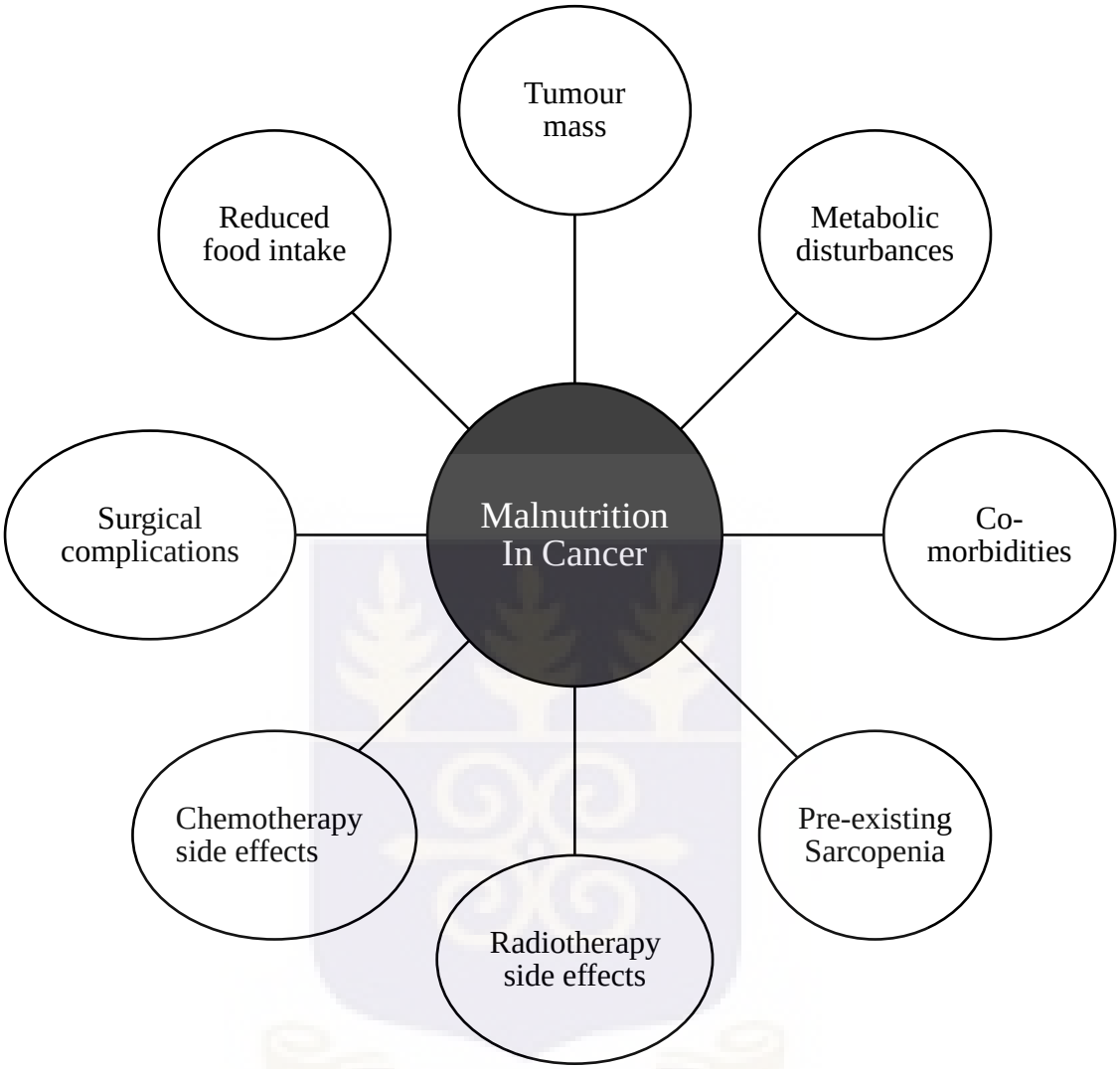


Fig. 2.1: Aetiology of Malnutrition in Cancer

2.4 MALNUTRITION DURING CHEMOTHERAPY IN CANCER PATIENTS

Chemotherapy is the use of antineoplastic agents or drugs to systemically destroy tumour cells and administered mostly in cycles (Polovich et al., 2014). The cycle may run for a period of five days then followed by a recess of three to four weeks. The whole period of chemotherapy can last up to eight cycles. (Smeltzer, Bare, Hinkle, & Cheever, 2010). Chemotherapy may resullt in side effects that have a detrimental effect on nutritional status (Caillet et al., 2017). Some of these include diarrhoea, food aversions, mucositis, nausea,vomiting, constipation (Sanchez-lara et al., 2013).

In a cross sectional descriptive audit research among 121 patients receiving chemotherapy in an ambulatory care unit in a teaching hospital in Australia, it was observed that 12% and 35% complained of nausea and vomiting respectively (Davidson et al., 2012). A retrospective study conducted on 233 patients undergoing chemotherapy who made unplanned presentation within six months of therapy, it was elucidated that 105(45%) presented with nausea and vomiting and 27% complained of pain (Mckenzie et al., 2011). An observational longitudinal study carried out in two oncology centres in Austrailia indicated that frequently reported symptoms by cancer patients undergoing chemotherapy were dysgeusia, constipation, diarrhoea, nausea, pain, anorexia and vomiting (Tong, Isenring, & Yates, 2009). They are also cited by patients as one of their biggest fears at the outset of chemotherapy (Hesketh, 2008). It is also indicated that different combination of chemotherapy drugs increase the incidence of emesis and also increases the duration of nausea and vomiting (Hesketh, 2008). In a study conducted in 219 medical oncology patients who had started chemotherapy for a month, it was elucidated that the nausea, dry mouth and constipation were the most frequent symptoms (Tong et al., 2009) and stomach pain, dry mouth, diarrhoea were the distressing

symptoms stated. The proportion of patients who experienced at least one nutritional symptom in one month, six month and twelve months were 79%, 72% and 46% respectively (Tong et al., 2009). In a retrospective study conducted among one hundred cancer patients who had about 673 cycles of chemotherapy, 52% had grade 3 and grade 4 chemotherapy induced diarrhoea (CID). The research also revealed that 22% of patients had their chemotherapy dosage reduced, 8% delays in the chemotherapy regimen and finally 15% had their chemotherapy treatment terminated (Arbuckle, Huber, & Zacker, 2000). Similarly, in a retrospective cohort study of colorectal patients receiving chemotherapy in two chemotherapy centres 32.3% of the patients experienced grade 3 and grade 4 to the extent that they were admitted. Grade 3 and grade 4 diarrhoea developed 54.2% in patients after the first cycle of chemotherapy which led to a dose reduction of 20% and delay for 7 days (Dranitsaris, Maroun, & Shah, 2005). In a survey of 100 chemotherapy patients of different cancer groups conducted in Pakistan, 77% and 75% complained of nausea and vomiting respectively (Aslam et al., 2014).

In various studies conducted, it revealed that two thirds of patients undergoing chemotherapy complained of decrease in sensory perception with one third having a reduction in the sweet taste perception (Haiser, Hofauer, Scherer, J, & Knopf, 2016; Nitenburg & Raynard, 2007). A research conducted to determine the chemosensory dysfunction among 66 advanced cancer patients undergoing palliative treatment indicated that 57(86.3%) of the patients reported of some form of chemosensory anomally. Out of these 57(86.3%) patients, 52% complained of both taste and smell chemosensory anomally (Hutton, Baracos, & Wismer, 2007). A qualitative study on chemosensory alterations was also carried out on 12 cancer patients undergoing chemotherapy indicated that 92% of the patients experienced moderate to severe chemosensory alterations and these alterations did not occur in isolation but occurred with grade 1 and grade 2 weight

loss(Bernhardson, Olson, Baracos, & Wismer, 2012). In a systematic review of 44 papers, 25,074 patients were pooled and it was revealed that lack of energy, fatigue, pain, weakness and appetite loss occurred in more than 50% of the patients (Teunissen et al., 2007). Mucositis is another nutritional symptom related to chemotherapy which has a profound effect on patients. Oral mucositis is strongly associated with severe pains, dehydration, reduced food intake weight loss and fatigue (Bonomi & Batt, 2015). It also increases the risk of infection which may lead to severe sepsis especially patients with neutropaenia thereby impacting negatively in their quality of life (Benson et al., 2004).

Cancer related fatigue is often reported by patients especially those undergoing chemotherapy and causes the most suffering thereby interfering in the treatment regimen and quality of life (Berger, Mitchelle, Jacobsen, & Pirl, 2015; Mitchelle, 2010; Wang et al., 2014). In a cross sectional study conducted among 126 cancer patients (both out and in patient) revealed that about 80% experienced cancer related fatigue during chemotherapy (Banipal, Singh, & Singh, 2017). A cross sectional study on 300 cancer patients receiving chemotherapy indicated that the most common complain were fatigue 51.3%, anorexia 43.3%, and dry mouth 41% (Shahvazi et al., 2017). When cancer related fatigue is left untreated, it could lead to termination of normal social, physical, recreational and physical activities thereby interfering in performance roles such as academic, family and work. All these nutrititional impact symptoms affect the individual. Inadequate nutritional intake has frequently been observed in cancer patients (Arends et al., 2017a) and especially in patient undergoing chemotherapy.

Chemotherapy can as well have an immediate destructive effect on muscle resulting in consequential loss of body mass (Caillet et al., 2017). This often leads to diminished food intake as confirmed by studies revealing that more than 50% of the cancer patients undergoing chemotherapy were taking in less food relative to their previous or normal

intake. This therefore increases their risk of malnutrition (Haiser et al., 2016; Khoshnevis et al., 2012; Nitenburg & Raynard, 2007; Parasa & Avvaru, 2016).

A retrospective study among cancer patients undergoing chemotherapy indicated that prevalence of weight loss ranged from 40% to 91.6% depending on the location of the cancer (Caillet et al., 2017). In a cross sectional and observational survey for two weeks in university hospital services in France involving 476 cancer patients undergoing treatment, it was observed that 30.2% have varying degrees of weight loss (Nourissat et al., 2007). It was also observed in another study conducted in Tehran, Iran stating that 44.4% had lost weight and the cancer group with the highest weight loss was cases of gastrointestinal cancers with the least being the cases of breast cancers (Khoshnevis et al., 2012). Another study also stated that upper and lower gastrointestinal cancers had the highest number of weight loss that is 19.8% and 20.8% respectively as compared to other cancer groups. This same study also stated that the least loss of weight was seen in breast cancer 5% (Silva et al., 2015). It has also been elucidated in a retrospective study among 191 cancer patients undergoing chemotherapy that more than half 63.3% had weight loss during treatment. It was also noted that weight loss was more common in patients with gynaecological tumours (91·6 %), gastrointestinal cancers (77 %), lung (72·7 %). According to this research the weight loss was minimal in the cancers of the breast and colon (Sanchez-lara et al., 2013). In a systematic review study among aged (above 65 years) cancer patients, it was observed that 8% to 40% of these cancer patients had lost weight of 10% or more during the past three or six months whilst 10.7% to 23% had body mass index less than 21 kg/m^2 (Caillet et al., 2017). It is important to note that percentage weight loss greater than 5% in six months previous to the diagnosis is related to a lower survival rate and > 10 % is correlated with an increased risk of complications due to malnutrition (Ottery et al., 2015). Percentage weight loss greater than 10% was

seen to be very common among gastrointestinal cancer patients undergoing therapy and patients with advanced form of tumours by various studies (Nourissat et al., 2007; Sanchez-lara et al., 2013). A retrospective study to determine gastrointestinal symptoms and weight loss in cancer patient undergoing chemotherapy indicated that the patients with gastrointestinal cancer had greater than 10% weight loss (45.2%) followed by haematological cancers (14.3%)(Sanchez-lara et al., 2013). Another study on the nutritional assessment of cancer patients receiving chemotherapy in Tehran indicated that percentage weight loss was common in gastrointestinal cancer with 27% greater than 10% and 21.3% between 5%-10% and the least being breast cancer patients with (1.6%) greater than 10% and 6(9.4%) between 5%-10% (Khoshnevis et al., 2012).

All the chemotherapy-related symptoms may bring about a reduction in the intake of food and a resultant weight loss, the vital clinical sign of altered nutritional status which will affect every facet of life of the patient(Caillet et al., 2017; Cederholm et al., 2017). In a comparative study of breast cancer patients as against women without breast cancer, it was ascertained that during chemotherapy patients with breast cancer had significantly lower energy intake as compared to those without breast cancer when a 24 hour recall was used (1779 ± 56 vs 1993 ± 68 kcal) (De Vries, Van Den Berg, De Vries, & Boesveldt, 2017). The food intake of patients undergoing chemotherapy during a hospital based cross sectional study revealed that 38(57%) eating less than their usual intake (Parasa & Avvaru, 2016). Another cross sectional study among 416 patients undergoing chemtherapy, 50.4% of them indicated that their food intake had reduced drastically as compared to their usual intake(Khoshnevis et al., 2012).

Physical inactivity is related to loss of muscle mass: one week of complete bed rest in a healthy male is strongly associated with 4% muscle loss due to low protein synthesis. This has a replicating effect on the individual thereby affecting their nutritional status

(Drummond et al., 2012; Luctkar-Flude, Groll, Tranmer, & Woodend, 2007). Limited functional capacity plays an active role in difficulties in food intake and preparation (Bozzetti et al., 2012; Silva et al., 2015). It is indicated in various researches that for Eastern Cooperative Oncology Group score greater than or equal to 2 is a risk factor for malnutrition in cancer patients and those undergoing chemotherapy. This is very similar to an epidemiological study in France where it was revealed that the chances of being malnourished increases three folds when cancer patients are admitted with low functional capacity (Pressoir et al., 2010).

2.5 NUTRITIONAL ASSESSMENT OF CANCER PATIENTS

Nutritional assessment is the systematic process of collecting and interpreting information in order to make decisions about the nature and cause of nutrition related health issues that affect an individual (British Dietetic Association, 2012). Nutritional screening is the first step in identifying subjects who may be at nutritional risk or potentially at risk and who may benefit from appropriate nutritional intervention. It is a rapid, simple and general procedure used by nursing, medical or other staff on first contact with the subject so that clear guidelines for action can be implemented and appropriate nutritional advice provided (Todorovic, Russel, & Elia, 2003).

Various screening tools such as the Malnutrition Universal Screening Tool (MUST), the Subjective Global Assessment (SGA) tool and the Patient Generated Subjective Global Assessment Tool (PG-SGA) are quite similar, using parameters such as recent weight loss, recent poor intake/ appetite and body weight measures and providing a numerical score to categorise risk of malnutrition. However, the PG-SGA has been shown to have demonstrated validity and inter-rater reproducibility when used with in-patients with cancer, oncology patients receiving radiotherapy and medical oncology patients attending

a day unit (Andreoli, Lorenzo, Iacopino, & Grande, 2011) In view of this, the Oncology Nutrition Dietetic Practice Group of the American Dietetic Association has adopted the Scored Patient-Generated Subjective Global Assessment (PG-SGA) as a specific nutritional assessment and screening tool (Arribas et al., 2017) and the golden standard for oncology patients (Andreoli et al., 2011; Gorenc et al., 2015).

In a study carried out in two cancer treatment centres in Kenya, it was elucidated that 31% of the patients were malnourished comprising of SGA-B moderately malnourished 19.7% and SGA-C severely malnourished 11.3% (Opanga et al., 2017). In Nigeria, out of a total number of 89 patients, 60% of the patients were malnourished using the Subjective Global Assessment (SGA) scale (Ntekim, Folasire, & Folasire, 2017). PG-SGA was also used in Tehran to assess the nutritional status of cancer patients. It revealed 53.1% malnutrition prevalence with 24% being severely malnourished and 29.1% being moderately malnutrition (Khoshnevis et al., 2012). Another study carried out in Brazil with about 366 patients had 36% of them being malnourished using the PG-SGA tool but in that research the cut off were as follows: <17 was welnourished, ≥ 17 was malnutrition of some degree, < 22 was moderately malnourished patients and severely malnourished was ≥ 22 (Santos et al., 2017). That research also revealed malnutrition among the cancer groups: digestive system had (37.6%), male reproductive system-(34.1%), female reproductive system (44.4%), respiratory system – (28.1%), skin (23.1%), head and neck (45.5%), urinary tract – (40%), haematopoietic – (43.5%) and other cancers- (29%) (Santos et al., 2017).In a study carried out in Tehran , frequency of malnutrition in the various cancer sites were as follows: gastrointestinal cancers – 61%, genitourinary cancers- 37.1%, Breast cancers-11.6%, Lung cancers- 23%, Haematological cancers-28.5% and other cancers – 37.8% (Khoshnevis et al., 2012). A research carried out in Brazil also revealed the following malnutrition rates in various cancer sites: breast cancers

-(56.7%), upper gastrointestinal cancer – (83.7%), lower gastrointestinal cancer -(67.2%), reproductive system cancers- (75.0%), lung cancers -(84.4%) and other cancer -(62.9%). In this study malnutrition was very common among the upper gastrointestinal tract cancers (Silva et al., 2015). In a study carried out on 8895 hospitalized cancer patients in Korea revealed that 5,426(61%) of them were malnourished with the malnourished cancer groups as follows: Liver (86.6%), stomach (56.8%), Lung (60.6%), Colorectum (52.8%), Breast (51.%), Uterus (57.8%). In that study the most frequent malnutrition occurred in the liver cancers(Wie et al., 2010).

2.6 EFFECT OF POOR NUTRITIONAL STATUS ON CHEMOTHERAPY OUTCOMES AND SURVIVAL

In a research on lung cancer patients, it was elucidated that weight loss was directly proportional to the inability of completing chemotherapy cycles. The more weight the patient loses the worst the outcome (Ross et al., 2004). Another study among head and neck cancers, colorectal cancer and breast cancer patients indicated that low skeletal muscle mass is a unique prognostic factor for chemotherapy related toxicity and chemotherapy dose limiting toxicity (Wendrich et al., 2017). It is further noted that chronic weight loss is a basic determinant of poor survival or shorter survival rate of the cancer patient (Ross et al., 2004). In a retrospective cohort study of sixty-three patients with colorectal cancer who had received different combinations of chemotherapeutic agents, 54% developed grade 3 and grade 4 diarrhoea which led to a 20% dose reduction and delay of treatment for about 7 days. In fact, the median length of hospital stay was eight days (ranging from 1 to 49 days) which was economically quantified at a mean cost of $8,230 per patient (95% CI $6,519 to $9,942) (Dranitsaris et al., 2005)

CHAPTER THREE

3.0 METHODOLOGY

3.1 STUDY DESIGN

The study design used in this work was a cross sectional design. Cross-sectional designs entails the collection of data at one point in time or multiple times within a short period of study. All the circumstances under study are captured during the period of data collection. Cross-sectional studies are appropriate for describing the status of phenomena or for describing relationships among phenomena at a fixed point in time. Cross-sectional designs are sometimes used for time-related purposes most appropriately be used to infer time sequence under two circumstances (Polit & Beek, 2010).

3.2 STUDY SITE

The study was carried out at the National Radiotherapy Oncology and Nuclear Medicine Centre (NRONMC) of the Korle Bu Teaching Hospital, Accra Ghana. The centre was set up through a joint effort between the Government of Ghana and the International Atomic Energy Agency (IAEA) (Korle Bu Teaching Hospital, 2017). The Centre is solely responsible for the management of cancer through the use of ionizing radiation and chemotherapy when necessary. Breast, cervical, prostrate gastrointestinal tract, head and neck cancers are some of the common cancercases managed at the centre. The centre receives about 1200 cancer patients a year. The centre attends to Ghanaians and non-Ghanaians from other countries within the sub region (Korle Bu Teaching Hospital, 2017).

3.3 STUDY POPULATION

The study population was cancer out-patients undergoing chemotherapy at the Centre. They all have different types of cancers: breast cancer, prostate cancer, gastrointestinal cancers, head and neck cancers, gynaecological cancers, cancer of the bone and lungs. These patients come for chemotherapy regimen or cycles on a particular day within the week.The duration of data collection was two months from December to January.

3.4 INCLUSION AND EXCLUSION CRITERIA

3.4.1 Inclusion Criteria

The eligible participants were adults age 18 years and above who have been diagnosed as having any form of cancer by a physician and undergoing chemotherapy alone or chemotherapy in combination with any other treatment.

3.4.2 Exclusion criteria

Patients who were too unwell to participate.

Patients who were unable to talk as a result of their condition.

Patients who did not give consent to participate.

3.5 SAMPLING TECHNIQUE

Convenience sampling technique was used for this study. The participants were selected when they attended the chemotherapy unit – out-patient department of the National Radiotherapy Oncology and Nuclear Medicine Centre.

3.6 SAMPLE SIZE DETERMINATION

Sample size was calculated using the formular

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1)+Z^2P(1-P)}$$ (Wayne & Chad, 2013)

where n'= sample size with finite population correction

N= population size -200 (from NRONMC records)

Z= Z statistics for a level of confidence 95% -- 1.96

P= expected proportion (in proportion of one) 50% - 0.5

d= precision (in proportion of one)- 0.05

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1)+Z^2P(1-P)}$$

$$= \frac{200*(1.96)2*0.5(1-0.5)}{((0.05)\ 2*(200-1)) +((1.96)2\ *0.5(1-0.5))}$$

$$= \frac{(768.32)\ (0.25)}{(0.0025)(199) + (0.9604)}$$

$$= \frac{192.08}{1.4579}$$

= 131.75

131.75 rounded up to 140 to cater for 5% possible missing data.

3.7 DATA COLLECTION

3.7.1 Data Collection Tools

A structured questionnaire was developed to obtain socio-demographic information.The PG-SGA tool, a questionnaire validated for nutritional assessment in oncology patients was used in collecting data (Prado, Campos, Dias, Alvares, & Bonini, 2015). A paper and electronic digital app version of the tool were used in this study. Components of the tool includes;

a. Patient-generated historical items including weight, food intake, nutrition impact symptoms and functional capacity.

i. Box 1- Weight

This box contains the current height and weight of the cancer patient, weight one month ago and if it is not available the weight six months ago can be stated. It also contains a portion where the patient will indicate if he or she has lost, maintained or gained weight within the past two weeks. Worksheet 1 scores for box 1 and patient gains extra point if there is weight loss within the two weeks. The scores in the box are additive (Ottery, 2017).

ii. Box 2- Food Intake

This box assesses the food intake in a month as compared to the patient's normal intake: unchanged, more than usual and less than usual. It also assesses the consistency of the food intake: normal food but less amount, only solid foods, only liquid foods, very little of anything, only nutritional supplements and only tube feeds. The highest score is taken from this box (Ottery, 2017).

iii. Box 3 - Symptoms

In this box, the patient selects all symptoms which prevented him or her from eating properly for the past two weeks. These include vomiting, diarrhoea, dry mouth, things taste funny or have no taste, smells bother me, problems swallowing pain, feel full quickly, fatigue, nausea, constipation and other causes such as depression, financial or dental problems. In this box all the scores are additive (Ottery, 2017).

iv. Box 4 - Activities and Function

In this box, the patient rates his or her activity or functional capacity over a month: normal with no limitations, not my normal self but able to be up and about with fairly normal activities, not feeling up to most things but in bed or chair less than half the day and able to do little activity and spend most of the day in bed or chair pretty much bedridden, rarely out of bed. The highest point score is the total for this box (Ottery, 2017).

b. Professional-generated items including diagnosis, age, metabolic stress and physical exam.

i. Worksheet 1- Scoring Weight Loss

The percentage weight loss of the previous month is calculated (or six months if the previous month is not available) and then scored. The score is then added to the score in box 1(weight) (Ottery, 2017; Ottery et al., 2015).

ii. Box B - Worksheet 2 – Disease and its relation to nutritional requirements

This worksheet contains various catabolic conditions which may have nutritional impact namely cancer, AIDS, pulmonary or cardiac cachexia, presence of decubitus, open wound, or fistula, presence of trauma, age greater than 65 years and Chronic renal insufficiency. Each condition accounts for one point. Other relevant diagnoses and

staging of the primary disease (stage I, II, III, IV) are also included (Ottery, 2017; Ottery et al., 2015)..

iii. Box C - Worksheet 3 – Metabolic Demand

The score for this worksheet is determined by the presence of fever, the grade of fever and the use of corticosteroids. The score is additive so a patient who has a fever of >38.9˚C (3 points) and is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 point (Ottery, 2017; Ottery et al., 2015).

iv. Box D - Worksheet 4 – Physical Examination

Physical examination includes a subjective evaluation of 3 aspects of body composition namely fat, muscle, & fluid status. The following muscles are assessed namely clavicles (pectoralis & deltoids), interosseous muscles and thigh (quadriceps). Regarding the fat stores, orbital fat pads, triceps skin fold are also assessed. Ankle, sacral oedema and ascites are used to assess fluid status. These locations serve as a reference point to each component so it is not necessary to assess all. The locations are assessed subjectively in a scale of 0 = no deficit, 1+ = mild deficit, 2+ = moderate 3+ = severe. The numerical score for this section is determined by the overall subjective rating of total body deficit using a scale of 0 (no deficit), 1+ (mild deficit), 2+ = moderate 3+ = severe. The assumption made in this section is that muscle deficit impacts point score more than fat and fluid deficit (McCallum & Polisena, 2000; Ottery, 2017; Ottery et al., 2015).

v. Worksheet 5 - PG-SGA Global Assessment Categories

It reflects a qualitative appreciation of Box 1 - Weight, Box 2 – Food intake, Box 3 - Symptoms, Box 4 – Activity and function, Worksheet 4 – Physical Exam. This provides a global assessment category of A -well-nourished, B-moderately or suspected of being malnourished and C- severely malnourished (Ottery, 2017; Ottery et al., 2015).

vi. The total PG-SGA

The PG-SGA numerical score is obtained through the sum of the scores in Boxes A (sum of Box 1, Box 2, Box 3 and Box 4), B, C and D. Generally, 80-90% of the total PG-SGA score is generated by the patient-generated items (Ottery, 2017).

vii. Nutritional Triage Recommendations:

Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage).

Triage based on PG-SGA point score

0-1 No intervention required at this time. Re-assessment on routine and regular basis during treatment.

2-3 Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.

4-8 Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms (Box 3).

> 9 Indicates a critical need for improved symptom management and/or nutrient intervention options (McCallum & Polisena, 2000; Ottery et al., 2015).

The PG-SGA utilizes a continuous scoring system, enabling the triaging and prioritization of patients requiring more urgent treatment (Bauer, Capra, & Ferguson, 2002)) as well as a Global Assessment (categorizing patients as A= well-nourished, B= moderately malnourished or suspected malnutrition, or C= severely malnourished). The PG-SGA

yields a score from “0” (no need for nutrition intervention) to “50” (immediate nutrition intervention required)(Bauer et al., 2002).

3.7.2 Pre-Testing Questionnaires And Pt Global App

In order to make sure questionnaire and pt global app were easily understood by participants during data collection, the questionnaire and pt global app were pre-tested among patients undergoing chemotherapy at the National Radiotherapy Oncology And Nuclear Medicine Centre of KBTH. Questionnaires and pt global app were pre-tested on five participants.

Research assistant was trained prior to recruitment of participants to administer questionnaires

3.8 PROCEDURE FOR DATA COLLECTION

Study participants were recruited during patient review visits to oncology clinics at National Radiotherapy Oncology and Nuclear Medicine Centre (NRONMC) of the Korle Bu Teaching Hospital, Accra Ghana. Patients on chemotherapy were approached and provided with a thorough explanation of study. After eligibility criteria applied and consent given, participants were then recruited to the study.

Participants were interviewed to obtain their sociodemographic data: age, gender, educational level and employment status. Other clinical details such as cancer type, chemotherapy cycles completed, corticosteroids administered and duration of corticosteroid were obtained from their folders. The PG-SGA paper tool v3.22.15 was administered by the student-dietitian researcher with experience in nutritional assessment methods.

Box 1- Weight

Height measurements of participants were taken using a seca stadiometer (model 213 Hamburg, Germany). Paricipants stood upright on a base plate without shoes with their heads in Frankfurt horizontal plane position and back straight, feet together and heels touching the back of the plate and also recorded (Nweze, 2013). Particants were weighed using a calibrated Full Body Sensor Body Composition Monitor and weighing scale (Omron HB-516C, USA) without their shoes on and no heavy objects in their pockets (Nweze, 2013) and recorded in the PG-SGA paper tool v3.22.15. The participants' clinical folders were obtained and the weight in the previous one month or six months if one month is not available and was recorded. Participants were asked if they have lost or gained weight in the past two weeks and the answer recorded accordingly.

Box 2- Food Intake

The participants were asked to rate their intake of food as compared to their normal intake for the past month stating if it was less than or greater than normal or their usual intake and what they are currently taking. They were then asked their current intake: normal food but less than normal amount,little solid food, only liquids, only nutritional supplements, very little of anything, tube fed or by vein.

Box 3 - Symptoms

Nutritional symptoms that have kept participants from eating enough for the past two weeks were assessed. These include vomiting, diarrhoea, dry mouth, things taste funny or have no taste, smells bother me, problems swallowing pain, feel full quickly, fatigue, nausea, constipation and other causes such as depression, financial or dental problems.

Box 4 - Activities and Function

Performance status or general activity level of the participants over the past month was also enquired.

Worksheet 2 – Disease and its relation to nutritional requirements

The participants' clinical folders were obtained the cancer, the stage of disease, age (if >65years) and other relevant diagnosis. These were duly recorded.

Worksheet 3 – Metabolic Demand

The participants' clinical folders were obtained for intake of corticosteroids and duration, fever and fever duration.

Worksheet 4 – Physical Examination

An assessment (physical examination) of 3 aspects of body composition: muscle status, fat and fluid status was also carried out.

Worksheet 5 - PG-SGA Global Assessment Categories

	stage A	stage B	stage C
Category	Well nourished	Moderately malnourished	Severely malnourished
weight	No weight loss or Recent weight gain	< 5% weight loss in 1 month or 10% in 6 months) or Progressive weight loss	> 5% weight loss in 1 month or >10% in 6 months) or Progressive weight loss
Nutrient intake	No deficit OR Significant recent improvement	Definite decrease in intake	Severe deficit in intake
Nutrition Impact symptoms	none OR Significant recent improvement allowing adequate intake	Present of nutrition impact symptoms (PG-SGA Box 3)	Present of nutrition impact symptoms (PG-SGA Box 3)
Functioning	No deficit or Recent improvement	Moderate functional deficit OR Recent deterioration	Severe functional deficit OR Recent deterioration
Physical Exam	No deficit or Chronic deficient but ,# recent improvement	Evidence of mild to moderate loss of muscle mass / SQ fat/ muscle tone on palpation	Obvious signs of malnutrition (e.g., severe loss muscle, SQ possible oedema)

The information collected was then carefully and systematically transferred to the pt global app for analysis.The questionnaire was used for data collection purposes and then transferred to the Statistical Package for Social Sciences (SPSS 20.0).

3.9 DATA HANDLING

Information sought from the participants was kept strictly confidential. The data from this study was under limited admittance by encryption and password protection. No other person had access to the data collected apart from research team. All quality assurance protocols were observed before, during and at the completion of this research. Codes were used for the participants for confidentiality purposes.

3.10 DATA ANALYSIS

The percentage weight loss was automatically calculated by the pt global app using this formular $\frac{(one\ or\ six\ months\ weight - current\ weight)}{one\ or\ six\ month\ weight} x\ 100$

The pt global app automatically scored both the patient-generated historical items and the professional generated items. After analysis of data collected with the PG-SGA tool, the app tool (pt-global app) determined nutritional status by categorising participants as well nourished (A), moderate or suspected of being malnourished (B) and severe malnutrition (C) and triaged them.

Data were further statistically analysed using the Statistical Package for Social Sciences (SPSS 20.0); Categorical variables were presented using frequency distribution tables, graphs and bar charts and continuous variables were expressed as mean ± standard deviation. Pearson's correlation was used to determine the association between nutritition impact symptoms and the PG-SGA score (nutritional status). Chi square test was used to determine the relationship between chemotherapy cycles completed and PG-SGA score (nutritional status). Analysis of variance (ANOVA) test was used to compare the

variances of nutrition symptom score among the different cancer groups. A p-value < 0.05 was considered significant.

3.11 ETHICAL APPROVAL

The study conformed to the Helsinki Declaration on Human Experimentation of 1975, revised in 1985 and 1989. Ethical approval for the study was obtained from the Korle Bu Teaching Hospital Ethical and Protocol Review Committee. Permission was sought from the National Radiotherapy Oncology and Nuclear Medicine Centre (NRONMC). In addition, informed written consent was obtained from patients after theresearch protocols was explained to them to the best of their understanding. The patients were informed that participation in the study was entirely voluntary and the refusal to participate was not going to affect or influence the care they received at the centre. Patients were informed that they had the right to withdraw consent at any time after agreeing to take part in the study. They were also assured of the confidentiality of their personal information.

3.12 RESEARCH TEAM

The student dietician researcher led the assistant in taking the anthropometric measurements. The student dietician input the information on the questionnaire into the PG-SGA app.

CHAPTER FOUR

4.0 RESULTS

4.1. SOCIO-DEMOGRAPHIC CHARACTERISTICS PARTICIPANTS

The total number of participants for the research was 123 and 5 participants were not willing to take part in the study. the number of participants was less than the sample size estimated eventhough it was about it was about 93.9%. All participants were patients at the National Radiotherapy Oncology and Nuclear Medicine Centre (NRONMC), Korle Bu ranged from the ages of 18 years to 75 years. Majority of the participants were females (98, 79.7%) and the males were (25, 20.3%). Approximately one third of the population (40 participants) were 60 years and above making about 32.5% of the population. Majority of the participants were the Akan tribe (59, 48%), the least was the Mole-Dagbani tribe (13, 10.6%) and there were some non-Ghanaians (4, 3.3%). In this study, majority of the participants were married (74, 60.2%) whilst the rest were either single, separated or widowed. More than half of the participants (86, 69.9%) were employed whilst 12(9.8%) participants were unemployed. The participants in the study who were retired were 23 making 18.7% of the study population and the students were 2 making 1.6% of the study population. With respect to level of education, majority of the participants had junior high school education (46, 37.4%) followed by the tertiary level of education (36, 29.3%) and the least being primary school level (6, 4.9%) (Table 4.1a and b).

Table 4. 1a.: Sociodemographic characteristics of participants (N=123)

CHARACTERISTICS	N(%)
Mean age = 50.90 ± 13.80	
Gender	
Male	25 (20.3)
Female	98 (79.7)
Age groupings	
18-20	1 (0.8)
21-30	7 (5.7)
31-40	23 (18.7)
41-50	24 (19.5)
51-60	28 (22.8)
61-70	37 (30.1)
71-80	3 (2.4)
Ethnicity	
Ewe	27 (22)
Ga-Adangme	20 (16.3)
Akan	59 (48)
Mole-Dagbani	13 (10.6)
Non-Ghanaian	4 (3.3)
Marital Status	
Single	20 (16.3)
Married	74 (60.2)
Separated	15 (12.2)
Widowed	14 (11.4)

Table 4. 1b. Sociodemographic characteristics of participants

Level of Education	
Primary	6 (4.9)
JHS	46 (37.4)
SHS	21(17.1)
Tertiary	36(29.3)
None	14(11.4)
Employment Status	
Employed	86 (69.9)
Unemployed	12 (9.8)
Retired	23 (18.7)
Student	2 (1.6)
Type of Job	
White collar	25 (20.3)
Blue collar	61 (49.6)
Retired	23 (18.7)
Unemployed	12 (9.8)
Student	2 (1.6)

4.2 CANCER DIAGNOSIS, STAGE AND TREATMENT AMONG THE PARTICIPANTS

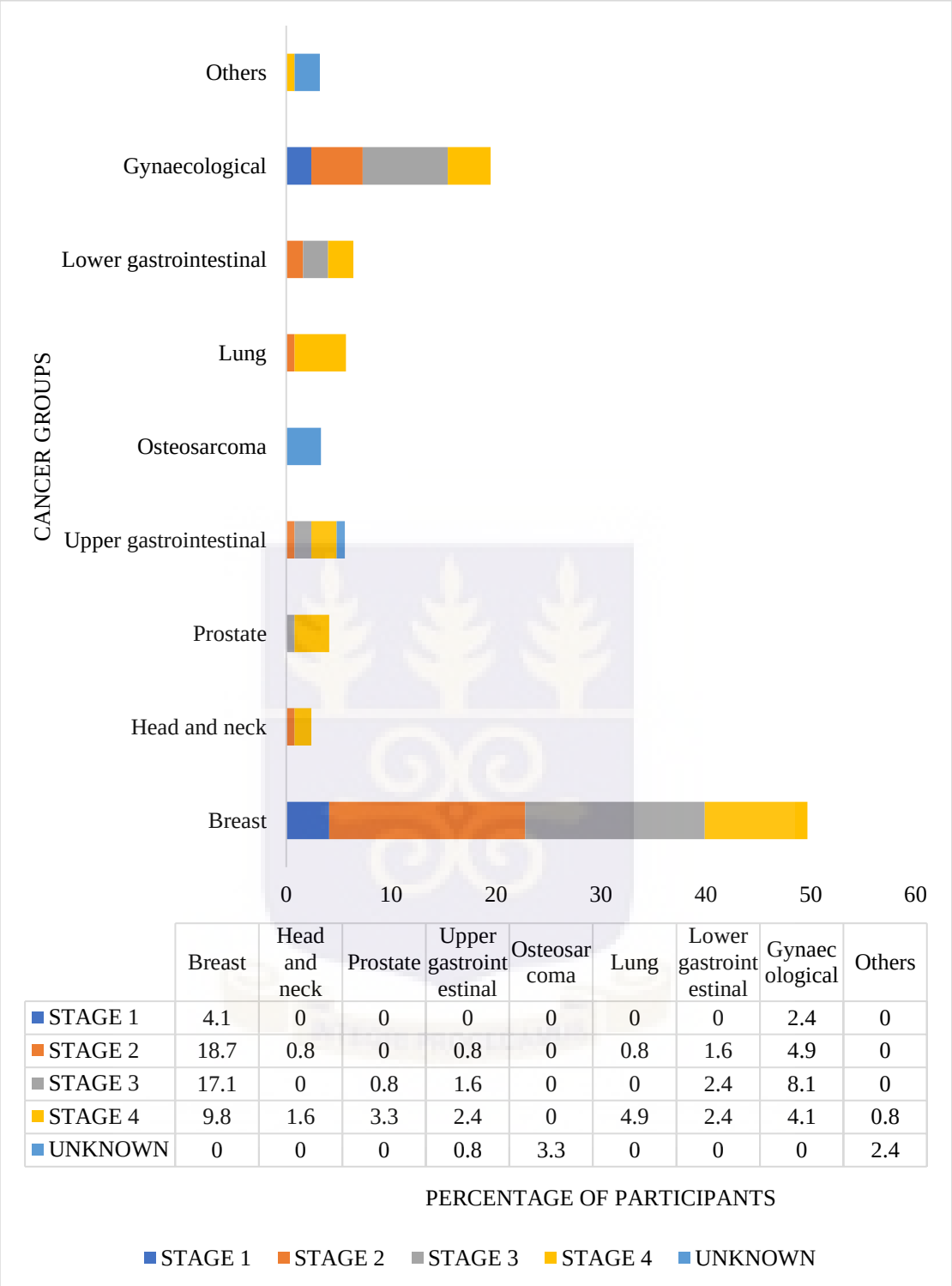
Approximately 61 participants (49.6%) were diagnosed with breast cancer followed by participants with gynaecological cancers, 24 (19.5%) and these were the commonest among the females. Participants with head and neck cancers were the least in number (n=3) making up 2.4% of the study population. Among the males, patients with prostate, lung and lower gastrointestinal cancers were the highest with 5 participants (4.1%) followed by upper gastrointestinal cancers with 4 participants (3.3%) and participants with head and neck cancers, osteosarcoma and the "other"cancers were the least in number (n=2) making up 1.6%. In this study, thirty seven participants had stage three cancer representing 30.1% of the population followed closely by thirty six participants with stage 4 cancers (Fig.4.1) making 29.0% with eight participants with stage 1 and the unknown stage representing 6.5% apiece. Majority of the participants (n=97, 78%) were undergoing chemotherapy and 26 (22%) were undergoing a combination of chemotherapy and radiotherapy (Table 4.2) (Fig.4.1).

Table 4.2: Cancer Diagnosis, Stage and Treatment type amongst participants

Medical Diagnosis	**n (%)**
Breast cancer	61 (49.6)
Gynaecological cancers	24 (19.5)
Head and neck cancer	3 (2.4)
Prostate cancer	5 (4.1)
Upper gastrointestinal cancers	7 (5.7)
Osteosarcoma	4 (3.3)
Lung cancer	7 (5.7)
Lower gastrointestinal cancers	8 (6.5)
Others	4 (3.3)
Stage of Cancer	
Stage 1	8 (6.5)
Stage 2	34 (27.6)
Stage 3	37 (30.1)
Stage 4	36 (29.3)
Unknown	8 (6.5)
Type of treatment	
Chemotherapy	97 (78)
Chemotherapy and radiotherapy	26(22)

**gynaecological cancers: cancer of vulva, uterus, choriocarcinoma, ovary and cervix*

**others: Kaposis sarcoma, leiomyosarcoma*



	Breast	Head and neck	Prostate	Upper gastrointestinal	Osteosarcoma	Lung	Lower gastrointestinal	Gynaecological	Others
STAGE 1	4.1	0	0	0	0	0	0	2.4	0
STAGE 2	18.7	0.8	0	0.8	0	0.8	1.6	4.9	0
STAGE 3	17.1	0	0.8	1.6	0	0	2.4	8.1	0
STAGE 4	9.8	1.6	3.3	2.4	0	4.9	2.4	4.1	0.8
UNKNOWN	0	0	0	0.8	3.3	0	0	0	2.4

Fig. 4.1: Cancer groups and their stages

4.3: WEIGHT CHANGE OF PARTICIPANTS WITHIN 1 MONTH

Forty five (45) making (46.40%) out of ninety seven (97) of the population had varying degrees of weight loss ranging from 1 to 20kg within a month whilst 14 participants making (14.40 %) had no change in weight with 38 participants making (39.20 %) with weight gain. Most of the participants, 37 making (38.20%) with weight loss from 1-5kg and participants with weight loss from 10.1-20.0kg were the least in number (n= 2) making 2% of the population (Fig. 4.2).

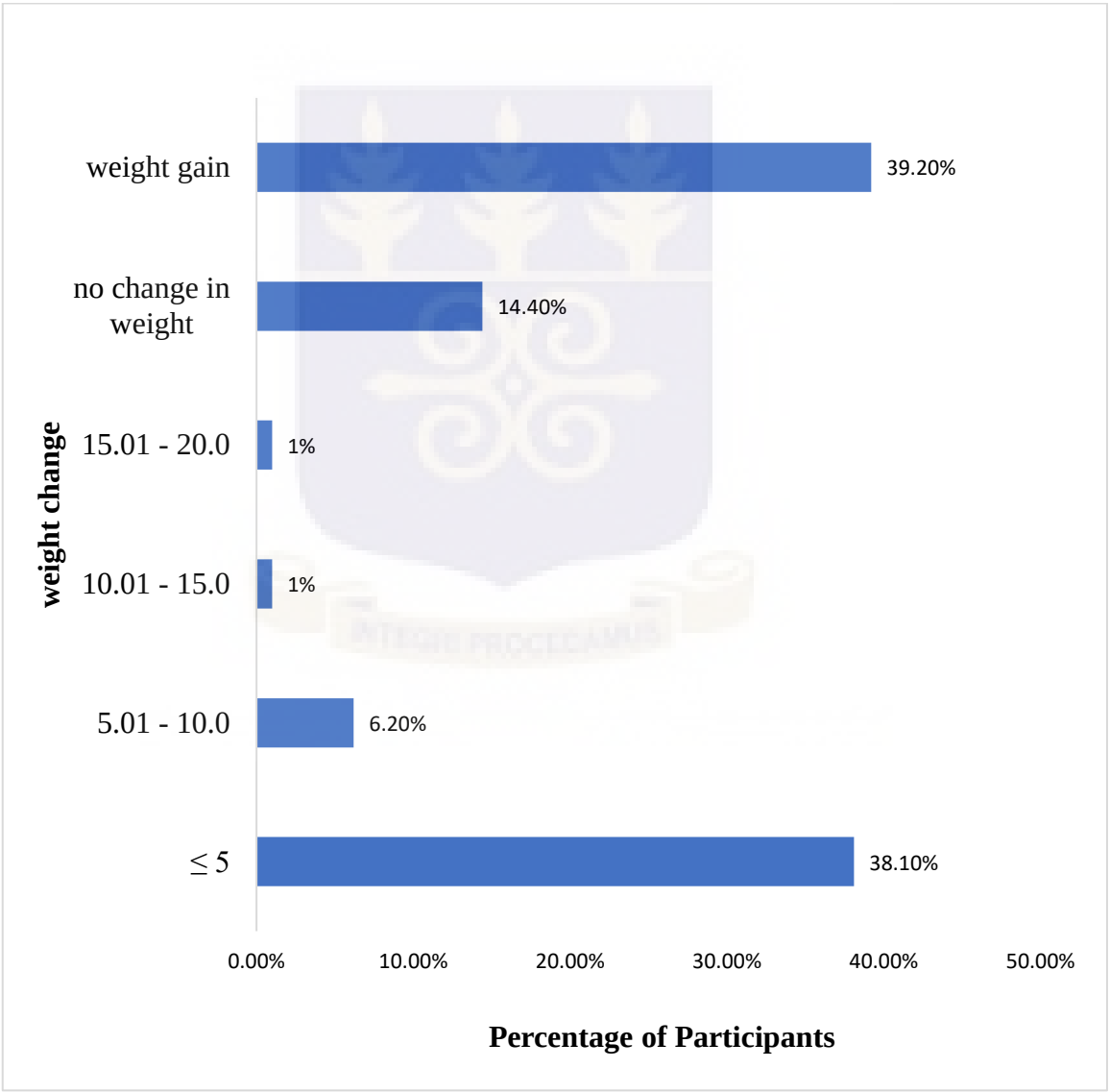


Fig. 4.2: Weight Change of Participants within 1 month

4.4 WEIGHT CHANGE OF PARTICIPANTS WITHIN SIX MONTHS

Within six months, fifteen (15) participants making 57.70% of the study population had weight loss ranging from 1kg to 15kg within the past six months. Participants with no change in weight were (2, 7.70%) whilst participants who gained weight were (9, 34.60%) (Fig. 4.3).

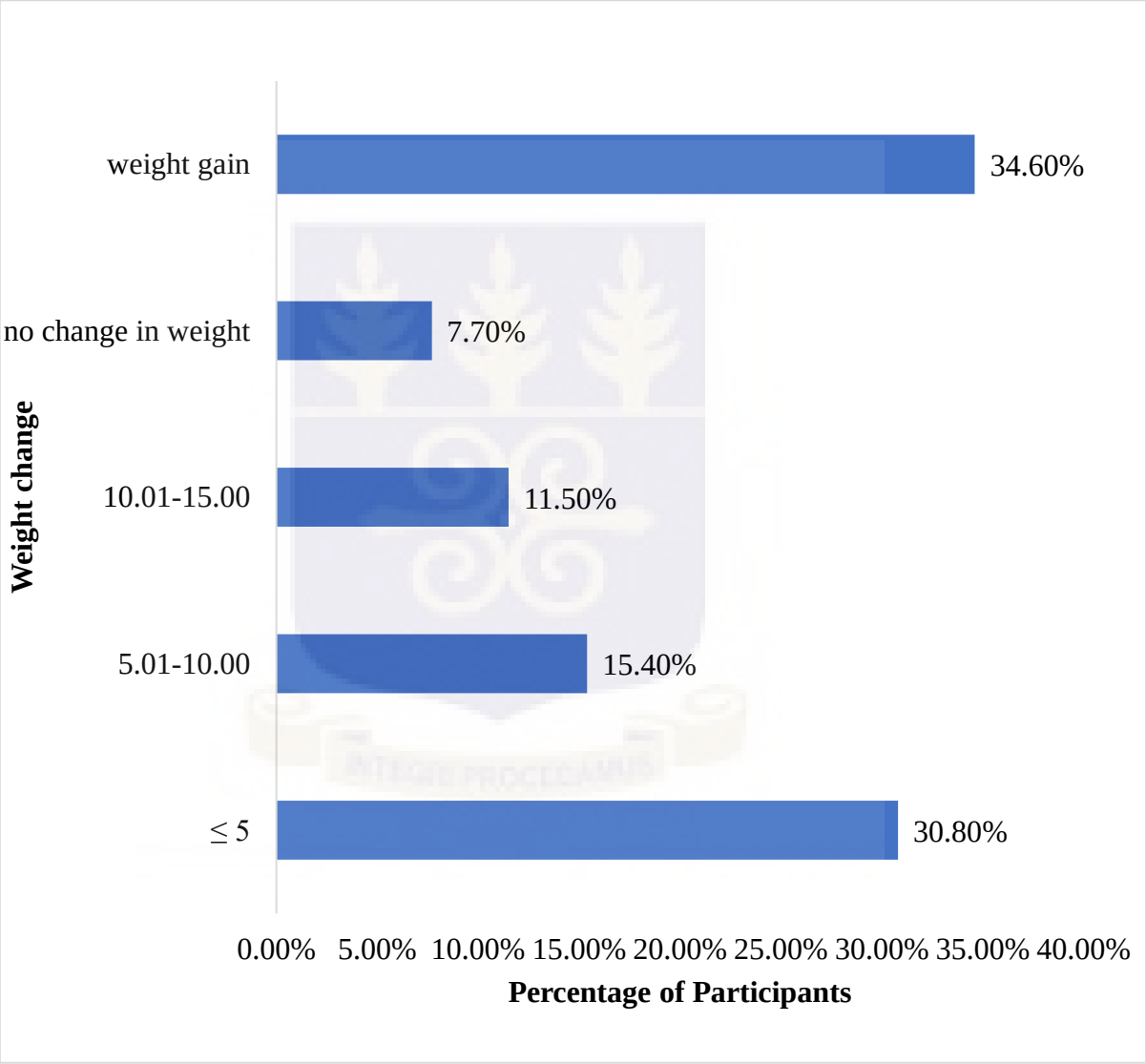


Fig. 4.3: Weight Change of Participants Within Six Months

4.5 PERCENTAGE WEIGHT CHANGE OF PARTICIPANTS WITHIN ONE MONTH

Forty five (45) making (46.40%) out of ninety seven (97) of the population had varying degrees of percentage weight loss within a month whilst 14 participants making (14.40 %) had no percentage weight loss with 38 participants making (39.20 %) with weight gain. (Fig. 4.4).

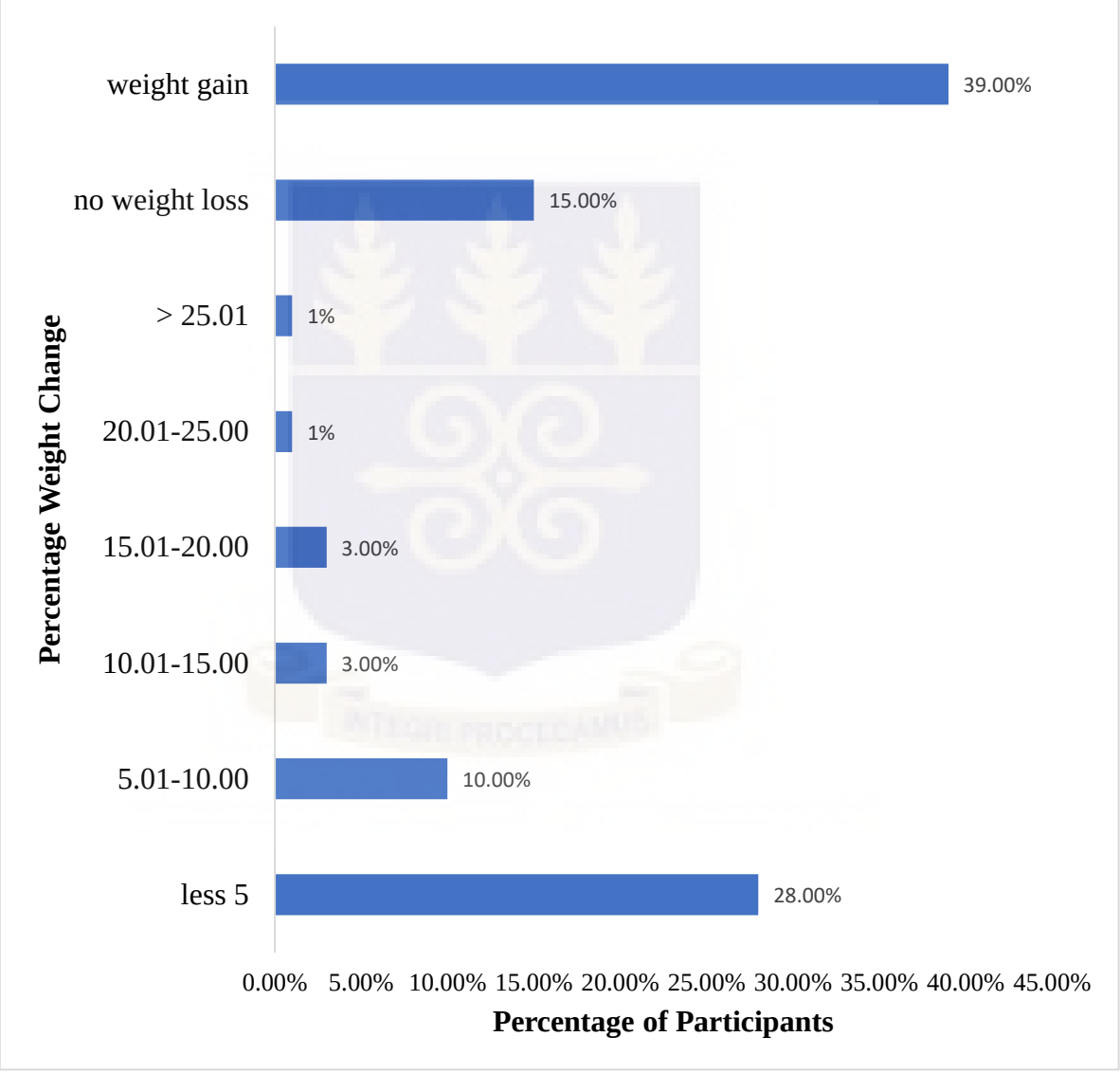


Fig. 4.4: Percent Weight Change of Participants Within One Month

4.6 PERCENTAGE WEIGHT CHANGE OF PARTICIPANTS WITHIN SIX MONTHS

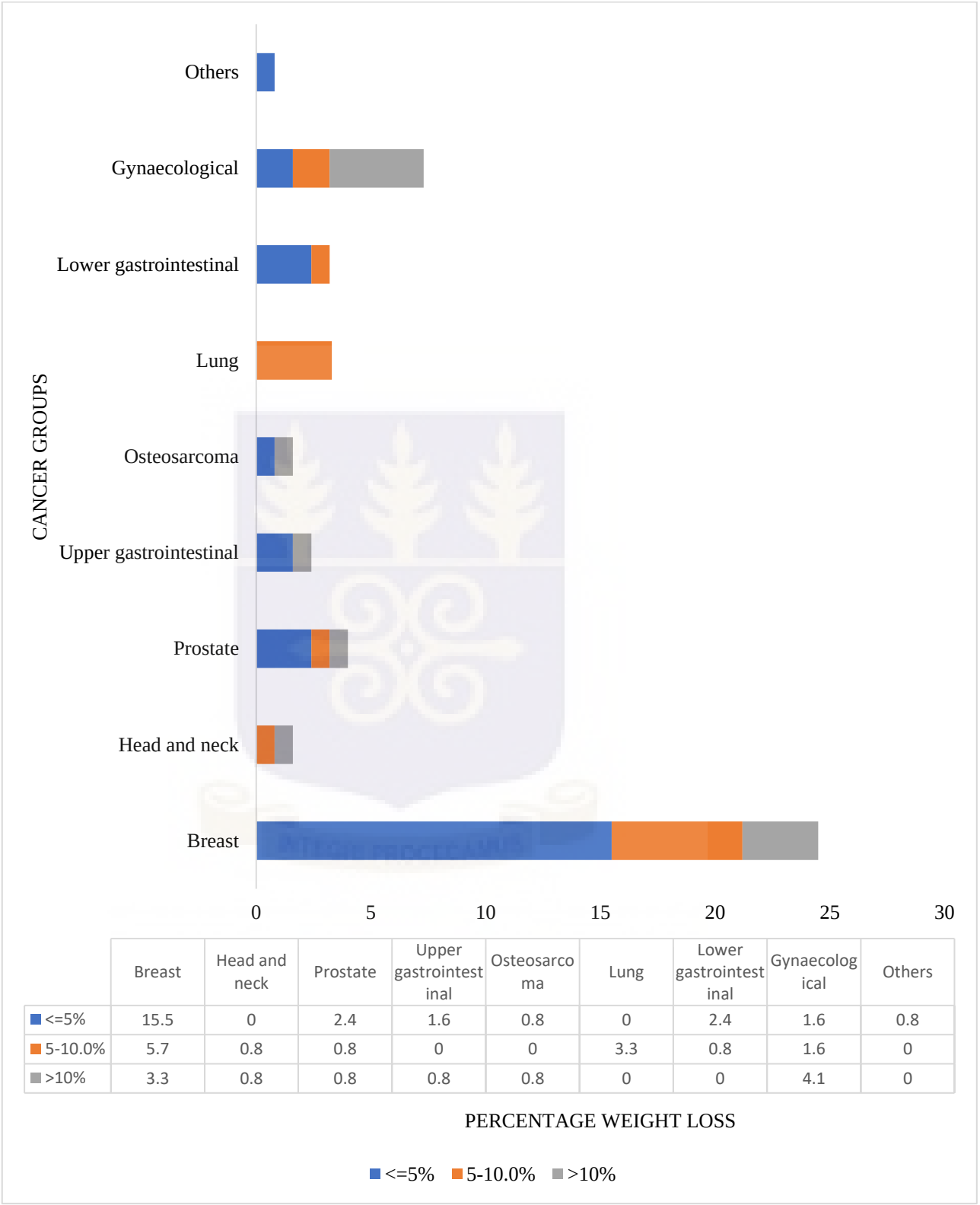
Within six months, fifteen (15) participants making 57.70% of the study population had varying degrees of percentage weight loss ranging within the past six months. Participants with zero percentage weight loss were (2, 7.70%) whilst participants who gained weight were (9, 34.60%).

4.7 PERCENTAGE WEIGHT CHANGE OF PARTICIPANTS WITHIN ONE AND SIX MONTHS

Sixty(60) of the study population making 48.78% had varying degrees of percentage weight loss within one and six months. Forty seven (47) (38.20%) of the study population presented with weight gain whilst 16 (13.0%) presented with no weight loss.

4.8 PERCENTAGE WEIGHT LOSS WITHIN DIFFERENT CANCER GROUPS

Nineteen participants with breast cancer had percentage weight loss from 1-5% making 15.4% of the study population. Seven participants with breast cancer had percentage weight loss from 5-10% making 5.7% of the study population whilst four participants with breast cancer had more than 10% weight loss making 3.3% of the population. Among the participants with gynaecological cancers, five had more than 10% weight loss making 4.1% of the study population whilst two participants had percentage weight loss of 1-5% and 5-10% apiece making 1.6% each of the study population. Pertaining to participants with prostate cancer, three had percentage weight loss of 1-5% making 2.4% of the study population whilst one participant had percentage weight loss of 1-5% and greater than 10% apiece making 0.8% each of the study population. Among the participants with upper gastrointestinal tract, two had percentage weight loss of 1-5% making 1.6% of the study population and one had percentage weight loss greater than 10% making 0.8% of the population. Within the participants with lower gastrointestinal cancers, three had percentage weight loss of 1-5% making 2.4% of the study population and one had percentage weight loss of 1-5% making 0.8% of the population. Among participants with lung cancer, four had percentage weight loss participants of 1-5% making 3.3% of the population (Fig. 4.5).



	Breast	Head and neck	Prostate	Upper gastrointestinal	Osteosarcoma	Lung	Lower gastrointestinal	Gynaecological	Others
<=5%	15.5	0	2.4	1.6	0.8	0	2.4	1.6	0.8
5-10.0%	5.7	0.8	0.8	0	0	3.3	0.8	1.6	0
>10%	3.3	0.8	0.8	0.8	0.8	0	0	4.1	0

Fig. 4.5 Percentage Weight Loss Within Different Cancer Groups

4.9 FOOD INTAKE AMONG STUDY POPULATION

When the participants were asked "as compared to their normal intake, how would you rate your food intake during the past month" 70 participants (56.90%) stated that their food intake was less than the normal. Twenty two (22) of the participants (17.90%) of the study population stated that they consumed more than usual whilst 31 participants (25.20%) stated that their food intake did not change (Fig. 4.6).

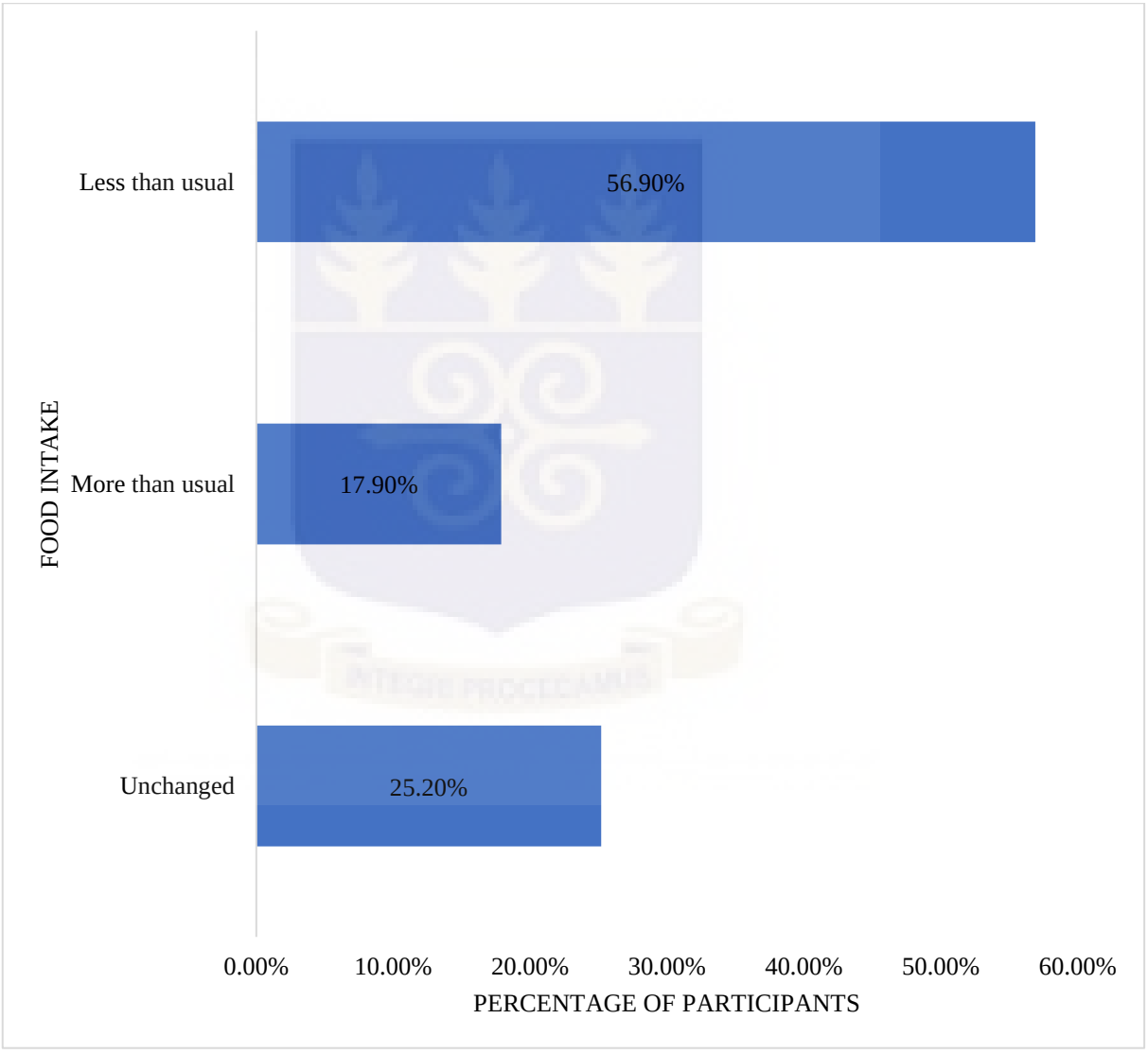
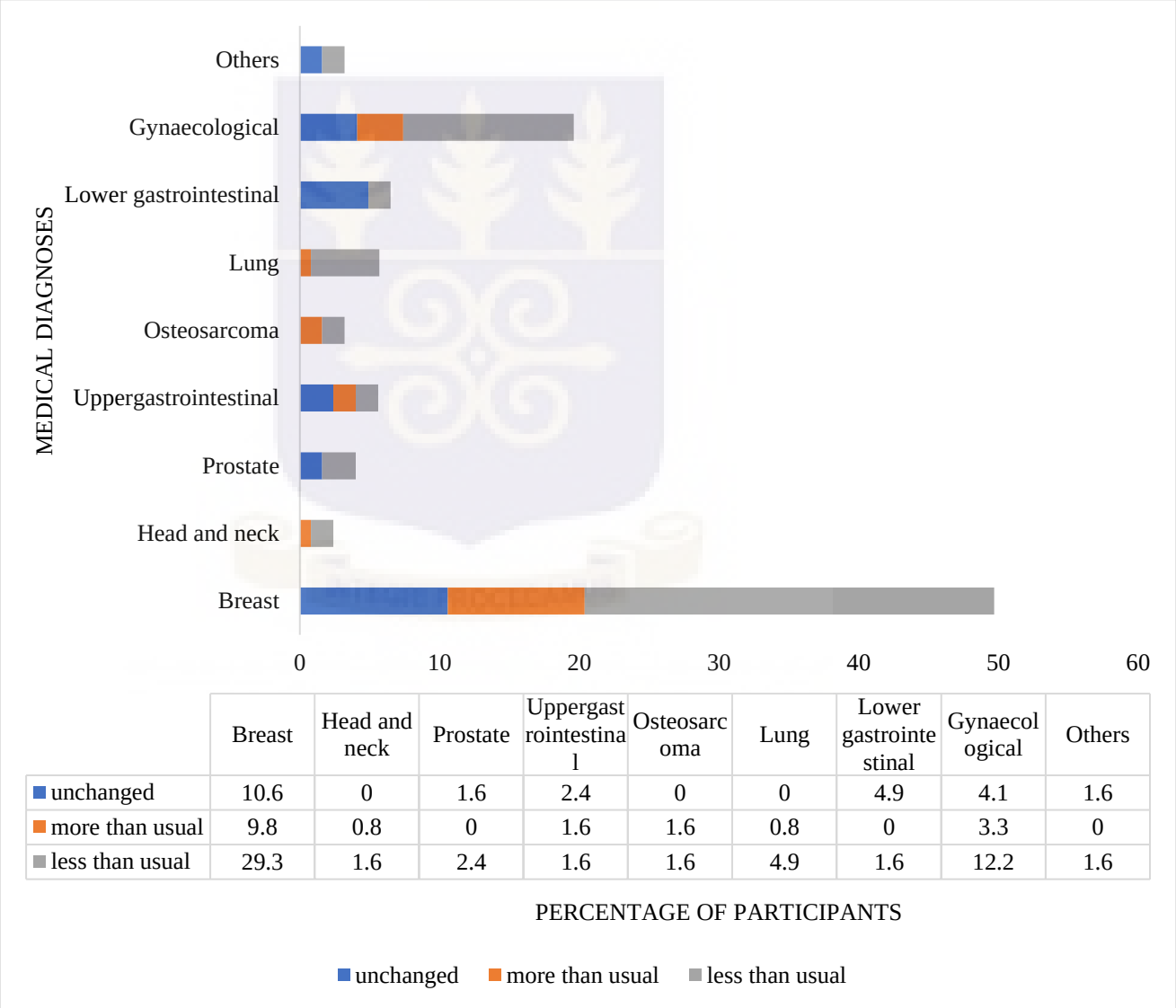


Fig. 4.6 Food Intake Among Study Population

4.10 FOOD INTAKE WITHIN CANCER GROUPS

A lot of the participants with breast cancer 36 making up (29.3%)of the study population stated that their intake was less as compared to their normal intake. Participants with gynaecological cancers making (15,12.2%) also stated that their intake were less than their normal intake. Six participants with lung cancer stated less intake of food making 4.9% of the study population whilst three participants with prostate cancer stated less intake making 2.4% of the population (Fig. 4.7).



	Breast	Head and neck	Prostate	Uppergastrointestinal	Osteosarcoma	Lung	Lower gastrointestinal	Gynaecological	Others
unchanged	10.6	0	1.6	2.4	0	0	4.9	4.1	1.6
more than usual	9.8	0.8	0	1.6	1.6	0.8	0	3.3	0
less than usual	29.3	1.6	2.4	1.6	1.6	4.9	1.6	12.2	1.6

Fig. 4.7: Food Intake Within Cancer Groups

4.11 NUTRITIONAL SYMPTOMS INDICATED BY PARTICIPANTS

Most of the participants (100) making 81.3% of the study population stated fatigue, 83 participants making 67.5% stated "others" referring to depression and financial issues. Seventy seven(77) (62.6%) stated pain as the most symptoms experienced. Twenty five (25) participants making 20.3% stated "smells bother me" accounting for the least nutritional symptoms stated (Fig. 4.8).

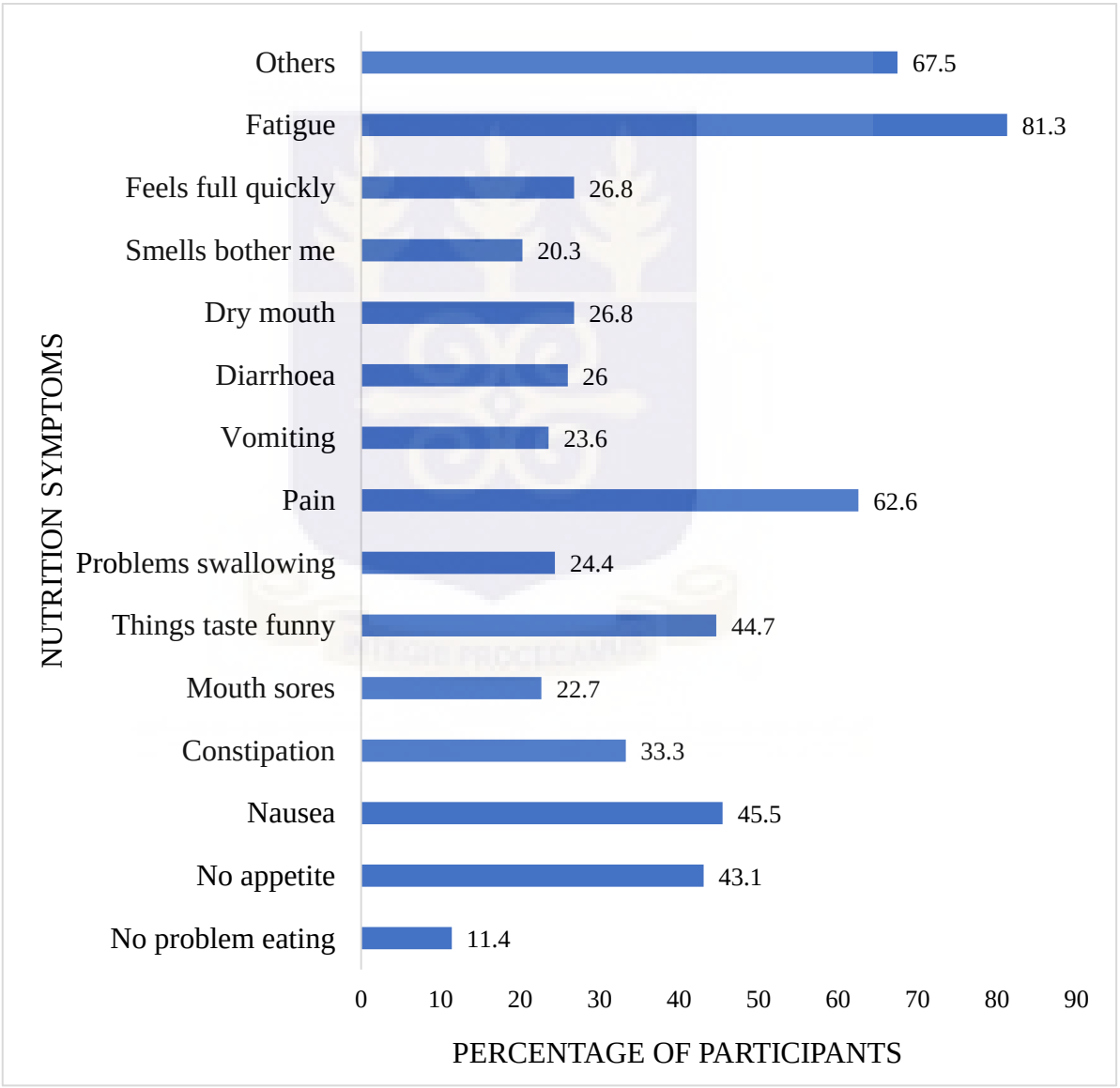


Fig. 4.8: Nutritional Symptoms Indicated by Participants

4.12 NUMBER OF NUTRITIONAL SYMPTOMS OF PARTICIPANTS

Number of nutritional symptoms stated by patients ranged from 1 to 12 with the highest number of nutritional symptoms stated by patients ranging from 7 to 9. Approximately two-fifths of the participants 48 making (39%) of the study population reported 4 to 6 nutritional symptoms which was followed closely by 40 participants making 32.60% of the study population who indicate nutrititional symptoms ranging from 7 to 9. Seven participants making 5.7% of the population stated number of nutritional symptoms from 10-12 making the least (Fig 4.9).

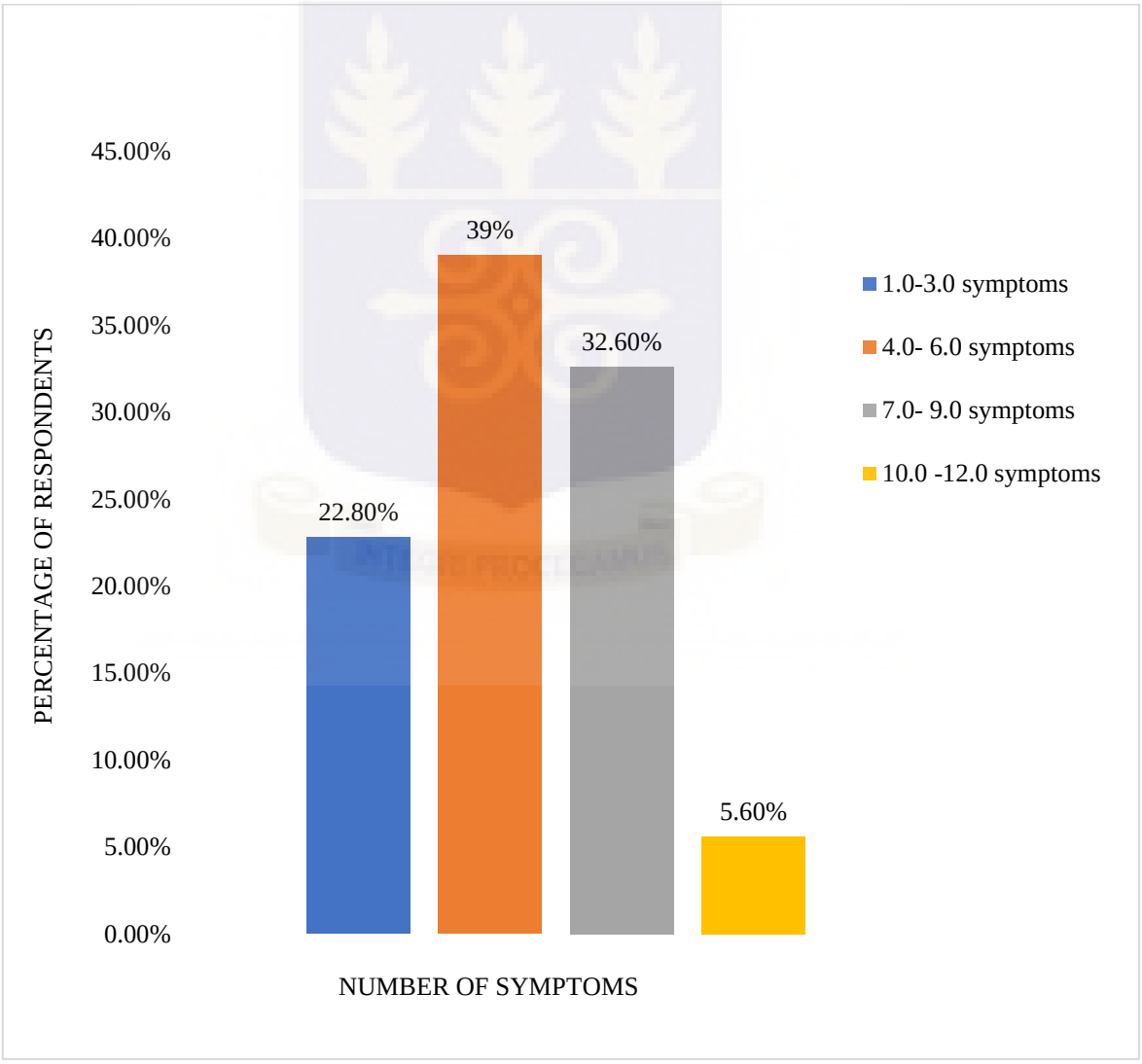


Fig 4.9: Number of Nutritional Symptoms Stated By Participants

4.13: NUTRITION SYMPTOM SCORE BY PARTICIPANTS

Nutrition symptoms stated have a corresponding score which are summed up. Score of 0-5 indicate less nutrition symptoms, score 6-10 indicate mild nutrition symptoms, score 11-15 indicate moderate symptoms whilst 15-20 indicate severe nutrition symptoms that will have a negative impact on food intake. Two-fifth of the participants 48 (39.10%) of the study population had nutrition symptom score 6-10 followed by 41 participants making (33.3%) of the study population with 11-15 scores. Participants with nutrition symptom score 16-20 were the least in number (n=8) making up 6.5% of the study population (Fig. 4.10). The mean of the nutrition symptom score for the various cancer groups were analysed using ANOVA and showed no statistical significance between the groups (Table 4.3).

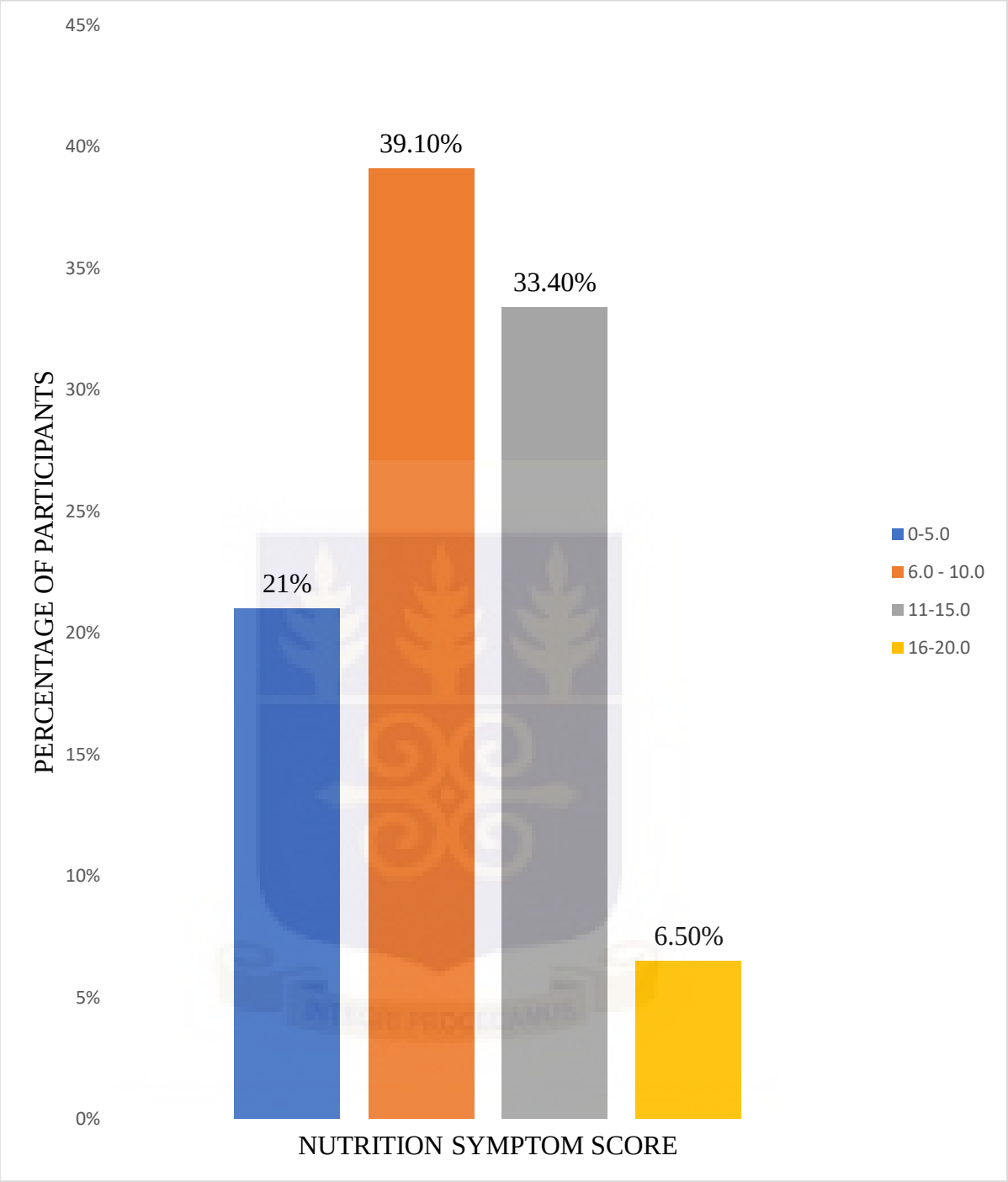


Fig 4.10: Frequency of Nutrition Symptom Score of Participants

Table 4.3: Analysis of Variance of Nutrition Symptom Score of the Various Cancer Groups

Medical Diagnoses	N	Mean	Standard Deviation	f-value	p-value
Breast cancer	61	9.15	3.65	0.701	0.69
Head & neck cancer	3	10.33	2.89		
Prostate cancer	5	7.60	3.29		
Lower gastrointestinal cancer	8	8.25	5.15		
Upper gastrointestinal cancer	7	11.29	4.89		
Osteosarcoma	4	8.50	5.92		
Lung cancer	7	8.14	2.67		
Gynaecological cancer	24	8.79	4.59		
Other	4	6.25	5.74		
Total	123	8.93	4.06		

4.14 GENERAL ACTIVITY LEVEL OF THE PARTICIPANTS

When participants were asked to rate their general activity level over the past month, only 41(33.3%) of the study population stated that their activity was normal and with no limitation. Eighteen participants (14.6%) stated that they were not feeling up to most things but in bed or chair less than half the day. More than half of the participants (n=63, 51.2%) indicated that they are not their normal selves but able and about with fairly normal activities. Only 1(0.8%) participant stated being pretty much bedridden and rarely out of bed.

4.15 PG-SGA GLOBAL ASSESSMENT CATEGORIES

When the patient generated subjective global assessment was calculated, (n=7,5.7%) of the participants were nourished whilst (n=39,31.7%) were suspected of being malnourished and the rest which makes about (n=77, 62.6%) were malnourished (Fig. 4.11).

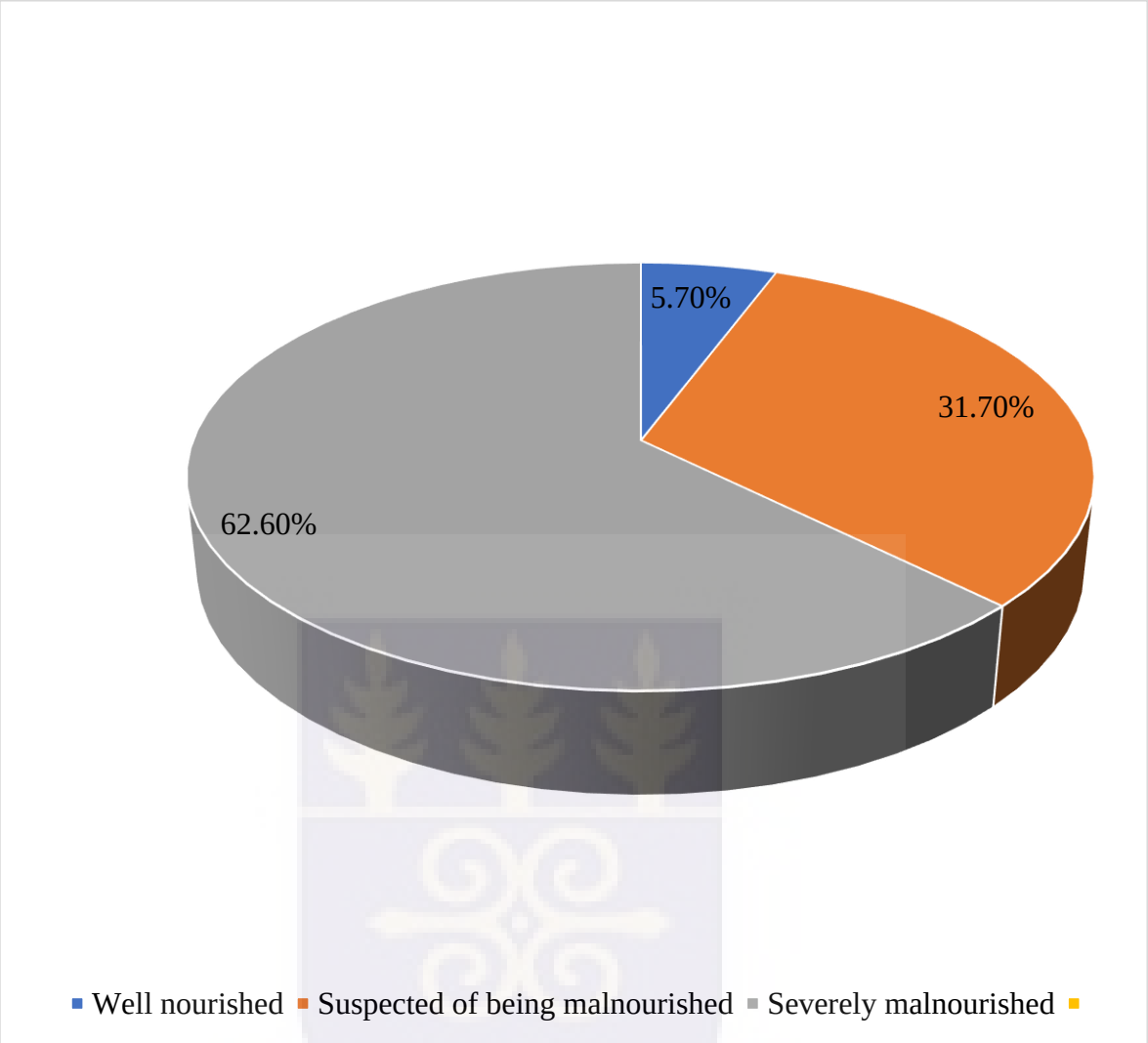


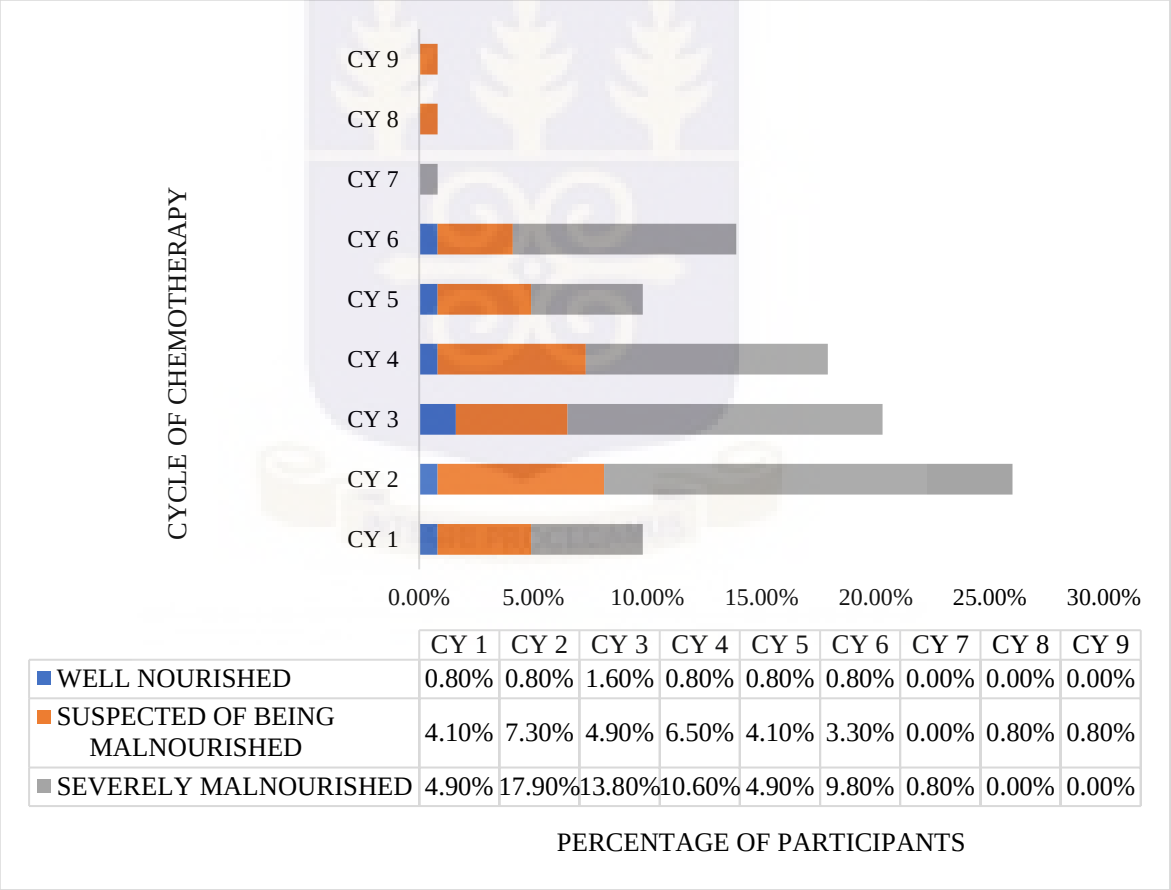
Fig. 4.11: PG-SGA Global Assessment Categories

4.16 PG-SGA SCORE OF THE PARTICIPANTS WITHIN THE DIFFERENT CANCER GROUPS

Participants with head and neck cancers were all malnourished (n=3, 100%) followed by lung cancers with (n=6, 85.7%) and then breast cancers with (n=40, 65.7%).Participant with “other” cancers was the least with (n=1, 25%).

4.17 PG-SGA SCORE OF THE PARTICIPANTS ACCORDING THE CHEMOTHERAPY CYCLE COMPLETED

Twenty two(22) of the participants who had completed cycle 2 were severely malnutrition making 17.9% of the study population. Seventeen (17) participants who had completed cycle 3 were severely malnourished making 13.8% of the study population whilst thirteen (13) who had completed cycle 4 were severly malnourished making 10.60%. Two of the participants who had completed cycle 2 were well nourished making 1.6% of the population Fig. 4.12. Pearson chi square analysis showed no statistical significance between the chemotherapy cycles and nutritional status Table 4.4.



	CY 1	CY 2	CY 3	CY 4	CY 5	CY 6	CY 7	CY 8	CY 9
WELL NOURISHED	0.80%	0.80%	1.60%	0.80%	0.80%	0.80%	0.00%	0.00%	0.00%
SUSPECTED OF BEING MALNOURISHED	4.10%	7.30%	4.90%	6.50%	4.10%	3.30%	0.00%	0.80%	0.80%
SEVERELY MALNOURISHED	4.90%	17.90%	13.80%	10.60%	4.90%	9.80%	0.80%	0.00%	0.00%

Fig. 4.12: PG-SGA Global Assessment Categories Of The Participants According To Chemotherapy Cycle Completed

Table 4.4 Pearson Chi Square Analysis of Chemotherapy Cycles and Nutritional Status

	WELL NOURISHED	SUSPECTED OF BEING MALNOURISHED	SEVERELY MALNOURISHED	X^2	p-value
Cycle 1	1(0.8)	5(4.1)	6(4.9)	8.848	0.920
Cycle 2	1(0.8)	9(7.3)	22(17.9)		
Cycle 3	2(1.6)	6(4.9)	17(13.8)		
Cycle 4	1(0.8)	8(6.5)	13(10.6)		
Cycle 5	1(0.8)	5(4.1)	6(4.9)		
Cycle 6	1(0.8)	4(3.3)	12(9.8)		
Cycle 7	0(0.0)	0(0.0)	1(0.8)		
Cycle 8	0(0.0)	1(0.8)	0(0.0)		
Cycle 9	0(0.0)	1(0.8)	0(0.0)		
Total	7(5.6)	39(31.8)	77(62.7)		

4.18: CORRELATION BETWEEN NUMBER OF NUTRITIONAL SYMPTOMS AND PG-SGA SCORE

There was a positive significant correlation between nutrition symptoms and the PG-SGA score (r= 0.747, p<0.001).

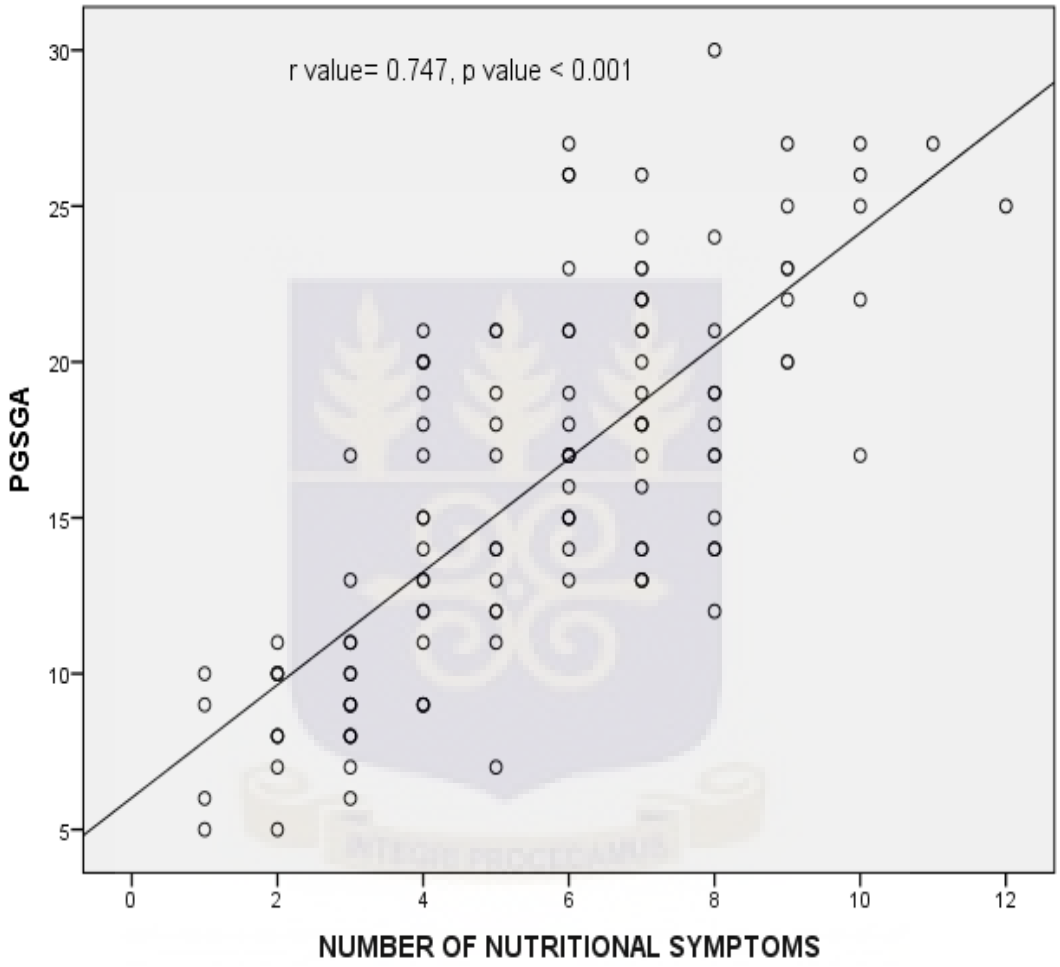


Fig. 4.13: Correlation Between Nutritional Symptoms And PG-SGA Score

4.19 TRIAGE RECOMMENDATIONS OF PG-SGA TOOL

Nutritional triaging is the prioritisation of nutritional intervention based on the total PG-SGA score or nutritional status. Majority of the participants, 111(90.2%) required the highest level of intervention which indicates a critical need for improved nutritional symptom management and/or nutrient intervention options Fig. 4.14.

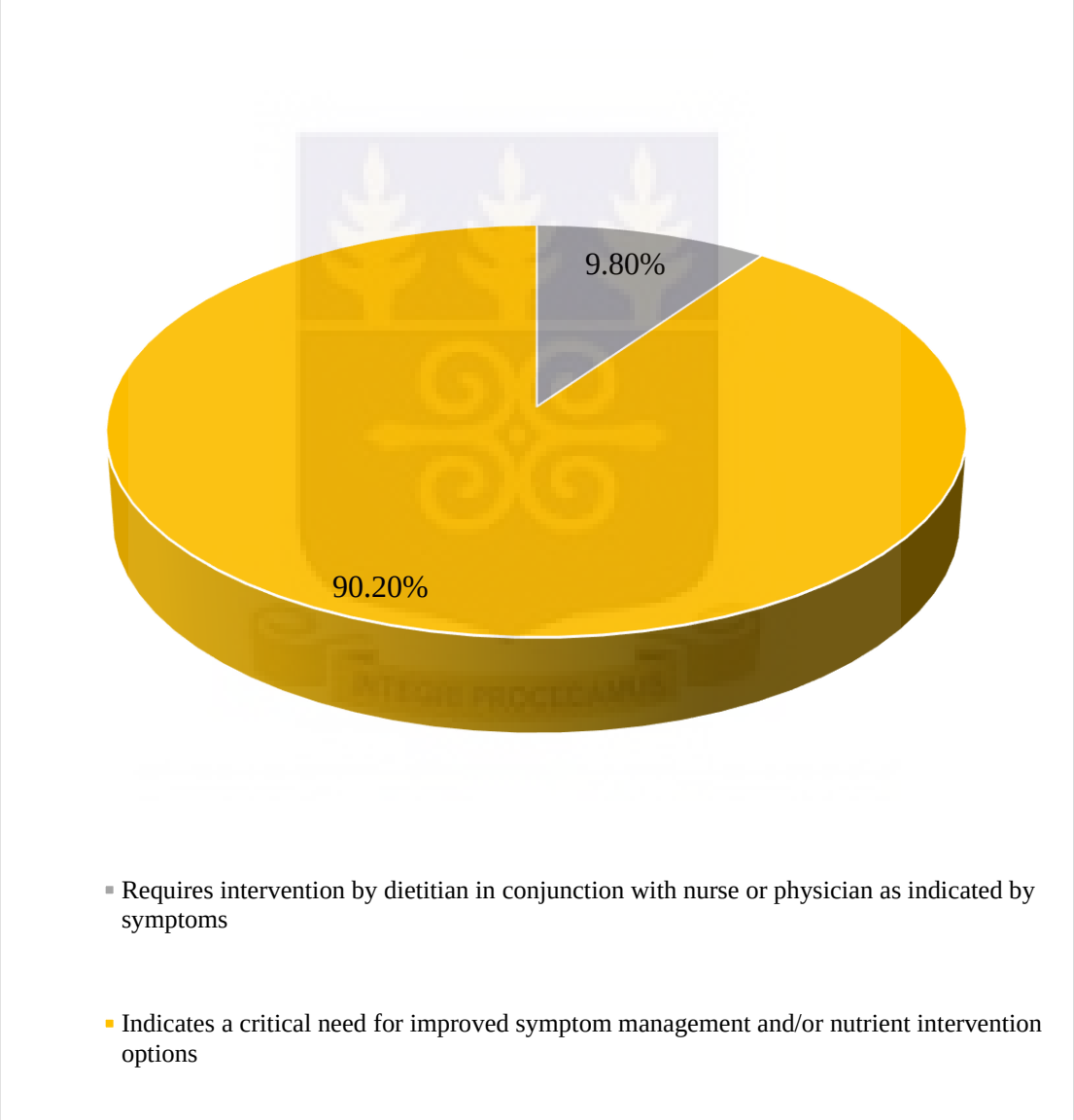


Fig. 4.14: Triage Recommendation of PG-SGA Tool

CHAPTER FIVE

5.0 DISCUSSION

5.1 SOCIODEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION

The study involved 123 cancer patients undergoing chemotherapy treatment at the National Radiotherapy Oncology and Nuclear Medicine Centre, Korle Bu. Majority of the participants 98 constituting 79.7% of the study were females. This is comparable to the findings of previous studies in Ghana and Kenya which stated 70.2%, 71.8% and 71.7% of the participants being females (Calys-Tagoe et al., 2014; Kaduka et al., 2017; Opanga et al., 2017). This could be due to the fact that two of the three most common cancers in the country are seen among women: cervical and breast cancers. The mean age of the participants obtained from the study was 50.90 ± 13.80 years. This is lower in comparison to a study carried out in Spain where the mean age of the cancer patients was 61.55.60 ± 12.70 years (Opanga et al., 2017) but slightly lower in those observed in a Brazilian study which stated the mean age as 54.70 ± 14.90 years (Silva et al., 2015). Level of education plays a crucial role in influencing health seeking behaviour because individuals with higher level of education educated are more likely to seek medical and health advice than those who are not. In this study, 103(83.7%) of the population had junior high school education and above which is consistent with a study conducted at the same facility(NRONMC) in the year 2012 (Calys-Tagoe et al., 2014). The study indicated that 78% had attained secondary education or higher (Calys-Tagoe et al., 2014). It also confirms the study carried out in Ibadan (Nigeria) and Mizoran (India) which stated that health seeking behaviours is very high among higher level of educated people as compared to the lower level of education (Lalmalsawmzauva & Lalwhlala, 2018; Latunji & Akinyemi, 2018).

Breast and gynaecological cancers were most common cancer in this study accounting for more than half 95(69.1%) of all the cancers cases making 61(49.6%) and 24(19.5%) respectively. This was seen in studies conducted in 2009 and 2012 at the Korle Bu Teaching Hospital. In 2009, the cases of cancer seen at the Oncology department were Breast cancer (26%), followed by Cervical (18%) whilst in 2012 those seen in the hospital were cancers of the breast (40.8%), cervix (24.3%) and uterus (4.5%) (Calys-Tagoe et al., 2014; Ministry of Health, 2011). This finding also goes in line with a study carried out in Kenya where 29.7% and 22.9% of the population had breast and female genital cancers respectively (Opanga et al., 2017). Prostate cancer, lower gastrointestinal cancer and lung cancer were the most common among men in the study. This is similar to the result obtained in a cancer registry study carried out in 2012 in which it was noted that the commonest cancers among men in Ghana were liver (21.1%), prostate (13.2%), lung (5.3%) and stomach (5.3%) (Laryea et al., 2014). The stages of cancer observed in the study were mostly stage three and stage four indicating metastasis. This could be partly attributed to late presentation due to fear, financial incapability, widespread use of herbal treatment and ignorance (Clegg- Lamptey, Dakubo, & Attobra, 2009; Martei, 2011).

5.2 WEIGHT LOSS AND PERCENTAGE WEIGHT LOSS IN THE STUDY

In this study 60 (48.7%) of the participants experienced varying degrees of weight loss. This finding confirms a systematic review study in France which revealed that the prevalence of weight loss among cancer patients undergoing chemotherapy ranged from 40% to 91.6% depending on the location of the cancer (Caillet et al., 2017). A retrospective study conducted in Mexico revealed that over 50% of the patients experienced weight loss during treatment (Sanchez-lara et al., 2013) whilst a study conducted in Tehran among cancer patients undergoing treatment revealed that 44.4% of

the patients had weight loss (Khoshnevis et al., 2012) which is quite similar to this study. Another study carried out in Nottingham, revealed that 55% of participants lost some weight during the study period (Halliday, 2010). The decrease in weight loss in this study could be partly attributed to the poor intake of food 70(56.9%) among the respondents. In this study about 23.3% of the patients with weight loss had weight loss greater than 5% and this is similar to a study among cancer patients where almost half (23%) of the group also had weight loss greater than 5% (Halliday, 2010).

In this study, the highest incidence of weight loss of the total population was in breast cancer patients (20, 24.30%). The study population was predominantly breast cancer which could have accounted for the high incidence. In a study conducted in Tehran, weight loss was more prevalent in cases of gastrointestinal cancers with the least being cancers of the breast (Khoshnevis et al., 2012). Another study carried out in Brazil revealed that upper and lower gastrointestinal cancers had the highest number of weight loss (Silva et al., 2015). The incidence of gastrointestinal cancers in Ghana and within the sub Saharan Region as compared to the other countries is very low leading to this observation (Calys-Tagoe et al., 2014; Daouda, Mouhamadou, Louise, & Lamine, 2013; Zarea, Beiranvand, Ghanbari, & Tuvesson, 2017). Another factor that may explain the higher than expected levels of weight loss in breast cancer patients in this study is the high numbers (73, 60%) of patients with metastatic and advanced disease. Patients with gynaecological cancers had the second highest population of incidence of weight loss accounting for 7.30 % (n=9) of the total study population. In another cross sectional study carried out on hospitalized cancer patients, 14.9% (n=15) of the population with gynaecological cancers experienced percentage weight loss greater than 5% (Silva et al., 2015). In this study, gynaecological cancer patients receiving chemotherapy recorded the highest frequency of percentage weight loss greater than 10% 5(4.1%). This result is

similar to a study involving patients undergoing chemotherapy which revealed that that weight loss was more commonly found with gynaecological tumours 11(91·6 %) (Sanchez-lara et al., 2013). Possible explanation could be that the gynaecological cancer group were the second largest group and had a lot of stage 3 and stage 4 cancers indicating metastasis. In this study, 1 out of 7 patients with upper gastrointestinal cancer patients undergoing chemotherapy had percentage weight loss greater than 10% . This is in line various studies carried out among cancer patients undergoing chemotherapy which have indicated that weight loss greater than 10% is very common among gastrointestinal cancers (Khoshnevis et al., 2012; Sanchez-lara et al., 2013). The result obtained from this study could be attributed to the less numbers of the gastrointestinal tract cancers in the study. In this study it was also realised that participants with lung cancer (4, 3.3%) had percentage weight loss of 5-10% which is confirmed by another study among cancer patients undergoing chemotherapy stating that 15 participants making 14.9% had percentage weight loss greater than 5% (Silva et al., 2015).

Weight loss has often been reported and recognized to occur frequently in cancer patients and regarded as a stronger and powerful parameter for malnutrition detection in cancer patients (Geirsdottir & Thorsdottir, 2008). There was a positive significant correlation between weight loss and the PG-SGA score ($r= 0.469$, $p<0.001$) in this study. This result corresponds to other studies carried out among cancer patients undergoing chemotherapy which have indicated a positive significant correlation between weight loss and PG-SGA score (Khoshnevis et al., 2012; Sanchez-lara et al., 2013). Weight loss therefore is an important marker of malnutrition which needs to be consciously monitored in patients with cancer undergoing chemotherapy.

5.3 FOOD INTAKE OF PARTICIPANTS

When the patients were asked "as compared to your normal intake, how would you rate your food intake during the past month" 70 (56.9%) indicated that their food intake was less than normal. This concurs with a hospital based cross sectional study among 70 cancer patients receiving chemotherapy which revealed that 38(57%) of the patients indicated that they consume less than what they normally consume (Parasa & Avvaru, 2016). Another cross sectional study among 416 patients receiving chemotherapy also revealed that 50.4% of the patients indicated that they had less food relative to their previous or normal intake (Khoshnevis et al., 2012). This informs us that more than 50% of patients undergoing chemotherapy typically experience less food intake which can compromise their nutritional status. The high rates could be explained by the high proportion of advanced stage 3 and stage 4 cancers in the study population. This is in line with a study which carried out to determine the malnutrition risk among cancer patients in Korea indicated that the patients with more advanced cancers tend to have lower intake making them at risk of malnutrition due to increased catabolism (Wie et al., 2010).

Chemotherapy and its side effects may also be playing a significant role in reduction of food intake in this study. A study between breast cancer patients undergoing chemotherapy and women without breast cancer (De Vries et al., 2017). indicated that the dietary intake of those undergoing chemotherapy reduced as compared to the other group (De Vries et al., 2017). In this study, participants who had completed the second and third cycles of chemotherapy indicated they were taking less than their normal intake. This could be explained that there is a cumulative effect of chemotherapy: as the chemotherapy increases there is accumulation of cytotoxic effects of the drugs which will indirectly affect their food intake (Lawrence, 2012). The more nutritional symptoms there are the

less intake of food occurs. Participants who had completed 4 and 5 chemotherapy cycles were seen to have far less symptoms that impact on food intake. This could be explained on the basis that at this point most patients would be stabilized on chemotherapy regimen and tolerating treatment well. Secondly, patients at this stage would be experiencing the therapeutic effect of chemotherapy on the cancer cells.

5.4 NUTRITION RELATED SYMPTOMS

Chemotherapy related nutritional symptoms directly or indirectly affect the nutritional status of the cancer patients undergoing chemotherapy. These symptoms give a clear direction to both the health worker and the patient as to whether they are both getting better or worse. The number of nutrition related symptoms exhibited by the patients ranged from 1 to 12. In this study, almost four fifths of the patients 98(77.3%) stated more than three nutrition related symptoms. In a previous study conducted, the presence of more than three nutrition related symptoms were independent factors associated with malnutrition and almost half of the patients (45.8%) required critical symptom management or nutritional intervention (De Pinho, Martucci, Rodrigues, Almeida, & Thuler, 2018). In another study carried out to determine the nutritional impact symptoms among cancer patients undergoing treatment, it was elucidated that 79% of patients experienced at least one symptom affecting nutrition at one month, 72% at six months and 46% at 12 months after starting chemotherapy (Tong et al., 2009). In this study, almost all the patients experienced at least one of the nutritional impact symptoms. The high number of nutritional symptoms stated by participants could be partly attributed to the possible low levels of compliance with prophylactic symptom control drugs. Chemotherapy in Ghana is funded privately by patients and the cost is high. The cost of chemotherapy drugs, repeated laboratory investigations, other investigations and travel

can be burdensome to the patient. Limited access to the management of nutritional symptoms could also be a contributing factor. A similar study indicated that up to 81% of cancer out patients did not receive nutrition counselling possibly due to issues with referral system (Opanga et al., 2018). In this study, participants with upper gastrointestinal cancers exhibited the greatest number of nutritional symptoms. This buttresses studies conducted in Brazil and Mexico among cancer patients undergoing chemotherapy which found that upper gastrointestinal cancers had the highest cases of malnutrition (De Pinho et al., 2018; Sanchez-lara et al., 2013).

In this study the most frequent nutritional related symptoms indicated by patients were fatigue 99(81.3%), pain 77(62.6%), others 83(67.5%) (financial constraints and depression), nausea 56(45.5%) and no appetite for food 53(43.1%). These results agree with other studies carried out in Kenya and Brazil which place pain, fatigue and poor appetite as the most common symptoms experienced by patients (Silva et al., 2015; Kaduka et al., 2017). A cross sectional study on 300 cancer patients receiving chemotherapy indicated that the most common complaint were fatigue (51.3%) (Shahvazi et al., 2017). Fatigue, pain and financial constraints put an immerse issue which indirectly affects the nutritional status of the patient. A study carried out to determine the gastrointestinal symptoms that occur in patients undergoing chemotherapy revealed that the most frequent symptoms were nausea 318(59·6 %), anorexia 245 (46 %) and constipation 170(31·9 %) (Sanchez-lara et al., 2013). A similar study also stated that the most frequent symptoms were dry mouth, nausea, stomach pain, diarrhoea and constipation (Caillet et al., 2017).

To confirm the existence of a relationship between the number of nutritional symptoms and nutritional status (PG-SGA score), a correlation analysis was done. There was a positive significant correlation between the number of nutritional symptoms and the PG-

SGA score (r= 0.747, p<0.001). The mean of the nutritional scores were calculated for the various cancer group and analysis of variance was done which showed that there was no statistical significance within the various groups (f value =0.701, p value= 0.690). The greater the number of nutritional impact symptoms presented the greater the risk of malnutrition. It is therefore imperative to take into account of all the nutritional symptoms presented by cancer patients in order to prevent or lower the occurrence of malnutrition.

5.5 FUNCTIONAL CAPACITY OF CANCER PATIENTS UNDERGOING CHEMOTHERAPY

In this study, 101(84.5%) of the participants stated that they could perform fairly normal to normal activities without any limitation. 18(14.6%) stated that they were not feeling up to most things but in bed or chair less than half the day with 1(0.8%) stating mostly bedridden. In a study on performance status of patients undergoing chemotherapy, 116(37.2%) stated that they were not feeling up to most things but in bed or chair less than half the day with 7(2.2%) stating mostly bedridden (Prigerson et al., 2015). Another study also indicated that among gastrointestinal cancer patients undergoing chemotherapy , 74 (24%) stated that they were not feeling up to most things but in bed or chair less than half the day with 17 (6) stating mostly bedridden (Attar et al., 2012). The result in this study could be possibly traced to number of participants who had weight loss (n=60, 48.7%), the number of nutritional symptoms which led to poor intake (n=70, 56.9%). All these probably had an impact in the ability of some of the participants to perform various activities.

5.6 NUTRITIONAL STATUS OF THE PATIENTS USING THE PG-SGA TOOL

This study was to determine the nutritional status of cancer patients using the scored patient generated subjective global assessment. The results demonstrated that 7(6%) of the patients were well nourished, 39(32%) of them were suspected of being malnourished and 77(62%) were severely malnourished. In a study carried out in two cancer treatment centres in Kenya, it was revealed that 31% of the patients were malnourished comprising of SGA-B moderately malnourished 19.7% and SGA-C severely malnourished 11.3% (Opanga et al., 2017). In a study carried out in Nigeria to determine the prevalence of malnutrition among cancer patients in a Nigerian Institution, out of a total number of 89 patients, 60% of the patients were malnourished using the subjective global assessment (SGA) scale (Ntekim et al., 2017). PG-SGA tool was also used in Tehran to assess the nutritional status of cancer patients. It revealed 53.1% malnutrition prevalence with 24% being severely malnourished and 29.1% being moderately malnutrition. The high number of malnutrition among the study population could be attributed to the factors such as almost half of the population (48.7%, n=60) having varying degrees of weight loss. The presence of more than three nutritional impact symptoms among the study population (77.3%, n= 95) which could have possibly contributed to more than half of the study population (56.90% n=70) taking less than their normal intake. The study result could also be explained on the basis that majority of the study had stage 3 and stage 4 cancers which are advanced cancers therefore decreasing the intake of food thereby increasing malnutrition(Wie et al., 2010). The most frequent symptoms presented by the study population were fatigue 99(81.3%), pain 77(62.6), others 83(67.5%) (financial constraints (69.1%, n=85) and depression (26.0%, n=32), nausea 56(45.5%) and no appetite for food 53(43.1%) which might have prevented most of the participants from consuming enough.

In this study, 39(32%) of the study population were suspected of being malnourished and 77(62%) were severely malnourished. This is much higher than other studies which indicated that the prevalence of malnutrition range from 30-80% (Bauer, 2007; Khoshnevis et al., 2012). Possible explanation for this could be that looking at the socioeconomic characteristics of the study population 61(49.6%) are blue collar job workers which might affect their economic power and buying medications even though some drugs are on the National Health Insurance Scheme. Many of the participants stated financial constraints(69.1%, n=85) as part of their problems which possibly have led to missing out on certain sessions of chemotherapy thereby worsening their plights. It is needful to state that food and nutrition insecurity may affect the participants of the study population since majority of the participants were in the lower economic class.

Data analysis of this study indicated malnutrition to be very common in the participants with breast cancer (47.9%, n= 59) and gynaecological cancers (17.9%, n= 22). The study participants were predominantly women and the predominant cancers were breast and gynaecological cancers which had the highest number of advanced cancers (stage 3 and stage 4). Almost half of the participants had varying degrees of weight loss which negatively impact on chemotherapy. The more weight the patient loses the worst the outcome and chronic weight loss is a basic determinant of poor survival or shorter survival rate of the cancer patient (Ross et al., 2004). Weight loss is also a unique prognostic factor for chemotherapy related toxicity and chemotherapy dose limiting toxicity (Wendrich et al., 2017).

In this study, the triage recommendation of the PG-SGA tool suggested that 111 participants (90.20%) required critical need for improved nutritional symptom management.In another study carried out to determine the nutritional status of pelvic cancer patients undergoing chemotherapy, 19(63.6%) of them required symptom

management (Rosli, Shahar, Manaf, & Majid, 2017). In another study among various cancer patients, 67(14.2%) needed nutrition education, symptom management and nutrition counselling were needed by 164 (34.8) and 159 participants making 33.8% of the population that needed critical nutrition care (Opanga et al., 2017). This result confirms studies carried out in various parts of sub Saharan Africa stating that nutritional problems are common among cancer patients and these are not routinely addressed (Ntekim et al., 2017; Opanga et al., 2018). A study conducted by Nyatefe in 2017 on the prevalence and consequences of hospital malnutrition associated outcomes at a teaching hospital in Ghana stated that there was low dietetic referral in the hospital. It could be seen that nutritional symptoms management need to be improved to curtail malnutrition among cancer patients undergoing chemotherapy.

5.8 LIMITATIONS

There may be that selection bias was introduced by the convenience sample technique. The exclusion of patients who are seriously ill and cannot communicate may have prevented them from completing the Scored PG-SGA.

CHAPTER SIX

6.0 CONCLUSIONS AND RECOMMENDATION

6.1 CONCLUSION

The data presented in this study showed high prevalence of malnutrition in cancer patients undergoing chemotherapy in National Radiotherapy Oncology and Nuclear Medicine Centre of the Korle Bu Teaching Hospital. The high level of malnutrition was associated with the occurrence of nutrition impact symptoms, weight loss and less food intake. Majority of the participants took less food than normal. Fatigue, pain, nausea, "others" (financial constraints and depression) and no appetite for food were the most common nutritional symptoms stated by the participants. Participants with advanced cancer stage 3 and stage 4 had the highest number of severely malnourished patients. The scored patient – generated subjective global assessment has the ability or potential to identify patients at risk of malnutrition therefore appropriate interventions can be carried out for better health outcomes.

6.2 RECOMMENDATIONS

Hospital management team

1. Dietetics is an integral part of patient care during chemotherapy therefore a structured referral system should be made to the dieticians. There should be a dedicated oncology dietitian who will help with the dietetic management of the patients.

2. The scored Patient-Generated Subjective Global Assessment (PG-SGA) tool as well as the Subjective Global Assessment and other nutrition assessment tools can be used to frequently assess the nutritional status of chemotherapy patients.

3. Public education, Screening programmes should be carried out frequently for early intervention thereby preventing malnutrition.

Ministry of Health

1. Policies should be made so that most or all medications of the cancer patients undergoing chemotherapy be put on the national health insurance scheme to ease the financial burden on the patients and also aid in nutrition symptom control.

Areas of further research

Further studies should be carried out on nutritional interventions in patients undergoing chemotherapy.

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APPENDIX

PARTICIPANT INFORMATION SHEET

STUDY TITLE: NUTRITIONAL ASSESSMENT OF PATIENTS UNDERGOING CHEMOTHERAPY: A STUDY AT THE NATIONAL RADIOTHERAPY ONCOLOGY AND NUCLEAR MEDICINE CENTRE , KORLE BU).

Cancer and it's treatment can y affect the nutritional status of cancer patients putting them at risk of weight loss, underweight and very weak . Malnutrition in cancer patients interferes and delays treatment which has a negative effect on the recovery process . Early detection of malnutrition will help reduce this risk. This study seeks to assess the state of health nutritional status of cancer patients undergoing chemotherapy, at the **National Radiotherapy Oncology And Nuclear Medicine Centre** of the Korle-Bu Teaching Hospital. If you decide to participate you will be asked some questions about your food intake, pains, lack of appetite, activities and function and some personal information such as your age, educational level and employment status. Your weight and height measurements will be taken.

Your participation in the research is entirely voluntary. You may decide to take part or withdraw from the research at any time without anyone penalties. Refusal to participate in this study will not affect the care being provided by the centre. You will be given the opportunity to ask any question you don't understand about the research.

All information you provide during this project will be kept confidential. The forms will not bear your name or any other personal identities but rather numbers or codes will be assigned to each questionnaire and document that will be used during the study. The data obtained from the study will be useful for the formulation of nutritional interventions among patients undergoing chemotherapy.

We do not envisage any risk to your participation in this study apart from some inconveniences that may occur during the interview and your weight and height measurements. Competent and experienced health personnel will ensure that potential discomfort is minimized. Results of the survey will be given to your doctor or nurse so that you can be counselled or treated if necessary.

You will not incur any cost as a result of your participation in this study.

For further enquires about this research, you can contact the following addresses below:

1. The Researcher, Makafui C. Akpah, Tel: 0208280299, email: confidencemakafui@gmail.com at School of Biomedical and Allied Health Sciences, Korle-Bu, Accra, Ghana.

2. Supervisor of the study, Dr. Mrs. Matilda Asante, Department of Nutrition and Dietetics, College of Health Sciences, Korle-Bu, Accra, Ghana.

3. Supervisor of the study, Mrs. Olivera Kegey, Department of Nutrition and Dietetics, College of Health Sciences, Korle-Bu, Accra, Ghana.

4. Supervisor of the study, Dr. Kyei, National Radiotherapy Oncology And Nuclear Medicine Centre, Korle-Bu, Accra, Ghana.

CONSENT FORM

I have fully explained to …… the nature and purpose of the above described research, its procedures, risks and benefits. I have allowed the subject to ask questions and have answered and will answer to the best of my ability, all questions relating to the study.

I, ... have read (or have read to me in a language that I fully understand) and understood the nature of the proposed study. I am aware of the fact that I can withdraw from the study at any point in time without receiving any objection. My signature or thumbprint below indicates that I have given my consent to participate in this study.

…….

Name of Researcher Signature Date

(0208280299)

……

Name of Participant Signature Date

QUESTIONAIRE

PARTICIPANT'S CODE ……

SOCIO- DEMOGRAPHIC DATA

PATIENT

1. Gender Male [ ] Female [ ]
2. Age…….
3. Traditional language ……
4. Marital status

Single [ ] Married […..] Separated [ ] Widowed [ ]

5. Number of children…….
6. What is your employment status?

Employed [ ] Unemployed [ ]

7. Occupation ……
8. Educational level

Primary [ ] JHS [ ] SHS [ ] Tertiary [ ] None [ ]

9. What is your household income in a month?

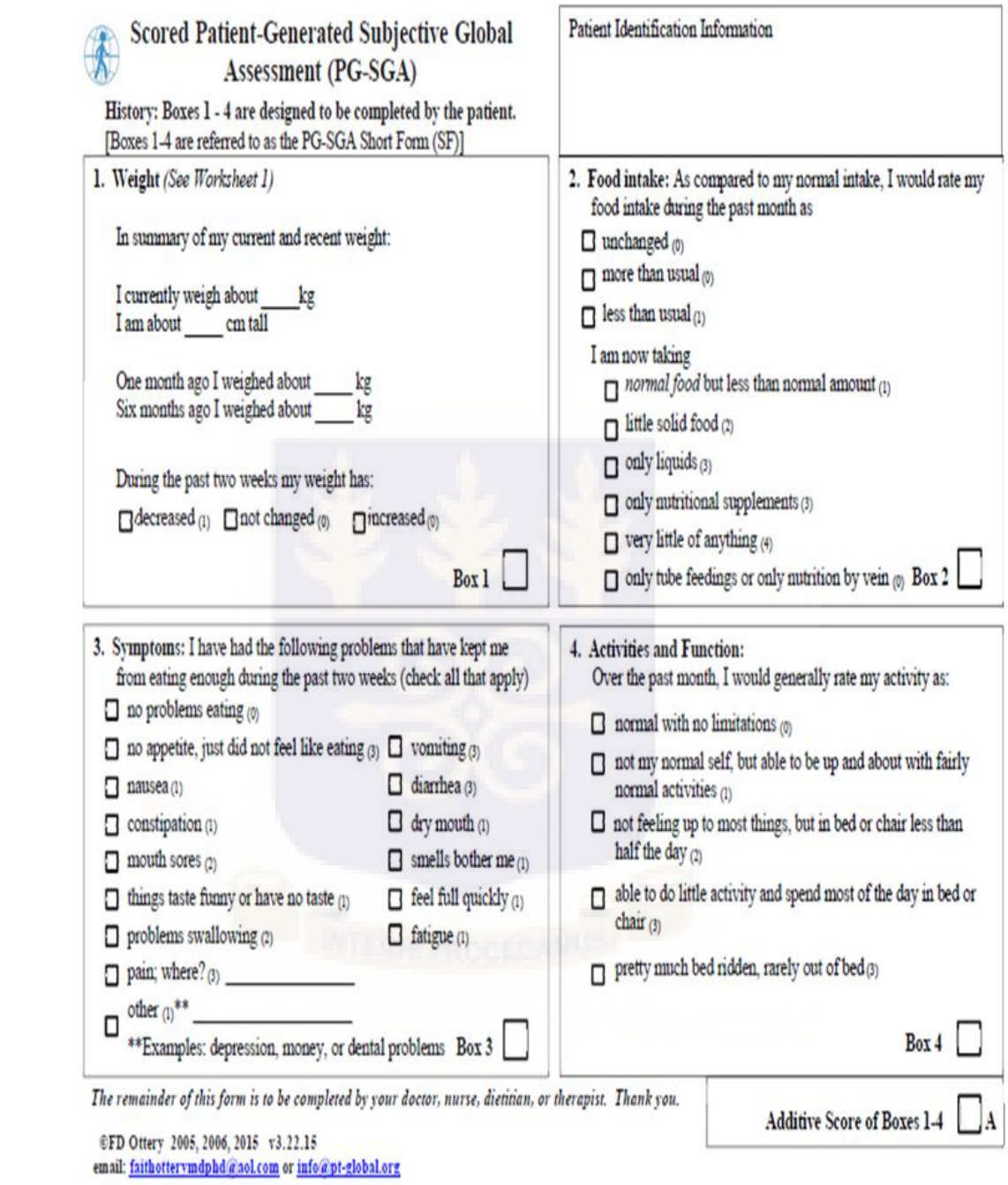
GH¢ 50- GH¢ 100 [ ] GH¢ 100-500 [ ] GH¢ 500-GH¢ 1000 [ ]
GH¢1000-GH¢3000 [ ] >GH¢3000 [ ]

10. How many people depend on this income? ……

MEDICAL HISTORY

11. Diagnosis ……
12. Disease Stage ……
13. Type of treatment…….
14. Cycles planned ……
15. Current cycle ……
16. Pre-medications ……
17. Post- medications……..
18. Date of diagnosis……..……

APPENDIX I



Scored Patient-Generated Subjective Global Assessment (PG-SGA)

History: Boxes 1 - 4 are designed to be completed by the patient.
[Boxes 1-4 are referred to as the PG-SGA Short Form (SF)]

Patient Identification Information

1. Weight *(See Worksheet 1)*

In summary of my current and recent weight:

I currently weigh about ____ kg
I am about ____ cm tall

One month ago I weighed about ____ kg
Six months ago I weighed about ____ kg

During the past two weeks my weight has:

☐ decreased (1) ☐ not changed (0) ☐ increased (0)

Box 1 ☐

2. Food intake: As compared to my normal intake, I would rate my food intake during the past month as

☐ unchanged (0)
☐ more than usual (0)
☐ less than usual (1)

I am now taking

☐ *normal food* but less than normal amount (1)
☐ little solid food (2)
☐ only liquids (3)
☐ only nutritional supplements (3)
☐ very little of anything (4)
☐ only tube feedings or only nutrition by vein (0) Box 2 ☐

3. Symptoms: I have had the following problems that have kept me from eating enough during the past two weeks (check all that apply)

☐ no problems eating (0)
☐ no appetite, just did not feel like eating (3)
☐ nausea (1)
☐ constipation (1)
☐ mouth sores (2)
☐ things taste funny or have no taste (1)
☐ problems swallowing (2)
☐ pain; where? (3) _____
☐ vomiting (3)
☐ diarrhea (3)
☐ dry mouth (1)
☐ smells bother me (1)
☐ feel full quickly (1)
☐ fatigue (1)
☐ other (1)** _____

**Examples: depression, money, or dental problems Box 3 ☐

4. Activities and Function:
Over the past month, I would generally rate my activity as:

☐ normal with no limitations (0)
☐ not my normal self, but able to be up and about with fairly normal activities (1)
☐ not feeling up to most things, but in bed or chair less than half the day (2)
☐ able to do little activity and spend most of the day in bed or chair (3)
☐ pretty much bed ridden, rarely out of bed (3)

Box 4 ☐

The remainder of this form is to be completed by your doctor, nurse, dietitian, or therapist. Thank you.

Additive Score of Boxes 1-4 ☐ A

email: faithotterymdphd@aol.com or info@pt-global.org

APPENDIX II

Scored Patient-Generated Subjective Global Assessment (PG-SGA)

Worksheet 1 – Scoring Weight Loss

To determine score, use 1-month weight data if available. Use 6-month data only if there is no 1-month weight data. Use points below to score weight change and add one extra point if patient has lost weight during the past 2 weeks. Enter total point score in Box 1 of PG-SGA.

Weight loss in 1 month	Points	Weight loss in 6 months
10% or greater	4	20% or greater
5-9.9%	3	10- 19.9%
3-4.9%	2	6- 9.9%
2-2.9%	1	2- 5.9%
0-1.9%	0	0- 1.9%

Numerical score from Worksheet 1 ☐

Additive Score of Boxes 1-4 (See Side 1) ☐ A

5. Worksheet 2 – Disease and its relation to nutritional requirements:

Score is derived by adding 1 point for each of the following conditions:

- ☐ Cancer
- ☐ Presence of decubitus, open wound or fistula
- ☐ AIDS
- ☐ Presence of trauma
- ☐ Pulmonary or cardiac cachexia
- ☐ Age greater than 65
- ☐ Chronic renal insufficiency

Other relevant diagnoses (specify) _____

Primary disease staging (circle if known or appropriate) I II III IV Other

Numerical score from Worksheet 2 ☐ B

6. Worksheet 3 – Metabolic Demand

Score for metabolic stress is determined by a number of variables known to increase protein & caloric needs. **Note:** Score fever intensity or duration, whichever is greater. The score is additive so that a patient who has a fever of 38.8 °C (3 points) for < 72 hrs (1 point) and who is on 10 mg of prednisone chronically (2 points) would have an additive score for this section of 5 points.

Stress	none (0)	low (1)	moderate (2)	high (3)
Fever	no fever	≥ 37.2 and < 38.3	≥ 38.3 and < 38.8	≥ 38.8 °C
Fever duration	no fever	< 72 hours	72 hours	> 72 hours
Corticosteroids	no corticosteroids	low dose (< 10 mg prednisone equivalents/day)	moderate dose (≥ 10 and < 30 mg prednisone equivalents/day)	high dose (≥ 30 mg prednisone equivalents/day)

Numerical score from Worksheet 3 ☐ C

7. Worksheet 4 – Physical Exam

Exam includes a subjective evaluation of 3 aspects of body composition: fat, muscle, & fluid. Since this is subjective, each aspect of the exam is rated for degree. Muscle deficit/loss impacts point score more than fat deficit/loss. Definition of categories: 0 = no abnormality, 1+ = mild, 2+ = moderate, 3+ = severe. Rating in these categories is *not* additive but are used to clinically assess the degree of deficit (or presence of excess fluid).

Muscle Status		Fat Stores	
temples (temporalis muscle)	0 1+ 2+ 3+	orbital fat pads	0 1+ 2+ 3+
clavicles (pectoralis & deltoids)	0 1+ 2+ 3+	triceps skin fold	0 1+ 2+ 3+
shoulders (deltoids)	0 1+ 2+ 3+	fat overlying lower ribs	0 1+ 2+ 3+
interosseous muscles	0 1+ 2+ 3+	Global fat deficit rating	0 1+ 2+ 3+
scapula (latissimus dorsi, trapezius, deltoids)	0 1+ 2+ 3+	**Fluid status**	
thigh (quadriceps)	0 1+ 2+ 3+	ankle edema	0 1+ 2+ 3+
calf (gastrocnemius)	0 1+ 2+ 3+	sacral edema	0 1+ 2+ 3+
Global muscle status rating	0 1+ 2+ 3+	ascites	0 1+ 2+ 3+
		Global fluid status rating	0 1+ 2+ 3+

Point score for the physical exam is determined by the overall subjective rating of the total body deficit.

No deficit	score = 0 points	Again, muscle deficit/loss takes precedence over fat loss or fluid excess.
Mild deficit	score = 1 point	
Moderate deficit	score = 2 points	
Severe deficit	score = 3 points	

Numerical Score for Worksheet 4 ☐ D

Total PG-SGA Score (Total numerical score of A+B+C+D) ☐

Clinician Signature _____ RD RN PA MD DO Other _____ Date _____

Global PG-SGA Category Rating (Stage A, Stage B or Stage C) ☐

Worksheet 5 – PG-SGA Global Assessment Categories

	Stage A	Stage B	Stage C
Category	Well-nourished	Moderate/suspected malnutrition	Severely malnourished
Weight	No weight loss OR recent non-fluid wt gain	≤ 5% loss in 1 month (≤ 10% in 6 months) OR Progressive weight loss	> 5% loss in 1 month (>10% in 6 months) OR Progressive weight loss
Nutrient intake	No deficit OR Significant recent improvement	Definite decrease in intake	Severe deficit in intake
Nutrition Impact Symptoms (NIS)	None OR significant recent improvement allowing adequate intake	Presence of NIS (Box 3 of PG-SGA)	Presence of NIS (Box 3 of PG-SGA)
Functioning	No deficit OR Significant recent improvement	Moderate functional deficit OR Recent deterioration	Severe functional deficit OR Recent significant deterioration
Physical Exam	No deficit OR chronic deficit but with recent clinical improvement	Evidence of mild to moderate loss of muscle mass &/or muscle tone on palpation &/or loss of SQ fat	Obvious signs of malnutrition (e.g., severe loss muscle, fat, possible edema)

Nutritional Triage Recommendations:

Additive score is used to define specific nutritional interventions including patient & family education, symptom management including pharmacologic intervention, and appropriate nutrient intervention (food, nutritional supplements, enteral, or parenteral triage)

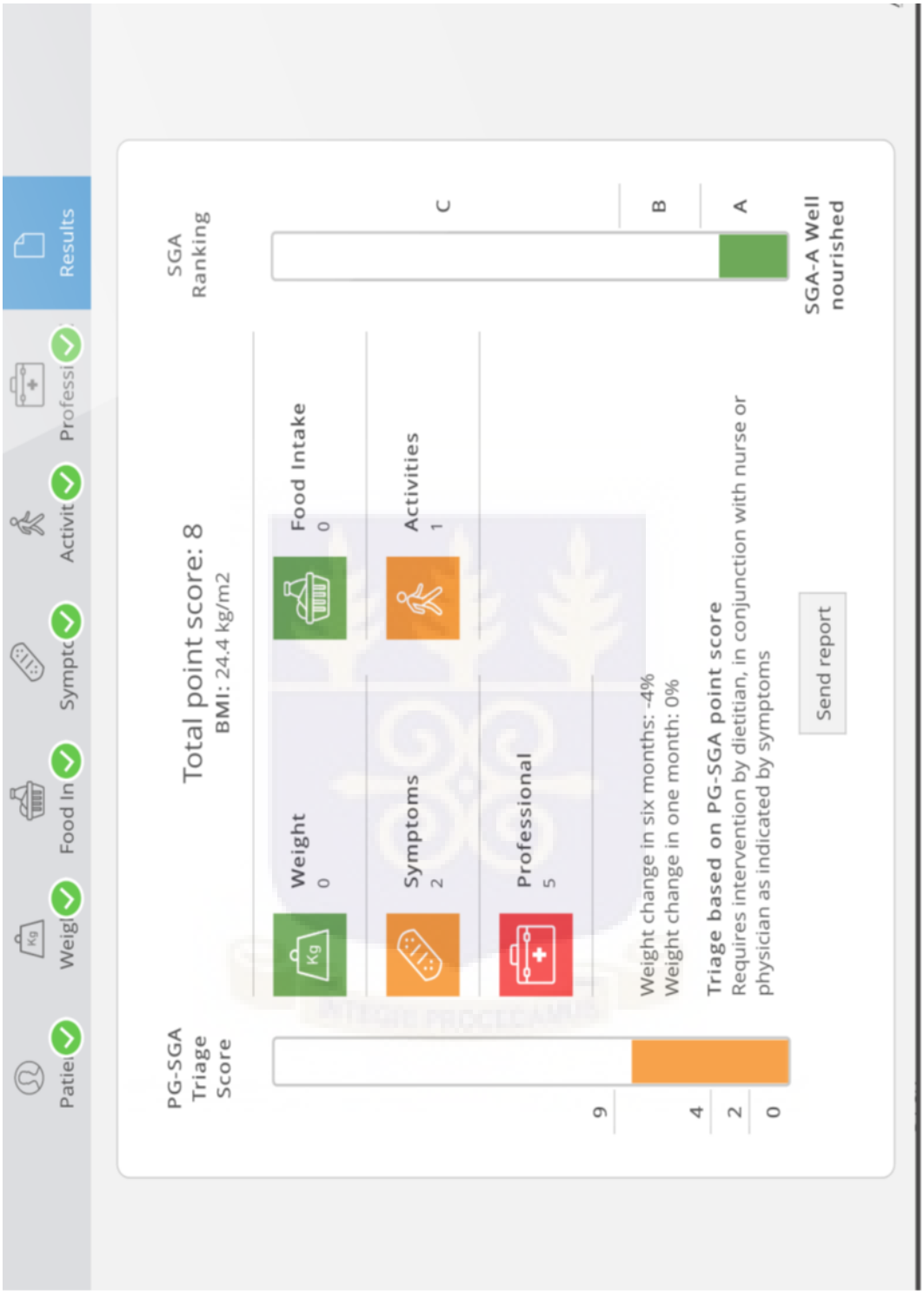
First line nutrition intervention includes optimal symptom management.

Triage based on PG-SGA point score

- 0-1 No intervention required at this time. Re-assessment on routine and regular basis during treatment.
- 2-3 Patient & family education by dietitian, nurse, or other clinician with pharmacologic intervention as indicated by symptom survey (Box 3) and lab values as appropriate.
- 4-8 Requires intervention by dietitian, in conjunction with nurse or physician as indicated by symptoms (Box 3).
- ≥ 9 Indicates a critical need for improved symptom management and/or nutrient intervention options.

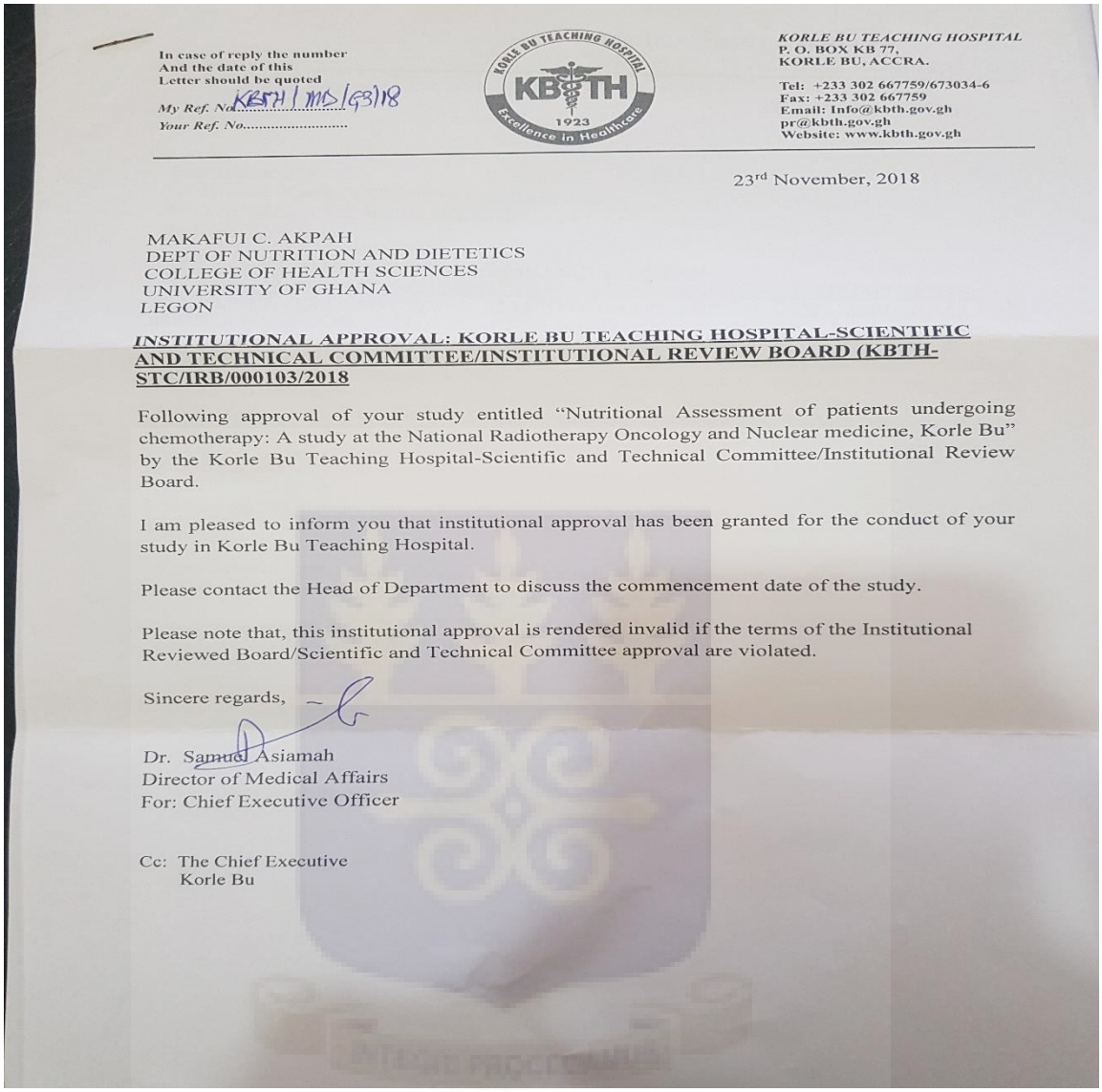
email: faithottervmdphd@aol.com or info@pt-global.org

APPENDIX III



APPENDIX IV

ETHICAL CLEARANCE



In case of reply the number
And the date of this
Letter should be quoted

My Ref. No. KBTH/IMD/693/18

Your Ref. No.....

KORLE BU TEACHING HOSPITAL
P. O. BOX KB 77,
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Tel: +233 302 667759/673034-6
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23rd November, 2018

MAKAFUI C. AKPAH
DEPT OF NUTRITION AND DIETETICS
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA
LEGON

INSTITUTIONAL APPROVAL: KORLE BU TEACHING HOSPITAL-SCIENTIFIC AND TECHNICAL COMMITTEE/INSTITUTIONAL REVIEW BOARD (KBTH-STC/IRB/000103/2018

Following approval of your study entitled "Nutritional Assessment of patients undergoing chemotherapy: A study at the National Radiotherapy Oncology and Nuclear medicine, Korle Bu" by the Korle Bu Teaching Hospital-Scientific and Technical Committee/Institutional Review Board.

I am pleased to inform you that institutional approval has been granted for the conduct of your study in Korle Bu Teaching Hospital.

Please contact the Head of Department to discuss the commencement date of the study.

Please note that, this institutional approval is rendered invalid if the terms of the Institutional Reviewed Board/Scientific and Technical Committee approval are violated.

Sincere regards,

Dr. Samuel Asiamah
Director of Medical Affairs
For: Chief Executive Officer

Cc: The Chief Executive
Korle Bu