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Dietary Practices and Nutritional Status of Adult Cancer Patients: A Case Study of Texas Cancer Center, Kenya

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Authors' contributions

This work was carried out in collaboration among all authors. Author EAO conceived, designed, collected data, analyzed data, and wrote the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Background: Cancer remains a significant public health challenge globally, with profound impact on patients' nutritional status. Despite the critical role of nutrition in cancer care, there is a notable research gap regarding the specific dietary practices and nutritional status of cancer patients in Kenya. Therefore, this study focused on examining the dietary practices and nutritional status of adult cancer patients at the Texas Cancer Center in Kenya.
Methods: The study employed analytical cross-sectional research design, with a sample size of 384 adult cancer patients through systematic sampling, at an interval of two participants. Nutritional status was assessed using the BMI, while dietary practices were assessed using a dietary diversity

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score, food frequency questionnaire, and meal frequency. Data was analyzed using the software 'STATA version 17', incorporating descriptive statistics such as mean, mode, and percentages. Inferential statistics (Pearson's chi-square) and logistics regression were used to test for associations between nutrition status and dietary practices. Bivariate regression (Crude odds ratio- COR) was done to establish, and dietary factors with a p-value of <0.05 were subjected to multivariate regression (Adjusted odds ratio- AOR) to establish the predictors of dietary practices and nutritional status.

Results: The findings revealed that only 41% (n=157) of participants exhibited optimal nutrition status, with more than half of the respondents being malnourished. The overweight respondents accounted for 28%, while those underweight and obese were at 17% and 14% respectively. Among the respondents, 96% (n=369) had three meals or more per day, with only 15 (4%) having less than three meals a day, hence 104 respondents (27%) had a low dietary diversity score. Dietary patterns (AOR=0.55; CI, 0.15-1.13; p- value= 0.032) had a significant association with the nutritional status of the respondents.

Conclusion: This study established the need for regular nutrition screening of all cancer patients to enhance their healthcare management by providing them the need based nutritional support.

Keywords: Cancer; patients; dietary practices; nutritional status.

1. INTRODUCTION

Cancer, a broad term encompassing various diseases, arises from the rapid formation of abnormal cells that exceed their normal boundaries and can metastasize to other body parts or organs [1]. It can originate from any part of the body and when unchecked, disrupts normal cell function, hindering optimal bodily processes [2]. Globally, cancer stands as the leading cause of death, claiming 10 million lives annually, representing one in six deaths [3]. In 2020, there were 18.1 million cancer cases worldwide, with 9.3 million occurring in men and 8.8 million in women. Africa reported 1.1 million new cancer cases and 711,429 cancer-related deaths. Malnutrition in cancer patients differs from starvation-induced malnutrition, often presenting as anorexia, cachexia, and sarcopenia, exacerbated by pro-inflammatory cytokines produced by tumors or immune cells, leading to systemic inflammation [4]. Factors such as changes in appetite, digestive issues, weight fluctuations, and dietary restrictions collectively contribute to the complexity of maintaining optimal nutrition during this demanding period [5-7]. Cancer and its treatments often exert a profound influence on appetite, manifesting as a loss of appetite, nausea, or alterations in taste perception. Negotiating these challenges demands a thoughtful approach, with strategies ranging from consuming smaller, more frequent meals to selecting foods that are well-tolerated [8]. The gastrointestinal repercussions of cancer treatments, particularly those affecting the digestive tract, can manifest as nausea, vomiting, diarrhea, or constipation [9-11]. The dietary landscape undergoes significant modifications to accommodate these symptoms, necessitating adjustments to manage these challenges effectively. Weight fluctuations, encompassing both loss and gain, are usual among cancer patients. However, some treatments precipitate unintentional weight loss, others may contribute to weight gain. Nutritionists collaboratively work with patients to forge tailored dietary plans that adeptly address specific weight management needs [12,13].

2. METHODS

2.1 Locale of the Study

This research was carried out at the Texas Cancer Center. It was selected based on the characteristics of the study population and the objectives of the study. This location was purposively selected because the facility is accessible to a wide population. This facility has also reported an increasing number of patients through the years, as it acts as the main private cancer referral facility in Kenya, thus serving a lot of cancer patients. The estimated number of patients treated monthly in this facility is 900 patients. Texas Cancer Center is located at Mbagathi Way, Nairobi West in Nairobi County. Currently, the center offers laboratory and diagnostic procedures, cancer screening, prevention, treatment services, and palliative care [14-18]. Treatment services include surgery, physiotherapy, chemotherapy and radiotherapy. Moreover, this facility comprises all medical cadres and thus provides a holistic multidisciplinary approach to patient care.

2.2 Research Design

The study was conducted using analytical cross-sectional study design to examine the relationship between dietary practices and the nutritional status of the study participants.

2.3 Target Population

This study targeted cancer patients above 18-year-old, undergoing all forms of cancer treatment at Texas Cancer Center, with any type or stage of cancer.

Inclusion criteria: In-patient and outpatient adult cancer patients at Texas Cancer Center who consented.

Exclusion criteria: Critically ill patients and those who met the criteria for inclusion but could not be part of the study based on the individual's alternative commitments.

2.4 Sample Size

The sample size was calculated using Cochran's formula for sample size calculation in an infinite population. The sample size used in this study was 384 participants.

2.5 Sampling Technique

Purposive sampling was used to select the study location. A systematic random sampling method was employed to select cancer patients who participated in the study. The study population was selected at a random starting point followed by a fixed periodic interval of every second participant until the sample size was achieved. Given that the average number of patients who attend Texas Cancer Center daily is 30, and the data for this study was to be collected in 30 days, 13 study participants were to be interviewed daily.

2.6 Data Collection Instruments

A semi-structured questionnaire was used in data collection. The questionnaire assessed the food frequency, meal frequency, and dietary diversity of the study participants. All participants were weighed on a calibrated weighing scale. The heights were measured using a height board, following which the body mass index was calculated.

2.7 Data Collection Procedures

Dietary practices were assessed using food frequency, dietary diversity, and meal frequency. Meal frequency was captured by assessing the number of meals one had in a day- inclusive of any snacks taken in between the meals, which was obtained through unquantified 24-hour recall. Times in which the meal was consumed were also obtained. Food frequency and dietary diversity focused on collecting data on the consumption of foods from all the food groups including cereals, white tubers and roots, vitamin A-rich vegetables, dark leafy vegetables, other vegetables, fruits, organ meats, flesh meats, eggs, fish and sea foods, milk and its products, legumes, oils, sweets, and beverages. The food frequency comprised of foods taken in the past 7 days, while the dietary diversity was obtained through the standardized Food and Agriculture Organization guideline for measuring household and individual dietary diversity for the general population [19].

Nutritional status was determined using Body Mass Index (BMI), which was obtained from weight and height measurements. Weight was determined using a seca scale to the nearest 0.1kg- participants had minimal clothing and were barefooted. The average of three times measurement was considered as the final value for height parameter.

2.8 Validity and Reliability of Data Collection Tools

Pre-testing of the study tools was done to a group of cancer patients with similar characteristics of inclusion criteria attending Kenyatta National Hospital (KNH), to assess the validity and reliability of the tools. The pilot study comprised of 39 participants (10%) of the sample size. KNH was used as it acts as the main referral public health facility for cancer patients. This allowed modifications on the questionnaires to be done, by correcting mistakes eliminating ambiguous questions, and ensuring clarity to elicit the required information therefore enhancing reliability.

2.9 Validity of the Data Collection Tools

The validity of the data collection tool was assessed by a panel of experts including oncologists and university supervisors. All aspects of validity such as face validity and content validity were considered.

2.10 Reliability of the Data Collection Tools

The reliability of this tool was tested using the test-retest method. The questionnaire was

administered twice to non-participating cancer patients who meet the inclusion criteria but attending Kenyatta National Hospital. The interval between the two tests was two weeks and the questionnaire was reliable given that the results from the two tests by the same individuals had a correlation coefficient (r) greater or equal to 0.70 i.e., r ≥ 0.70.

2.11 Data Analysis and Presentation

The data obtained from the respondents was reviewed to check if all items in the questionnaires were answered. Questionnaires that were not well answered, as well as incomplete ones were termed as spoilt. Data was presented in the form of percentages through tables and figures that facilitated the description and explanation of the study findings. Nutrition status was either classified as normal (BMI of 18.5-24.9kg/m2), underweight (BMI of less than 18.5kg/m2), over-weights (BMI of 25-30kg/m2) or obese (BMI of over 35kg/m2). Quantitative data was entered and analyzed using STATA version 17. Inferential analysis (Pearson's chi-square), and logistics regression were used to test for associations. A P value of <0.05 was used as the criterion for statistical significance.

3. RESULTS

3.1 The Response Rate of the Respondents

The response rate of this study was 100% (n=384) of the minimum expected sample size without non-response adjustments.

3.2 Dietary Practices of the Respondents

Respondents had varied meal patterns whereby the majority of the respondents 89% (n=341) had three meals a day. Only 1% (n=5) of the respondents had one meal a day and this was the least representation. The average meal frequency was 3 meals ± 1SD.

A dietary diversity score was attained following the number of food groups consumed by the study participants. Low dietary diversity score represented <3 food groups consumed, medium dietary diversity score represented 4-5 food groups consumed, while high diversity score represented six or more food groups consumed. Nearly half of the respondents 48% (184) had a high diversity score, the least representation being ninety-six participants (25%) who had a medium dietary diversity score. The mean dietary diversity score was 3 ± 1SD.

Among the 384 respondents who were interviewed, cereals and white tubers and roots were the most consumed food groups (97%), with fish and seafood being the least consumed as represented by 38%.

3.3 Nutritional Status of the Respondents

Among the study participants, a significant 59% (n=227) were identified as malnourished, with an average BMI of 25.0kg/m2 ± 4.25SD.

Nutritional status of the study participants was broadly classified as being normal or malnourished (Fig. 5).

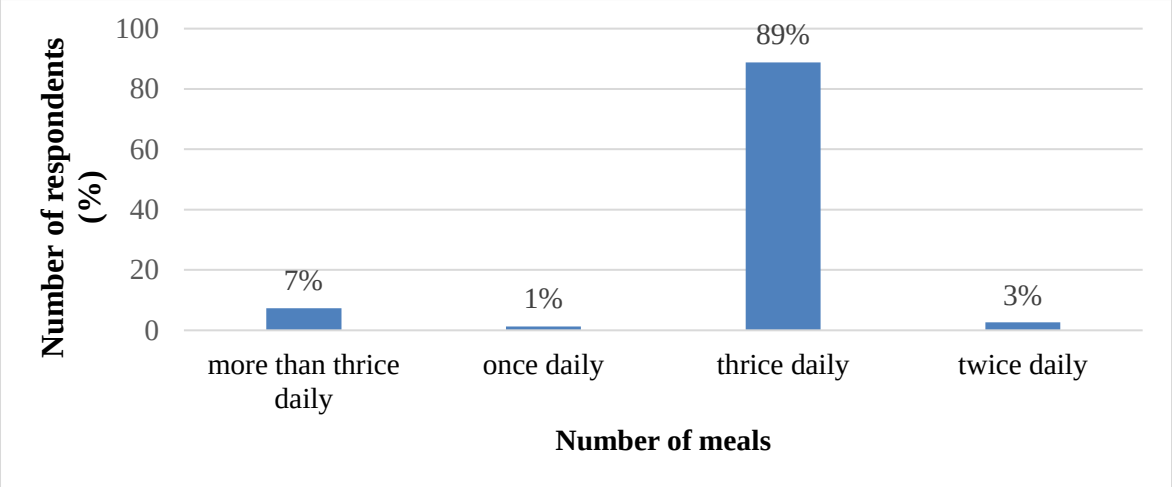

Fig. 1. Meal frequency of the respondents

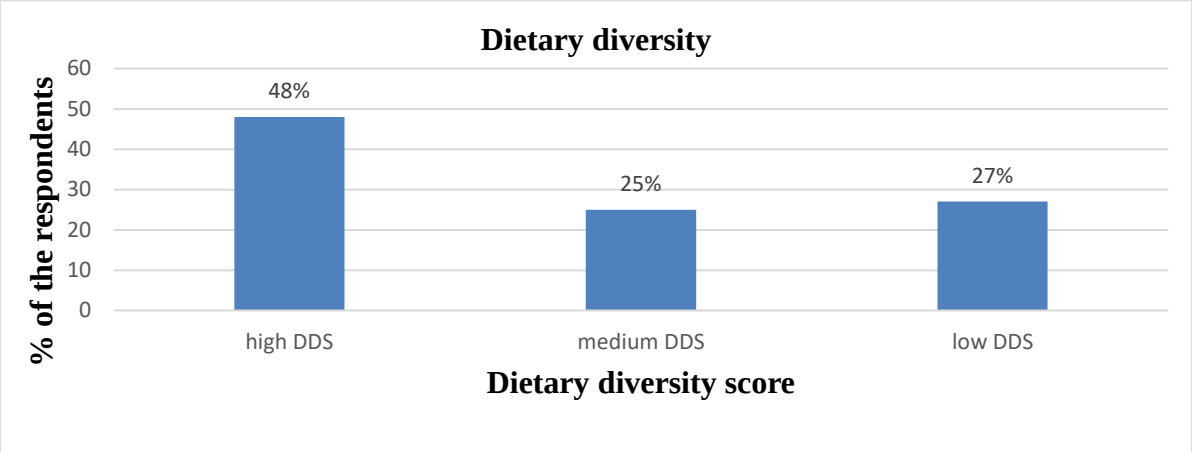

Fig. 2. Dietary diversity scores of the respondents

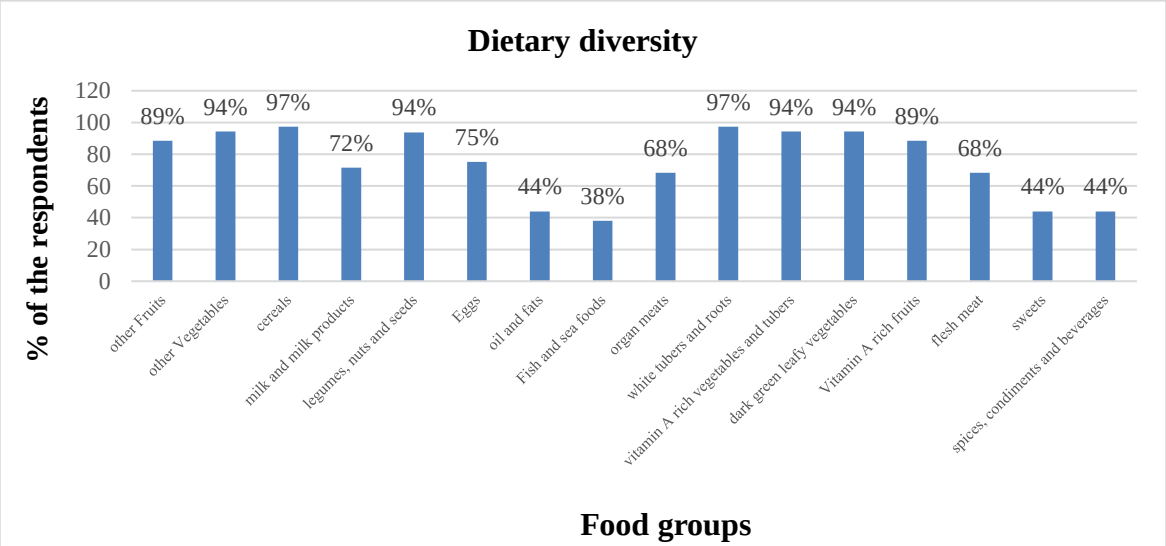

Fig. 3. Dietary diversity of the respondents

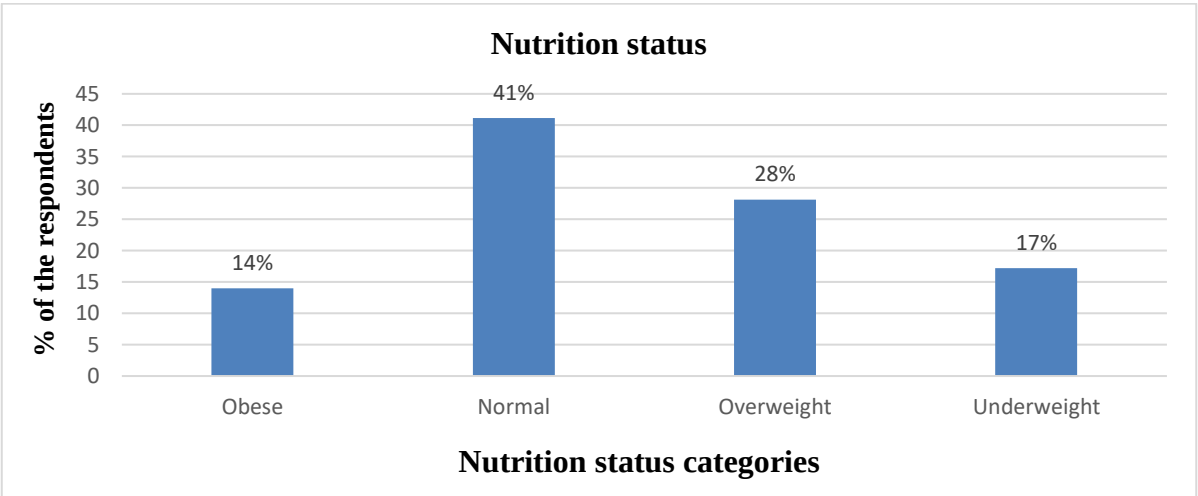

Fig. 4. Nutritional status categories of the respondents

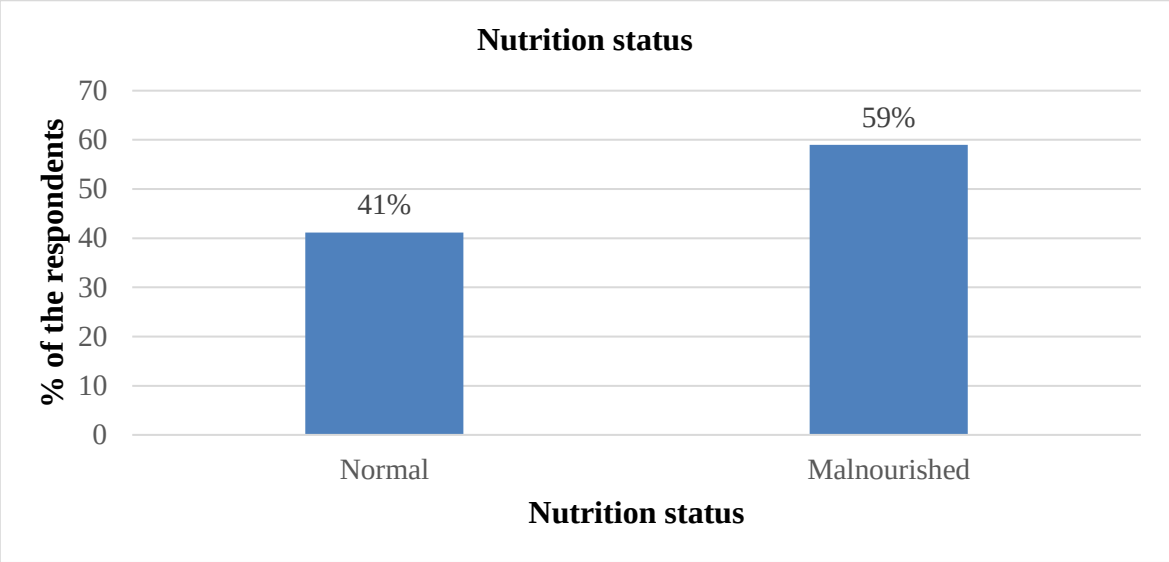

Fig. 5. Nutritional status of the respondents

Table 1. Relationship between nutritional status and dietary diversity

Food Group	Malnutrition		COR (95%CI)	P Value	AOR (95%CI)	P Value
	Yes	No				
Cereals	22	14	1.00		1.00	
White tubers and roots	24	4	0.66(0.41,2.02)	0.079	0.58(0.36,1.40)	0.197
Vit A rich vegetables and tubers	11	2	0.63(0.50,2.33)	0.409	0.94(0.49,1.91)	0.761
Dark green vegetables	37	16	0.68(0.33,1.30)	0.302	0.55(0.15,1.13)	0.032
Other vegetables	41	12	0.55(0.35,1.10)	0.157	0.51(0.21,1.09)	0.051
Vit A rich fruits	10	15	0.61(0.33,1.03)	0.132	0.77(0.31,1.34)	0.320
Other fruits	4	3	0.51(0.24,1.18)	0.188	0.54(0.23,1.15)	0.178
Organ meat	6	4	0.72(0.31,1.54)	0.469	0.63(0.36,1.46)	0.219
Flesh meats	1	2	0.88(0.45,1.66)	0.850	0.66(0.23,1.66)	0.418
Eggs	42	15	0.46(0.20,1.06)	0.054	0.41(0.15,1.02)	0.493
Fish and sea foods	1	9	1.51(1.01,2.33)	0.004	1.59(1.13,3.02)	0.009
Legumes, nuts and seeds	2	15	2.04(1.36,3.36)	0.001	2.47(1.02,4.28)	0.003
Milk and milk products	4	16	9.25(1.18,91.62)	0.023	2.54(0.46,33.72)	0.522
Oil and fats	7	4	1.67(1.17,3.38)	0.026	1.55(0.35,3.22)	0.119
sweets	6	9	1.51(1.01,2.23)	0.004	1.59(1.13,3.02)	0.035
Spices, condiments and beverages	9	17	1.20(1.12,2.34)	0.044	1.18(0.36,2.32)	0.446

A significant association was established between dietary diversity and nutritional status (p value=0.003; AOR=0.46; 95% CI=0.46,1.44).

3.4 Relationship between Nutritional Status and Dietary Practices

A significant association was found between nutritional status and consumption of dark green vegetables (AOR=0.55; 95% CI=0.15,1.13), other fruits (AOR=0.51; 95% CI=0.21,1.09), fish and sea foods (AOR=1.59; 95% CI=1.13,3.02), legumes, nuts and seeds (AOR=2.47; 95% CI=1.02,4.28), and sweets (AOR=1.59; 95% CI=1.13,3.02) at p- values of 0.032, 0.051, 0.009, 0.003, and 0.035 respectively.

Table 2. Relationship between nutritional status and meal frequency

Variables	Malnutrition		COR (95 % CI)	*P* value	AOR (95 % CI)	*P* value
	Yes	No				
Meal frequency						
Less than 3	10	54	1.00		1.00	
3 or more	217	103	0.70(0.24,1.26)	0.526	0.49(0.19,1.26)	0.138

No association was established between meal frequency and nutritional status.

Table 3. Relationship between nutritional status and dietary diversity scores

Variables	Malnutrition		COR (95%CI)	P Value	AOR (95%CI)	P Value
	Yes	No				
Low DDS	47	57	1.00		1.00	
Medium DDS	31	65	0.63(0.27,1.47)	2.197	0.8(0.27,2.41)	1.984
High DDS	112	72	1.28(0.36,4.49)	1.835	0.46(0.46,1.44)	0.003

4. DISCUSSION

4.1 Relationship between Nutritional Status and Dietary Practices

A significant association was found between nutritional status and dietary practices. These study findings were similar to those of a study carried out in Tanzania, whereby the prevalence of stunting was 31%, wasting 6%, and underweight 14%, and the majority of the cancer study population (74%) had a minimum dietary diversity. Therefore, Consumption of a diverse diet was significantly associated with a reduction of stunting, wasting, and being underweight [20]. Similarly, the prevalence of underweight, stunting, and wasting was 38, 41, and 22 %, respectively in a study carried out in India found an association between undernutrition and minimum dietary diversity [21]. However, these results differed in comparison to a study by Chang, 2018, where food insecurity was not significantly associated with nutritional status. The relationship between the nutrition status and dietary practices of the respondents is essential for assessing the overall well-being of cancer patients undergoing treatment. A balanced diet rich in essential nutrients is crucial for maintaining a normal nutrition status. In contrast, poor dietary practices can lead to undernutrition or contribute to overweight and obesity, both of which can have profound implications for the well-being and treatment outcomes of cancer patients. Given that all these studies were carried out in Africa, they depict that dietary practices have an impact on one's nutrition status. Dietary patterns serve as pivotal determinants of the nutrition status of cancer patients, exerting various impacts on nutrient intake, energy balance, and overall health. A comprehensive understanding of dietary choices is crucial, as it plays a vital role in providing essential nutrients necessary for immune function, tissue repair, and overall well-being. A diverse and balanced diet not only supports the body's ability to combat cancer but also helps patients endure the rigors of treatment. Dietary patterns can significantly influence body weight management, with implications ranging from preserving muscle mass to mitigating malnutrition-related complications and boosting treatment tolerance. Moreover, dietary choices extend their reach to gastrointestinal health, hydration status, immune function, and the management of treatment-related side effects. For instance, a diet rich in immune-boosting nutrients like vitamins, minerals, antioxidants, and phytochemicals can fortify the body's defence mechanisms, potentially reducing the risk of infections and treatment-associated complications [22]. By offering personalized dietary counselling, nutritional interventions, and comprehensive supportive care measures, healthcare providers can empower cancer patients to make informed dietary choices that not only optimize their nutrition status but also foster resilience, improve treatment outcomes, and elevate overall well-being throughout their cancer journey.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusion

Malnutrition among the cancer patients was high with the majority being overweight. A statistically

significant association was established between dietary practices and nutrition status.

5.2 Recommendations of the Study

This study has brought to light that majority of the cancer patients have a compromised nutritional status. Providing nutrition education to these patients is key to ensuring that they are well-nourished. In light of these findings, this study recommends that nutritionists and dietitians be at the forefront of carrying out weekly nutritional assessments on cancer patients to curb malnutrition among cancer sufferer.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT AND ETHICAL APPROVAL

The study sought ethical approval from the Mount Kenya Institutional, Scientific, and Ethical Review Committee (MKU/ISERC/2685). Besides, I sought permission from Texas Cancer Center management, to approve research patients seeking treatment from their facility. I also sought the NACOSTI Research Permit (Reference number: 247263) to carry out health-related research. Informed written consent was sought from the respondents and confidentiality of the respondent's information was maintained throughout the research process by use of serial numbers on the questionnaires to maintain anonymity and employing standard data protection guidelines. Names and other means of identity were not used during the data collection process. The study was voluntary, and respondents had the right to withdraw at any point in the study if they wished to. The use of any unacceptable language was avoided in the formulation of research interview guides. I acknowledged the works of other users by referencing them appropriately. The research assistant was trained before the research activities so that she maintained the highest level of objectivity during the data collection period.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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