EATING HABITS, OVERWEIGHT AND OBESITY AMONG NUTRITION STUDENTS FROM MOLO, KAREN, AND NYANDARUA KENYA MEDICAL TRAINING COLLEGES, KENYA

BRIDGET NDUTA MWANIKI (BSC. FND)

H60/CTY/PT/38439/2016

A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN FOOD, NUTRITION AND DIETETICS IN THE SCHOOL OF HEALTH SCIENCES OF KENYATTA UNIVERSITY

OCTOBER, 2024

DECLARATION

ii

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university.

Signature: _____ Date: 17-10-2024

Bridget Nduta Mwaniki **H60/CTY/PT/38439/2016**

Department of Food, Nutrition and Dietetics

SUPERVISORS

We confirm that the work reported in this thesis was carried out by the candidate and was submitted with our approval as university supervisors.

1. Signature: _____ Date: 17-10-2024

Prof. Sophie Ochola (Ph.D)

Department of Food, Nutrition and Dietetics

2. Signature: _____ Date: 17-10-2024

Juliana Kilo (Ph.D)

Department of Food, Nutrition and Dietetics

DEDICATION

This thesis is dedicated to my parents, Mr. and Mrs. Mwaniki for their love and support, and to my sons Isadore and Israel for their patience.

ACKNOWLEDGEMENTS

I express my utmost thankfulness to the Almighty God for the gift of life, care and protection. My special appreciation to my supervisors, Prof. Sophie Ochola and Dr. Juliana Kiio, for their dedication, patience, moral support and thorough guidance. This study is a fruit of your support. I would also like to recognize my lovely parents, Mr. and Mrs. Mwaniki, for moral support and advice. Your hard work and unwavering support inspired me to keep on. I also extend my appreciation to KMTC Molo, Nyandarua and Karen for your support and cooperation, same as the study participants for their cooperation. Finally, I appreciate the whole fraternity of Department of Food, Nutrition and Dietetics at Kenyatta University for the dedicated efforts to offer us the best.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

ANOVA: Analysis of Variance

AOR: Adjusted Odds Ratio

BMI: Body Mass Index

CUEA: The Catholic University of Eastern Africa

CVDs: Cardiovascular Diseases

FGD: Focus Group Discussions

GPAQ Global Physical Activity Questionnaire

KM: Kilometre

KMTC: Kenya Medical Training College

KNBS: Kenya National Bureau of Statistics

KU: Kenyatta University

MET: Metabolic Equivalents

MOH: Ministry of Health

NACOSTI:National Council of Science Technology and Innovation

NCDs: Non-Communicable Diseases

NS: Nutrition Status

PAL: Physical Activity Level

WHO: World Health Organization

WHR: Waist Hip Ratio

OPERATIONAL DEFINITION OF TERMS

Eating habits: The types and variety of foods consumed, with whom meals are consumed and where, frequency of consumption and how meals are distributed in a day.

Food preferences: Foods that the nutrition students like or dislike from a variety of choices.

Individual factors: Personal characteristics among the nutrition students that influence eating habits, such as food preferences as influenced by time and convenience, nutrition knowledge, economic food access, and socio- economic and demographic characteristics.

Social environmental factors: Immediate social setting likely to influence the eating habits of the students, such as peer interactions, media influence and parental influence.

Physical environmental factors: The immediate physical setting including eating facilities likely to influence the nutrition students' eating habits, such as eating facilities, access to food and availability of food.

Nutrition Knowledge: Level of understanding or ability of reproducing nutrition principles from memory as well as facts related to general health. A score of ≤40 % was considered to be low, 41–69 %- moderate, and ≥70 %- high.

Nutrition status: The health condition of the nutrition students as determined by intake and utilization of different nutrients, and assessed using BMI and waist/hip ratio. The waist-hip ratio cut-off points by WHO were used, where for women and men, a ratio of >0.85 and >0.90 respectively indicated central obesity. BMI cut-off points according to WHO (2000) were adopted in the study.

Nutrition student: A person undertaking a pre-service nutrition diploma course at the KMTC in Karen, Molo, and Nyandarua campuses, and in his or her 2nd or 3rd year.

Family influence: Positive or negative influence of the parents or family on the youth's eating habits.

Peer interactions (pressure/ modelling): The communications or exchanges between the nutrition students, leading to either positive or negative influences on the eating habits.

Pre-service students: Nutrition students in college for the first time, 18-23 years, with no work experience.

Physical Activity Level (PAL): Body movement that uses energy, categorized as vigorous, moderate and sedentary assessed using WHO physical activity recommendations (150 minutes for moderate-intensity and 75 minutes for vigorous-intensity throughout the week).

ABSTRACT

Globally, obesity and overweight have been on the rise among college students. In 2022, two and a half billion adults aged 18 years and above (43%) were overweight, and of these, 890 million people were obese (16%). Moreover, a prevalence of 16.5% of overweight was reported among Kenyatta University students in Nairobi, Kenya in 2024. Many factors make college students nutritionally vulnerable. There is scarcity of information on eating habits, physical activity level and the nutrition status of college students in Kenya, particularly those pursuing nutrition programmes. Therefore, this study's purpose was to establish the environmental and individual factors, eating habits and nutrition status among nutrition students of Kenya Medical Training College (KMTC). The study adopted a mixed methods cross-sectional analytical study design that collected both quantitative and qualitative data. Two hundred and ninety three (293) third- and second-year nutrition students at Karen, Molo, and Nyandarua Campuses were randomly sampled. Content-validated, semi-structured, self-administered questionnaires were used to collect data on social and physical environmental factors, individual factors, and eating habits. Observation checklist and Focus Group Discussion guides were also used to collect qualitative data. Eating habits was determined using dietary diversity score and meal frequency. Weight, height, waist and hip circumference measurements were collected and the weight status established using Body Mass Index (WHO 2000 cut-off points) and Waist Hip Ratio. Global Physical Activity Questionnaire (GPAQ) (WHO 2022) was used to collect physical activity data. Qualitative data was transcribed and coded for common themes, from which conclusions were drawn. SPSS version 25.0 was used for data analysis. Descriptive statistics; dispersion, means, frequencies, and Chi- square test, Man Whitney U test, one-way ANOVA, Bivariate Spearman's rank order correlation, and Multivariate logistic regression analysis were also used in establishing the relationships between study variables. A $p< 0.05$ was used as the statistical significance level. Majority of the participants were females (76%). The mean age of the participants was 22.7(±2) years. Majority of the respondents (57.7%) had moderate nutrition knowledge (41–69%). The meals of the students comprised mainly of *ugali,* kales, rice beans/green grams, *chapati* beans/ green grams, and rice, carrot, peas, ugali and cabbage. The diets of majority of the respondents (87%) were diverse, where they consumed a daily minimum recommended meal frequency of five meals. Sub-optimal eating habits were reported including consuming unhealthy snacks, skipping meals, and poor dietary diversity. About a fifth (20.5%) of the respondents were overweight and 7.5% were obese. Slightly less than one third (26.3%) and slightly less than a half (46.1%) of the respondents engaged in vigorous and moderate physical activity respectively. Over half (58%) of the respondents reported negative and positive peer influence in the choice of the foods consumed. A chi-square test established a positive association between eating habits and the nutrition status of the students ($p=0.009$). There was a significant association between the occupation of the parents and the respondents' BMI ($p=0.034$) and WHR ($p=0.004$). Furthermore, there was a significant relationship between the amount of pocket money the students received and nutrition status (AOR = 1.917, $p = 0.044$). Students who received higher amounts of pocket money were more likely to be obese (high WHR) (AOR = 1.917, $p = 0.044$). Higher nutrition knowledge was associated with the practice of recommended eating habits (AOR = 0.265, $p = 0.006$). There was no association between nutrition knowledge and nutrition status of the study participants. There is therefore need sensitize KMTC students on healthy eating habits. KMTC management should also ensure that the college physical environment supports healthy eating habits.

CHAPTER ONE: INTRODUCTION

1.1 Background

The prevalence of obesity and overweight has risen more than double globally between 1990 and 2022 (WHO, 2024). In 2022, according to WHO (2024), 2.5 billion adults aged 18 years and above (43%) were overweight, and of these, 890 million people were obese (16%). Worldwide, 4.72 million deaths every year are attributable to obesity (The World Counts, 2024). Ndung'u, Waudo and Kobia (2024), noted that in the college-age population (18- 29 years), 24.1% were obese or overweight.

Oluyombo et. al., (2021) reported that in sub-Saharan Africa, constituting majorly of developing nations, obesity rates have been on a rapid rise compared to other places worldwide. Oluyombo et al. (2021) notes that obesity consequently leads to the increased burden of chronic conditions. Adult obesity prevalence in Burkina Faso has risen by almost 1,400% within the previous thirty-six years. In Benin, Togo, Ghana and Ethiopia, it has risen by over 500%. A study in Ghana by Obirikorang et al. (2024) that adopted the cross-sectional design, it was established that the prevalence of overweight and obesity among young adults (16- 25 years) was 33.8% and 17.0 % among female and male students respectively. The Institute for Health Metrics and Evaluation (University of Washington), in a recent study documented that eight of the twenty countries in the world that have the fastest-rising adult obesity rates are in Africa. Olatona et al. (2018) studied three universities in Lagos, Nigeria and established that NCDs' (Non-Communicable Diseases) metabolic risk factors and unhealthy diets were prevalent.

According to Kiragu et al. (2022) and KEMRI (2024), NCDs accounted for over half of the inpatient admissions as well as 39% of all mortalities annually. Moreover, Kiragu et al. (2022) observed that NCDs account for over 55% of the hospital mortalities. KEMRI (2024) revealed that NCDs are responsible for 27% of all the mortalities in Kenya. A study among students from The Catholic University of Eastern Africa (CUEA), Kenya, that used the cross-sectional study design and had 245 participants, documented a prevalence of 27.8% and 19.6% of abdominal and general obesity respectively (Rotich et al., 2023). Moreover, a study by Ndung'u , Waudo and Kobia (2024) conducted among Kenyatta University students in Nairobi, Kenya, using the cross-sectional analytical design among 260 participants reported a 24.1% overall prevalence of obesity and overweight. This study also reported a prevalence of 7.6%, 16.5%, 8.4% and 67.5% of obesity, overweight, underweight, and normal weight respectively (Ndung'u, Waudo & Kobia, 2024). Obesity is a substantial risk factor for the gradually increasing NCDs (Ejigu & Tiruneh, 2023).

In a study by Bhawna, Sharma and Sharma (2022) that adopted the cross-sectional design, it was reported that college students in Delhi engaged in unhealthy behaviours, more so unhealthy eating behaviours. Healthy eating habits influence not only the feelings of students but also the manner in which they achieve and learn (Khan, Zada & Ismael, 2022). Absence of physical activity and poor eating habits promote poor health that lead to premature death, obesity, and coronary heart disease (The World Counts, 2024). Oluyombo et al. (2021) attributes obesity to increased physical inactivity in addition to unhealthy diets.

World Health Organization (WHO) provides recommendations on different foods' intake for young adults (Kim, 2023). Nevertheless, Awoke et al. (2022) noted that for both college men and women, the recommended daily intake was way below the recommendations. Students lack specific action plans related to healthy eating (Akujobi, 2022). Many factors interact in the college environment, which interferes with students' intentions and opportunities for healthy eating. Healthy eating is usually perceived as a complex behavior which is susceptible to different self-regulatory failures, regardless of the presence of solid intentions (Stroebe, 2023). According to Healthy People 2030 (2024), the behavioral and lifestyle patterns that college students develop determine their present health status, and the future risk of chronic diseases during adulthood. Founded on this rationale, this study aimed at establishing if individual and environmental factors among nutrition students at Kenya Medical Training College (KMTC) had an influence on their eating habits and nutrition status.

1.2 Problem Statement

Epidemiological studies indicate that change to inappropriate dietary habits over the past years has resulted to higher incidences of chronic conditions. In the college population (18-29 years), 24.1% are obese or overweight (Ndung'u, Waudo & Kobia, 2024), and demonstrate unhealthy eating habits. Regardless of the fact that nutrition students have knowledge on healthy eating and its benefits, there are apparent difficulties with healthy dietary practices. Despite the intention to consume healthy diets, many factors interact, contributing to unhealthy dietary practices. Moreover, lack of specific action plans that would lead to goal-directed activities lead to unhealthy eating. In college life, food is the biggest hurdle, and acquiring it at a low

cost is pivotal for survival. KMTC strictly enforces the rule against cooking in the hostels, making the students identify cheap eateries around the colleges. Food kiosks are more preferable to KMTC students as opposed to the school mess (Odenyo, 2017), whose food is associated with lack of variety and monotony. Although studies have been carried out to assess the eating behaviors among college students (Kariuki, 2021), there is limited information on the dietary practices among nutrition students at KMTC campuses. Therefore, this research study aimed at exploring the environmental and individual factors, eating habits, overweight and obesity among college students pursuing pre-service diploma nutrition courses from Karen, Molo, and Nyandarua KMTC campuses.

1.3 Justification for the Study

Many factors hinder the engagement in healthy diets among nutrition students despite their knowledge, leading to major inappropriate dietary habits. Healthy eating is a behavior that requires supportive strategies. The students' conflicting priorities might distract their focus on proper diet. Nonetheless, appropriate dietary practices play an extremely fundamental role in the lives of teenagers and young adults. There is scarcity of information on the individual, societal and environmental factors affecting the eating habits of nutrition students at KMTC. Therefore, this research filled this gap by assessing the individual and environmental factors linked to students' eating habits and the nutrition status.

1.4 Purpose of the Study

This study's purpose was to establish environmental and individual factors associated with the eating habits, overweight and obesity among nutrition students from selected campuses of KMTC in Kenya.

1.5 Objectives

1. To establish socio-demographic and -economic characteristics of KMTC nutrition students.
2. To assess the eating habits of KMTC nutrition students.
3. To assess individual factors (nutrition knowledge, economic food access and food preferences) associated with eating habits of KMTC nutrition students.
4. To establish the physical environmental factors (physical food access) associated with eating habits of students.
5. To analyze the social-environmental factors (family, media and peer) associated with eating habits of the KMTC nutrition students.
6. To determine the nutritional status of the KMTC nutrition students.
7. Establish the relationship between individual factors, environmental factors, eating habits and nutrition status among the students.

1.6 Hypotheses

H_{01}- There is no significant association between socio-demographic and -economic characteristics and eating habits of the KMTC nutrition students.

H_{02}- There is no significant association between nutrition knowledge of the students and their eating habits.

$H_{03:}$ There is no significant association between physical environmental factors (physical food access) and eating habits.

H_{04}-There is no significant association between social- environmental factors (family, media and peer) and the eating habits.

H_{05}- There is no significant association between the students' eating habits and nutrition status.

1.7 Significance of the Study

The study's findings may guide the nutrition and dietetics department in promoting and advocating for appropriate action plans among students. Understanding the factors influencing the eating habits among the nutrition students can help in designing interventions for behavior change. The findings may also guide policy towards the provision of healthier diets at KMTC and other tertiary institutions.

1.8 Limitation and Delimitation of the Study

1.8.1 Limitation

The students' nutrition status and eating habits could have been influenced by other individual and environmental factors not focused on in this study. Since the students possess nutrition knowledge, there might have been bias through under reporting and/or over reporting, which was overcome through the use of observing eating habit in eateries to verify the reported findings. The nutrition knowledge possessed by the students might also be influenced by attitudes and perceptions.

1.8.2 Delimitation

The current study assessed individual and environmental factors which may potentially impact on the eating habits of KMTC nutrition students. The association between the eating habits and students' nutrition status was assessed using of BMI (Body Mass Index) and waist/hip ratio. Physical activity was also explored as a confounding variable.

1.9 Assumptions

It is assumed that the students were adequately trained in the field of nutrition which would translate in recommended practices.

1.10 Conceptual/ Theoretical Framework

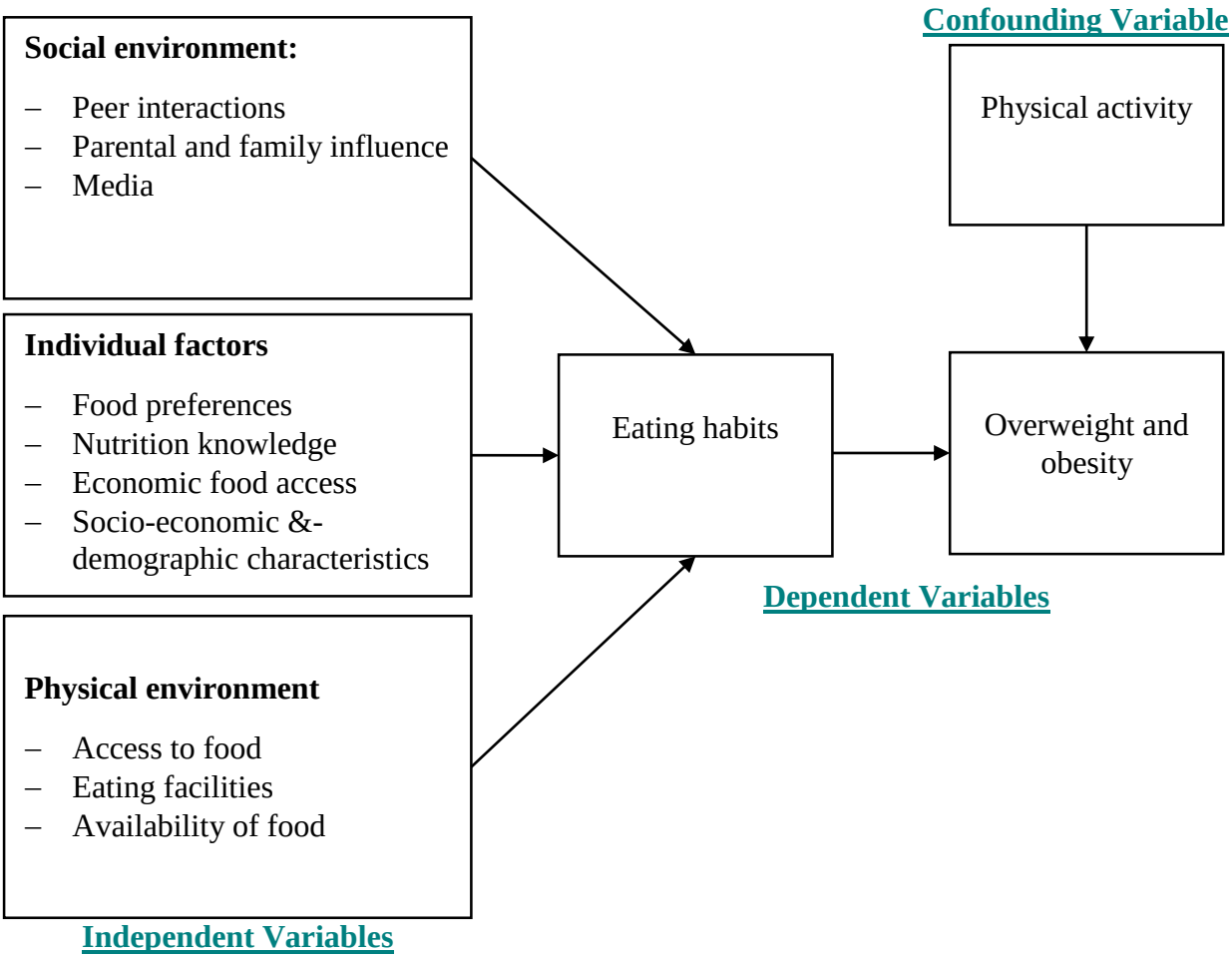


***Figure 1.1*: Factors Influencing the Eating Habits among Nutrition Students (adapted from Deliens et al., 2014)**

The conceptual framework was adopted from Deliens et al. (2014). Numerous factors interact to influence the eating habits of college-age students. The nutrition students' eating habits are influenced by a combination of physical environmental, social environmental, and individual factors. The social environment includes peer pressure, family influence and social media. The peer interactions could either be negative (pressure) or positive (modelling). Some of the individual factors are nutrition knowledge and food preferences, whereas physical environment factors entail of eating facilities and access to food. Consequently, the eating habits

determine the nutrition status of the students. However, physical activity is a confounding factor that is likely to influence the nutrition status, despite the eating habits of nutrition students (Fig. 1.1).

Social cognitive theory discusses health behaviour on the basis of a dynamic framework where internal personal factors, environmental events and behavioural patterns drive a person (Bandura, 1986). Reciprocal determinism refers to the interaction between the three factors. Studies have established that social cognitive interventions are more effective in increasing consumption of vegetables and fruits as opposed to education-based interventions. Self-efficacy, the theory's internal personal factor, can affect an individual's implementation of change, knowledge uptake and motivation (Bandura, 1986).

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

Optimal nutrition has a very central role in the well-being and health of students and healthy eating habits guarantee good health outcomes. College students are not exempted from the general nutrition recommendations. The rates of chronic conditions have remained stagnant among the 18- 24-year-olds over the previous decade, and this has a direct connection to overweight and obesity. There is need for a detailed understanding of the current nutrition status and eating habits, and factors influencing the eating habits among college nutrition students. According to Contento (2013), tertiary institutions are a strategic avenue for enhancing health and nutrition among students. Vilaz and Toledo (2024) recommend a high consumption of fruits and vegetables. According to Barnes et al. (2021), female students require iron rich foods to meet their iron requirements. Both sexes are required to take a high protein diet since they are still developing (Gan, Nasir, Zalilah & Hazizi, 2011). Elmskini et al. (2024) indicated that a high fat intake predisposes a person to the risk of heart conditions. At the same time, a high salt intake should be avoided as this predisposes people to hypertension (Olatona, Onabanjo, Ugbaja, Nnoaham, & Adelekan, 2018). High sugar foods also need to be avoided as these can eventually cause diabetes type 2 (Ministry of Health, 2017).

2.1 Eating Habits among College Students

Jayedi et al. (2020) and WHO (2011) indicated that consuming convenient and modernized foods in high amounts contributes to the escalating lifestyle chronic conditions among young adults in developing countries. Mogeni and Ouma (2022) and Przybyłowicz and Danielewicz (2022) links unchecked inappropriate dietary

practices to chronic lifestyle conditions. Waweru (2020) also links poor dietary practices among females with poor maternal health in future. Almasi and Rakicioglu, (2021) notes that the poor diet's ill-health effects are not immediate, which makes college students ignore proper dietary habits. However, a supportive college environment can enhance healthy eating habits as students start making choices independently (Healthy People 2030, 2024). This can counteract the factors that affect dietary habits (Almansour, Allafi & Al-Haifi, 2020). Awoke et al. (2022) advocates for healthful habits for reduced weight gain.

Nutritionally, a majority of the students do not meet the goals and guidelines of Healthy People 2030 (HealthyPeople.gov., 2018). A study among Kenyatta University (KU) students established that 96.33% of the students in first year exhibited suboptimal feeding habits (Mogeni & Ouma, 2022). They also take fewer whole grains (Awoke et al., 2022), vegetables and fruits daily, and report higher high-calorie, high fat foods' intake (Kriaucioniene, et al., 2021; Ferrara et al., 2022; Almansour, Allafi & Al-Haifi, 2020). College students exceed maximum level intakes proposed for trans- and saturated fats, refined sugars, and sodium through energy-dense snacks' over- consumption (Almasi & Rakicioglu, 2021). Meal skipping (Almansour, Allafi & Al-Haifi, 2020), unhealthy dieting, as well as fast food consumption increases at the college level. Literature documents that skipping breakfast is a common trend, particularly among those from low socio-economic backgrounds. Awoke et al. (2022) notes that college students have unhealthy alternatives to breakfast. Barnes et al. (2021) reported that adolescents who take breakfast regularly were highly likely to consume nutritious diets compared to those who never had. With age, the quality of the diet and breakfast consumption tends to

reduce (Gibney et al., 2018), although this might not be the case always. Snacking increases from elementary to the higher grades (KNBS (Kenya National Bureau of Statistics), 2022). Prnjak et al. (2021) argues that female college students eat with a lot of consciousness about beauty, appearance, and weight. Szabo and Piko (2019) reported that targeting the unhealthiness of inappropriate diets should go together with seeking solutions. There is limited information on the relationship between individual and environmental factors and the eating habits of college students. Despite the existing rich nutrition literature, there is inadequate targeting of issues related to unhealthy eating and choice of healthy foods.

2.2 Factors associated with Eating Habits among College Students

2.2.1 Individual Factors associated with Eating Habits among College Students

According to Arroyo et al. (2023), the preferences for specific foods are guided by liking or taste. Romero-Blanco et al. (2022) reported that personal preferences for fast food and vending machine snacks are identified as barriers to healthy eating among adolescents. Almasi and Rakicioglu (2021) also reported that nutrition knowledge plays a very crucial role in promoting positive attitudes that ultimately influence the dietary habits. According to Coman et al. (2024), raising the levels of accurate nutritional knowledge can help in reducing the burden of lifestyle conditions among young adults. In a research study on dietary intakes among college athletes from National Collegiate Athletic Association, Shriver, Betts and Wollenberg (2021) established that among the athlete students, the nutrition information sources were as follows; internet- 28%; magazines or newspapers- 70%; neighbours, friends, and families- 65%; coaches- 52%; and television- 60%. Annamalai and Gopichandran (2022) established that many of the responses were

from the female students, who also had higher nutrition knowledge and label reading behaviour marks compared to the men. Colleran, Fuller and Silva (2019) observed that for whole grains, protein, dairy and fruit, increased knowledge was related to higher chances of meeting the dietary guidelines. Moreover, on individual food choice, more healthful choices were linked to nutrition knowledge in every case (Colleran, Fuller & Silva, 2019). Nonetheless, nutrition knowledge does not consistently translate to appropriate dietary practices among students in university colleges that are within Nairobi metropolis (Kariuki, 2021). This gap can only be bridged if the factors influencing the eating behavior are clearly understood.

Young people are image conscious, which makes them very attentive to desirable figures, wellbeing, and good appearances when taking food (Nayak et a., 2023). This perception is based on the food conscious society which has unrealistic ideals of body weight, in addition to favoring slim bodies. As noted by Timlin et al. (2020), the success in behavior change interventions related to eating habits can only be realized if all the underlying and related factors are understood. There is a need for detailed investigation on factors linked to the eating habits among college students in order to provide information which could form the basis for policy formulation on healthy eating. There in scarcity of information on the influence of the individual and environmental factors on the eating habits of college students in Kenya.

2.2.2 Social and Physical Environmental Factors associated with Eating Habits among College Students

The health outcomes of students are influenced by both the physical environment but also the social environments such as societal, community, college, family, peer, and

individual levels. Almansour, Allafi and Al-Haifi (2020) notes that eating disorders, malnutrition, and under-nutrition among Turkish university students is caused by issues such as living in dorms, separation from family, and economic status. According to Hoque, Hoque and Thanabalan (2018), the incomes of parents significantly influence healthy eating habits among students. The school environment influences the eating habits through physical and financial accessibility of foods, policies, and peer and teacher role modelling.

Kariuki (2021), established that eating habits form a key concern among the Mount Kenya university students in Rwanda, particularly because of the changeover from home environments. However, family and pressure from the parents continue influencing the food choices of college students (Maunder, 2018). Peer interactions, social media, and advertising through mass media are presently playing evident roles in the food choices of youths. However, lot of the information being circulated is inaccurate and lacks scientific authentication (Ministry of Medical Services, 2010). There is also an upsurge of nutrition information from peer interactions (Maunder, 2018) and advertising mass media (Akujobi, 2022). This may influence food choices either positively or negatively. Competing activities imposes stress among the nutrition students, therefore hindering healthy nutrition habits (Kariuki, 2021). For the others, although the intent and willingness is there, healthy eating patterns remain theoretical than practical (Mogeni & Ouma, 2022).

In a study conducted by Szabo and Piko (2019) established that the college environment greatly influences eating habits through the foods available, and nutrition curricula, nutritional policies, and peer and teacher modelling. Therefore,

colleges and other tertiary institutions should enhance conducive environments for motivating appropriate dietary practice.

In Kenya, despite having general healthy eating guidelines, there is no guideline for college nutritional meal requirements and this may influence the eating habits among the college students. The college food environments are also rarely regulated in Kenya. The current study therefore aimed at to establishing both the social and physical environmental factors linked to the eating habits of college students.

2.3 Nutritional Status of College Students

Khan, Zada and Ismael (2022) noted that college students aged between 18 and 24 years acquire personal freedom and novel experiences, and develop the sense of identity while ascending to adulthood from adolescence. Centers for Disease Control and Prevention (2017) reports that, the rates of cancer, heart disease, and obesity have remained stagnant among the 18- 24-year-olds over the previous decade. While obesity and overweight are key nutritional concerns among the college-age youth, the interaction between individual, social and physical environmental factors might result to undernutrition. In a study conducted by Awoke et al. (2022) among 1st and 2nd year students in food, nutrition, and exercise in Virginia, significantly higher body fatness in women compared to men was reported.

A study by Ndung'u, Waudo and Kobia (2024) showed that female participants had higher prevalence of overweight (73.2%) and obesity (63.2%) compared to the male. This study also disclosed that the prevalence of underweight (57.1%) was higher in males than females. Ndung'u, Waudo and Kobia (2024) asserts a 21.7% of

abdominal obesity by waist circumference, with a higher female prevalence (87%) than males (13%). A study conducted in Rwanda among Mount Kenya University students established that poor dietary habits relate directly to the BMI (Body Mass Index) (Kariuki, 2021). There is limited information on the nutrition college students' nutrition status in Kenya. The current study therefore aimed at establishing the nutrition status of KMTC nutrition students using BMI and WHR (Waist Hip Ratio).

2.4 Summary of Literature Review

Young people, including the college-age population, are at a critical development stage. Unhealthy diets lead to chronic diseases overtime, and obesity has been increasing worldwide and particularly in the Low Middle-Income Countries, Kenya included. College students barely meet the recommended dietary intake, and engage in sub-optimal dietary habits. Gender variations exist in the nutrition status of young people in college, mostly based on societal pressure, where the society has unrealistic body weight ideals and prefers slim bodies. An amalgamation of factors (individual, social- and physical- environmental) influences the eating habits of college students. Nutrition issues among college students, specifically among nutrition students at KMTC, have not received a lot of attention both in research and programming. There is inadequate information on the factors which influence their eating habits and consequently the nutrition status.

CHAPTER THREE: METHODOLOGY

3.1 Research Design

A cross-sectional analytical study design was adopted to assess the prevalence of overweight and obesity and eating habits among the study participants. Data collection occurred at one point in time. The study design allowed for exploration of relationships between variables.

3.2 Study Variables

Table 3.1: ***The Dependent, Independent and Confounding Variables***

<table>
<tr><td colspan="2">Dependent Variables</td><td>Indicators</td></tr>
<tr><td colspan="2">Eating habits (WHO, 2008)</td><td>a) Eating healthy foods
b) Dietary diversity
c) Frequency of food consumption
d) Skipping or not skipping meals
e) Types of foods eaten</td></tr>
<tr><td colspan="2">Nutrition status- Overweight and Obesity based on WHO 2000 cut-off points</td><td>a) Waist/hip ratio (>0.85 and >0.90 for women and men respectively)
b) BMI</td></tr>
<tr><td colspan="3">Independent Variables</td></tr>
<tr><td>Individual factors
• Food preferences as influenced by time demands and convenience what does this mean?
• Nutrition knowledge
• Socio-economic &-demographic characteristics</td><td>Social environmental factors
• Peer interactions (pressure/ modelling)
• Parental control and family influence
• Media influence</td><td>Physical environmental factors
• Access to foods
• Eating facilities
• Availability of food</td></tr>
<tr><td colspan="3">Confounding Variable – Physical activity; Indicators: Intensity and Duration (WHO, 2022)</td></tr>
</table>

3.3 Location of the Study

The study was conducted in KMTC Karen, Nyandarua and Molo campuses. The state corporation offers 36 different health-related courses, among them Nutrition and Dietetics. The institution has students pursuing higher diploma, diploma and certificate levels. The Nutrition and Dietetics department trains students on healthy eating behaviour as well as the consequences of unhealthy eating. The Nutrition and Dietetics department has two categories of students, one in-service and the other pre-service. The in-service students reside mainly outside the campus as they are self-sponsored whereas the pre-service students are majorly residents at the school. The approximate number of nutrition students in one campus during a semester is 300.

3.4 Study Population

The study was conducted among nutrition students at the KMTC- Karen, Molo, and Nyandarua Campuses. This study focused on the pre-service diploma students, who are normally fresh graduates from high school. The third- and second- year pre-service students were the focus of this study as their content coverage from the curriculum is enough to enable assessment of nutritional knowledge.

3.4.1 Inclusion Criteria

The respondents were either in their second and third year of study who were boarders in the campuses, undertaking a pre-service diploma nutrition course at KMTC Nyandarua, Molo, or Karen campuses, and gave an informed consent. Only those willing to participate in the study were recruited upon their informed consent.

3.4.2 Exclusion Criteria

Nutrition students having chronic conditions, those on special dietary regimes, and KMTC students on other programs other than nutrition and dietetics were excluded from the study.

3.5 Sampling Techniques and Sample Size

3.5.1 Sampling Technique

The sampling frame was composed of the 13 KMTC campuses that offer nutrition, with a total population of 1643 students. KMTC campuses in Karen, Molo, and Nyandarua were selected purposively based on having larger numbers of 2nd and 3rd year pre-service diploma nutrition students, and their close vicinity to urban areas, where transitions in lifestyle and dietary behaviours has been observed recently. Proportionate sampling was used to determine the student numbers from each campus and class. 160 participants were sampled from Karen campus (76 3rd year and 84 2nd year). 46 participants were from Molo campus (20 3rd year and 26 2nd year), while there were 40 3rd year and 47 2nd year respondents from Nyandarua campus. Consequently, simple random sampling was done to select the respondents from each class using the table of random numbers (Fig. 3.1).

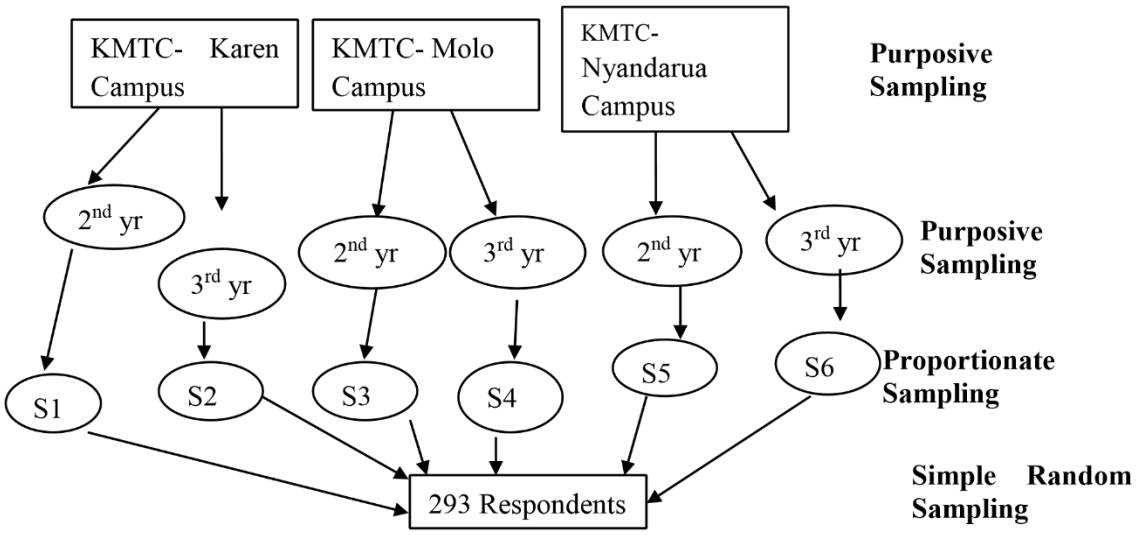


***Figure 3.1*: The Sampling Methodology**

3.5.2 Sample Size Determination

The sample size was determined using the Cochran formula: $N_0=z^2pq/e^2$ Where; e= desired precision level/ margin of error; p= proportion of the population with the characteristic of interest; q= 1-p; z value = 1.96 (Cochran, 1977). Based on Peltzer et al. (2014), the prevalence of overweight or obesity among university students aged 16 to 30 years in low and middle-income countries is 22%. This prevalence was used considering that the age of participants in this sample was similar to what is being studied, and Kenya is also a middle-income country.

$= (1.96^2)(0.22)(0.78)/ 0.05^2$

$=$ 264 respondents. Considering a 10% Non-response rate;

Desired sample size (total) = sample size obtained/ (1- non-response rate)

n= 264/(1-0.1)= 293

3.6 Data Collection Instruments and Tools

A content-validated, semi-structured, self-administered questionnaire (Appendix B) was used in collecting information on social and physical environmental factors, individual factors, and eating habits. Other instruments were observation checklist (Appendix D) that collected information on types of foods consumed and how diverse it was, and Focus Group Discussion guide for qualitative data such as how various factor influence eating habits in college (Appendix C). Assessment of physical activity was done using self-reported Global Physical Activity Questionnaire (GPAQ) by WHO (2022) (Appendix E).

3.7 Research Assistants' Selection and Training

There was recruitment of two research assistants to help with data collection. The recruitment criteria was; an undergraduate or diploma graduate in nutrition course, with previous research experience. The assistants were trained on the data collection components to ensure proficiency and accuracy as outlined in Appendix F. The topics included in the training were the nature of study, objectives, materials and method of data collection, ethical issues in research, taking anthropometric measurements, and the work schedule. They were also trained on interviewing techniques. Training was conducted using PowerPoint presentations, lectures, role plays and demonstrations.

3.8 Pilot Study, Pretesting of Data Collection Instruments, and Calibration of Weighing Scales

10% of the sample size (30 participants) were involved in the pretesting at Thika School of Medical and Health Sciences. Their feedback aided in improving the validity, reliability and accuracy of the instruments used in data collection. The

highlighted major issues with the data collection tools, including content, length, language level, and wording. Necessary review and modifications were done based on the pre-test, irrelevant or ambiguous questions eliminated, and mistakes corrected. The data collection tools were tested for accuracy so that correct readings were obtained. The weighing scale was calibrated every time before its use and after movement by placing a known 1KG item on it.

3.9 Validity and Reliability of Tools

A panel of nutrition experts scrutinised the questions thoroughly for validity. Reliability was tested using the test-retest method for reproducibility of results, with a reliability of 0.8- 0.9. Cronbach's alpha was also used, with a range of 0.7 to 0.9. The pre-test subjects' feedback guided improvements on the data collection instruments.

3.10 Data Collection Techniques

Two research assistants, supervised directly by the principal researcher, assisted in data collection. After, the participants were briefed about the research study and their informed consent was sought. Respondents responded to the questionnaires at their respective colleges in spacious halls. The questionnaires were checked for completeness before being collected.

3.10.1 Anthropometric Measurements

Data on the nutrition status was collected using the weighing scale, height scale, and tape measure. The measurements were taken twice, after which the average was obtained. If measurements were too apart, a third measurement was taken. To avoid

errors when taking the weight, the participants removed their shoes, heavy clothing, and items from their pockets. When taking the height, the participants stood upright on the scale with the head, shoulders, buttocks and heels touching it, while staring straight ahead. For both the weight and height, two measurements were taken, after which the average was obtained. These two measurements were used to calculate the BMI (Body Mass Index). The hip measurement was taken at the fullest part of hips and buttocks. The waist measurement was taken at the torso's narrowest part, below the ribcage and above the belly button. These two measurements were used to calculate the WHR (Waist Hip Ratio). The instruments were also calibrated prior to and during the data collection process. The brand name of the equipment used was Seca.

3.10.2 Focus Group Discussions

The facilitator started by briefing the participants on the research study, and sought their informed consent. Recorded FGDs were used in collecting qualitative information on eating habits and the influencing factors. A mobile phone assisted in recording the sessions through a video. The FGDs consisted of 6-12 respondents from each of the classes. A total of six FGDs were conducted in the three campuses; two from each campus. The FGDs were conducted in the campuses' lecture halls that were comfortable and free from disturbance. The facilitator conducted the sessions with the help of a recorder using the FGD guide during discussions while observing for non-verbal communication. Each discussion took an average of 60- 90 minutes. One research assistants recorded the discussion.

3.10.3 Observations

Observation guide was used for collecting additional data on the eating habits. The nutrition students were observed at the food kiosks and their areas of residence as they took their meals. A total of 30 students were observed (10% of the total sample), and proportionate sampling was used in selecting the number from each campus. An observation checklist guided the data collection on dietary intake and their diversity (Appendix D).

3.11 Data management and Analysis

Quantitative data was cleaned first and then coded. It was entered into the Ms Excel for BMI calculations. It was then entered into SPSS version 25.0 for the analysis. Descriptive statistics was done for general data characteristics. Outliers were identified through dispersion, means, frequencies, and cross tabulation. Extreme values were all set at the mean value by being transformed.

A knowledge score was used in determining the knowledge level of the students, where an incorrect response scored 0 and correct response 1. The overall knowledge score was the total of correct responses expressed as a percentage. There was a total of 17 questions and therefore the total possible score was 17. A score of 40 % was categorized as low nutrition knowledge, 41-69 % moderate, and >70 % high nutrition knowledge (Kigaru et al., 2015). The higher the knowledge score, the higher the competence. Dietary diversity score was calculated on the foundation of the food groups consumed in a 7 days reference period. The food groups considered were starchy staples, legumes – Beans and peas, nuts and seeds, all dairy, meat and meat products, fish and fish products, eggs, dark green leafy vegetables, other vegetables,

and fruits (WHO, 2008). A consumption of 3-4 times per week was considered a regular, and consumption of more than 4 food groups was considered to be dietary diverse, as spelt out by WHO (2008). Observation was also done to determine the eating habits. The waist-hip ratio cut-off points by WHO were used, where for women and men, a ratio of >0.85 and >0.90 respectively indicated central obesity. WHO physical activity recommendations were used, that is, 150 minutes for moderate-intensity and 75 minutes for vigorous-intensity throughout the week, and MET values were used during analysis, where moderate MET (Metabolic Equivalents) value was equated 4.0 and vigorous MET value equated 8.0 (WHO, 2022). For nutrition status assessment, BMI (Body Mass Index) was calculated and BMI cut-off points according to WHO (2000) used.

Table 3.2: ***The BMI Cut-off Points According to WHO (2000)***

Nutritional Status	**BMI cut-off: WHO criteria**	**Nutritional Status**	**BMI cut-off: WHO criteria**
<16	Severe underweight	25- 29.9	Overweight
16- 16.9	Moderate underweight	>/ Equal to 30	Obese
17- 18.4	Mild underweight	30-34.9	Obesity Class 1
18.5- 24.9	Normal	35- 39.9	Obesity Class 2
		>40	Obesity Class 3

Chi square test helped in determining the associations and relationships between observed and expected frequencies of nutrition knowledge, nutrition status, and eating habits. Man Whitney U test aided in comparing differences between independent (individual, social- environmental, physical-environmental) for variables not normally distributed and dependent variables (eating habits and nutrition status) in the three

campuses. Statistical differences between campuses' means was tested using one-way ANOVA tests.

Bivariate Spearman's rank order correlation was used for determining the direction and strength of associations between the nutrition knowledge and eating habits, eating habits and nutrition status, social environmental factors and eating habits, and physical environmental factors and eating habits. Multivariate logistic regression analysis was used to determine the predictor of eating habits and nutrition status. A $p< 0.05$ was set as the statistical significance level.

Thematic analysis was used for analyzing the qualitative data on the physical and social environmental factors, individual factors, and eating habits. The qualitative data collected from the guides and FGDs was transcribed then coded by assigning labels to the variable categories. Common themes were established then clustered in some patterned order. Conclusions were derived from the common themes. Information was then triangulated with data obtained from the questionnaires. Thematic analysis was used on data from observations, and conclusions drawn from findings.

3.12 Ethical and Logistical Considerations

Approval to conduct the research was acquired from KU Graduate School (Appendix G). Ethical clearance was sought from KU Ethical Review Committee (Appendix H). A permit to conduct the research was obtained from NACOSTI (National Council of Science Technology and Innovation). Approval from Principals at KMTC- Karen, Molo, and Nyahururu Campuses was also sought (Appendices J and K). Participants permitted their informed consent before participating in the study

(Appendix A). Confidentiality was upheld through coding the participants' identity. Information from participants was handled by researchers for research purposes alone. All participants were treated with respect. The research findings were also shared with principals from the three KMTC campuses.

CHAPTER FOUR: RESULTS

4.0 Introduction

This section presents the study findings based on the objectives. Descriptive findings on socio-demographic and -economic characteristics of KMTC nutrition students, nutrition knowledge, eating habits and food preferences, and nutritional status are presented. This is followed by inferential statistics on the influence of food access on the eating habits; family, media and peer influence on the eating habits; and the relationship between individual factors, social and physical environmental factors, eating habits and weight status of the nutrition students. There is also an integration of findings from both qualitative and quantitative methods.

4.1 Socio-demographic and socio-economic characteristics

A total of 293 students participated in the study; Karen (54.8%), Nyandarua (29.8%), and Molo (14.7%) campuses. The respondents' socio-demographic and -economic characteristics are presented in Table 4.1. Over half of the participants (62.5%) were aged between 22- 25 years. A majority of the participants were females (76%). Most of the guardians were married (69.8%) whereas 28.4% were single. The minority were the divorced and widowed (0.3%). Nearly a third of the guardians were either unemployed (34.5%) or in permanent formal employment (35.4%). Over half of the guardians to the participants were university or college graduates (51.2%), while 6.1% never attended school. The participants' mean age was 22.7 (±2) years. The mean pocket money for the month preceding the interview was 2533.27 (±1740.65) Kshs (Table 4.1).

Table 4.1: ***Respondents' Socio-demographic and Socio-Economic Characteristics***

Characteristics		(N=293) n (%)
The campus of the respondents		
Karen	160	(54.6)
Molo	46	(15.7)
Nyandarua	87	(29.7)
Age Mean (SD)	22.7 (± 2)	
Age by categories		
18-21	87	(29.7)
22 – 25	183	(62.5)
26-29	23	(7.8)
Gender		
Male	71	(24.2)
Female	222	(75.8)
Monthly pocket money (Kshs) Mean (SD)	2533.27 (±1741)	
Guardian's marital status		
Married	203	(69.3)
Divorced	1	(0.3)
Single	84	(28.7)
Separated	4	(1.4)
Widow	1	(0.3)
Occupation of the guardian		
Permanent formal employment	104	(35.5)
Contract employment	42	(14.3)
Casual labourer	46	(15.7)
Unemployment	101	(34.5)
Education level of the guardian		
Primary	32	(10.9)
Secondary	93	(31.7)
University/ College	150	(51.2)
Never attended school	18	(6.2)

4.2 Eating Habits among KMTC Nutrition Students

Generally, the findings clearly show that there was a high consumption of starches, and the adequacy and variety diet principles were not observed. Water and fruit juices were also consumed with meals.

4.2.1 Consumption of breakfast, meal frequency, and water intake among the Respondents

On average, breakfast was consumed six days in a week, while 4.8% of the respondents had skipped it in the last 24 hours. The minimum recommended meal frequency of five meals daily was not met since on average two meals were consumed in a day. The majority (55.6%) consumed less than three meals per day, while 44.4% attained the recommended meal frequency by consuming five meals per day. On average, the students consumed 5 glasses of water per day, which was below the recommended intake (Table 4.2). However, 25.2% of the respondents were able to hydrate as recommended. Noteworthy, reports from the FGD indicated that the thumb rule of avoiding fluids (water and fruit juice) during or immediately after meals was also not observed by majority.

Table 4.2: ***Consumption of breakfast, meal frequency, and water intake among nutrition students***

	N=293				
	Min.	Max.	Mean	Std. Dev.	n (%)
The number of days breakfast was consumed in 7 days	0	7	5.9	1.7	
Number of meals consumed Per day	2	8	2.1	3.6	
Number of glasses of water taken daily	1	12	5.2	2.1	
Consumption of 8 or more glasses of water as recommended	1	2	1.75	0.434	74 (25.2)
Skipped breakfast in the last 24 hours	1	2	1.05	0.214	14 (4.8)
Consumed tea only in the last 24 hours	1	2	1.69	0.465	92 (31.4)
Attained the recommended meal frequency of 5 meals in a day	1	2	1.55	0.497	130 (44.4)

4.2.2 Reasons for skipping meals

Lack of money was quoted by 61.8% of the participants as the reason why the nutrition students skipped meals. Other reasons included; competing activities (20.8%), to maintain body shape (7.8%), religion (6.2%), and eating place too far (3.4%) (Table 4.3). Due to inadequate finances, the students purchase cheaper foods such as *ugali and* kales in place of expensive ones such as beef and chicken).

Table 4.3: ***Reasons for skipping meals among nutrition students***

Characteristics	**N= 293**

	n (%)
Because of competing activities	61 (20.8)
Lack of money	181 (61.8)
To maintain body shape	23 (7.8)
Religion	18 (6.2)
Eatery located too far (more than 1 KM)	10 (3.4)

4.2.3. Timing of snacks

While 23.5% of the respondents consumed the afternoon snack about twice weekly, 28.1% never consumed the snack. One the same note, 26.0% of the respondents took the mid-morning snack about twice weekly whereas 21.5% never took the snack (Table 4.4).

Table 4.4: ***Timing of snacks among nutrition students***

Characteristics	Weekly Food Consumptions Habits (N= 293)					
	Always (≥once daily) n (%)	Often (5-6 times weekly n (%)	Sometimes (3-4 times weekly n (%)	Rarely (Twice weekly) n (%)	Once n (%)	No n (%)
Frequency of mid-morning snack in a week	30(10.2)	33(11.3)	46(15.6)	76(26.0)	45(15.4)	63(21.5)
Frequency of afternoon snack in a week	29(9.9)	18(6.1)	37(12.6)	69(23.5)	58(19.8)	82(28.1)

4.2.3.1 Type of snacks and frequency of consumption

Table 4.5 indicates the type of snacks and frequency of consuming them. Less than a half of the respondents (43.3%) rarely consumed commercial juice as a snack. However, 10.9% regularly consumed the commercial juice 3-4 times a week. While 31.7% of the respondents never snacked on chips, 5.1% consumed the chips 3-4 times a week. Nearly half of the participants (52.6%, 48.8%, and 49.5%) rarely snacked on

chocolate, doughnuts/ locally deep-fried dough snacks, and popcorns respectively. However, these food items were consumed as snacks by a considerable proportion of the respondents, as many as 3-4 times a week by 5.4%, 10.2% and 7.8% respectively. Nonetheless, this was contrary to fruit consumptions where only 21.2% and 37.2%, consumed them as a snack 3-4 times a week and daily respectively, (Table 4.5).

Table 4.5: ***Frequency of consumption of particular snacks***

N= 293	Never/rarely n (%)	1-2 times per week n (%)	3-4 times/ week n (%)	5-6 / week n (%)	Once Daily n (%)	2-3 times/ day n (%)	5 times+ per day n (%)
Commercial juices/ soft drinks (such as quencher, *afia*, *delmonte*, minute maid, tree top)	127(43.3)	34(11.6)	32(10.9)	15(5.1)	13(4.4)	7(2.4)	9(3.2)
Chips	93(31.7)	61(20.9)	15(5.1)	9(3.1)	4(1.4)	3(1.1)	9(3.2)
Chocolate	154(52.6)	31(10.5)	16(5.4)	9(3.1)	9(3.1)	5(1.7)	7(2.4)
Sausages/ smokies	101(34.5)	64(21.7)	19(6.5)	17(5.8)	15(5.1)	11(3.8)	4(1.4)
Doughnuts/ KDF (locally deep-fried dough snacks)	143(48.8)	47(16.1)	30(10.2)	10(3.4)	23(7.9)	3(1.0)	6(2.0)
Sweets	122(41.6)	43(14.7)	25(8.5)	22(7.6)	29(9.9)	5(1.7)	5(1.7)
Popcorns	145(49.5)	27(9.2)	23(7.8)	13(4.4)	10(3.5)	7(2.4)	7(2.4)
Cakes	83(28.3)	57(19.5)	42(14.3)	15(5.1)	16(5.5)	8(2.7)	9(3.1)
Fruits	14(4.8)	33(11.3)	62(21.2)	42(14.3)	109(37.2)	6(2.0)	9(3.1)

4.2.4 Consumption of fast foods, fruits and vegetables

Table 4.6 presents the consumption of fast food, fruits and vegetables among the study respondents. About a third (32.4%) of the respondents reported consumption of fast foods twice weekly. A few (17.4%) consumed the fast food more than once daily while only 6.1% never consumed. Slightly over a third of the respondents (34.2%) consumed fruits and vegetables 3-4 times weekly. Slightly over a quarter (26.6%) both consumed the fruits and vegetables more than once daily and 5-6 times weekly. Fruits and vegetables were consumed 3-4 times as a snack by about a quarter (25.3%) of the respondents in a week. Less than a quarter (23.2%) of the respondents had consumed more than one kind of vegetable 3-4 times in 7 days. A quarter (25%) of the respondents consumed more than a single kind of fruit more than once daily, while 24.2% had consumed 3-4 times a week (Table 4.6).

Table 4.6: ***Fast Food, Fruits and Vegetable Consumption habit***

Characteristics	**Weekly Food Consumptions Habits (N= 293)**					
	Always (≥once daily) n (%)	Often (5-6 times weekly n (%)	Sometimes (3-4 times weekly n (%)	Rarely (twice weekly) n (%)	Once n (%)	No n (%)
Weekly consumption of fast foods	51(17.4)	21(7.2)	26(8.9)	95(32.4)	82(28)	18(6.1)
Weekly consumption of fruits and vegetables	78(26.6)	78(26.6)	100(34.2)	21(7.2)	8(2.7)	8(2.7)
Weekly consumption of of fruits or vegetables as snack	61(20.8)	47(16)	74(25.3)	47(16)	35(12)	29(9.9)
Weekly consumption of more than one kind of vegetable	44(15)	41(14)	68(23.2)	52(17.7)	32(11)	56(19.1)
Weekly consumption of more than one kind of fruit	73(25)	42(14.3)	71(24.2)	52(17.7)	33(11.3)	22(7.5)

4.2.5. Dietary diversity among college students

Table 4.7 shows the frequency of consumption of foods from the various food groups. Dietary diversity score was calculated based on the food groups' consumed in the 7 days reference period. A consumption of 3-4 times per week was considered a regular (WHO, 2008; Ministry of Health, 2017). Slightly more than a third (35.6%) of the respondents consumed starchy staples daily whereas green leafy vegetables and other vegetables were consumed by 35.5% and 33.8% respectively. Only 26.9% of the respondents consumed fruits where as 29.7% consumed dairy daily. Slightly over a third of the respondents, 36.6% and 42.7%, had never/ rarely consumed nuts and seeds and fish and fish products respectively. There was no regular consumption of nuts and seeds, all dairy, and fish and fish products as these were consumed by less than 10% of the respondents 3-4 times weekly as follows; 10.6%, 10.2%, and 6.1% respectively, implying that a majority of the respondents had an irregular consumption of these foods (Table 4.7). The least frequently consumed food groups were nuts and seeds, meat and meat products, fish and fish products, and eggs where 28.4%, 43%, 17.1%, and 40.9% of the respondents consumed them ≥3 times per week.

Reports from the FGD indicated that the main meals' combinations consumed by the students comprised of *ugali* kales, rice beans/green grams, c*hapati* beans/ green grams, rice carrot peas and *ugali* cabbage. Moreover, during a single meal, variety and adequacy principles were not observed. For example, there was an overconsumption of rice beans, and no vegetable or fruit was consumed during the particular meal. The researcher also conducted structured observation sessions in eateries frequented by the students to assess the eating habits of the nutrition students. The observations indicated that there was no reflection of 'My Plate Model' in the meals consumed by the

participants, where starches constituted the larger portion, as opposed to fruits and vegetables. The implication from the ‘My Plate Model’ was that the recommended portion sizes were never observed. Participants also consumed fruits salads or fruit juices in place of the main meals.

Table 4.7: ***Frequency of Consumption of foods from different food groups***

Food Group	**N= 293**	**Frequency of consumption**							
	Never / rarely n (%)	1-2 per week n (%)	3-4 / week n (%)	5-6 / week n (%)	Daily n (%)	2-3 / day n (%)	4-5/ day n (%)	6+ per day n (%)	Frequently ≥3times/ week
Starchy staples	18(6.1)	49(16.7)	42(14.3)	26(8.9)	104(35.6)	5(1.7)	5(1.7)	8(2.7)	64.9%
Legumes – Beans and peas	21(7.2)	83(28.3)	73(24.9)	31(10.6)	42(14.3)	7(2.4)	2(0.7)	6(2.0)	54.9%
Nuts and seeds	106(36.6)	49(16.6)	31(10.6)	14(4.8)	16(5.5)	8(2.7)	5(1.7)	9(3.1)	28.4%
All dairy	36(12.3)	45(15.4)	30(10.2)	17(5.8)	87(29.7)	14(4.8)	14(4.8)	6(2.0)	57.3%
Meat and meat products	36(12.3)	88(30.0)	59(20.1)	24(8.2)	15(5.1)	19(6.5)	4(1.4)	5(1.7)	43%
Fish and fish products	125(42.7)	35(11.9)	18(6.1)	10(3.4)	6(2.1)	4(1.4)	7(2.4)	5(1.7)	17.1%
Eggs	51(17.4)	77(26.3)	53(18.1)	26(8.9)	21(7.2)	9(3.0)	6(2.0)	5(1.7)	40.9%
Dark green leafy vegetables	21(7.2)	40(13.6)	50(17.1)	26(8.8)	104(35.5)	12(4.1)	9(3.1)	10(3.4)	72%
Other vegetables	29(9.9)	45(15.4)	43(14.6)	29(9.9)	99(33.8)	15(5.1)	13(4.4)	9(3.1)	70.9%
Fruits	23(7.8)	46(15.7)	47(16.1)	45(15.4)	79(26.9)	14(4.8)	13(4.5)	8(2.7)	70.4%

A majority of the participants (87%) consumed over four food groups based on a 7-days reference period, and therefore, met the recommended dietary diversity (Table 4.8).

Table 4.8: ***Dietary Diversity among Nutrition Students***

		Frequency	**Percent**
	< 4 Food Groups	38	12.97
	≥ 4 Food Groups	255	87.03
	Total	293	100.0

***WHO (2008) Dietary Diversity Cut Off Points (≥ 4 Food Groups= Diverse; < 4 Food Groups= Not Diverse. Minimum dietary diversity is 4 food groups).**

4.3 Individual factors associated with eating habits among KMTC students

4.3.1 Nutrition knowledge of nutrition students

Nutrition knowledge of the students based on healthy eating guidelines was assessed. Table 4.9 presents the knowledge scores based on the proportion of the respondents who gave the correct answers for every question. Low scores (<50%) were also noted on consequences of unhealthy dietary habits among adolescents and recommended physical activity guidelines. However, the highest score was observed on sources of high biological value proteins (96.9%). Majority (>80%) of the students were knowledgeable on the percentage contribution of fat/oils to total energy needs in young adults, nutrition and health conditions associated with diets rich in sugar and fats, and tools for successful meal planning as highlighted (Table 4.9).

Table 4.9*: Nutrition knowledge of KMTC students*

S/No.	Aspects of knowledge	% of respondents with correct answers per question
1.	High biological value protein	96.9
2.	Source of recommended healthy fats/oils	55.3
3.	% contribution of fat/oils to total energy needs in young adults	84.3
4.	Unhealthy type of fat	65.2
5.	Recommended amount of water intake per day	59.7
6.	Nutrition and health conditions associated with diets rich in sugar and fats	80.9
7.	Recommended servings of animal proteins, fruits and vegetables from the food guide pyramid	67.2
8.	Tools for successful meal planning	90.4
9.	Basic diet planning principles	82.9
10.	Consequences of unhealthy dietary habits among adolescents	42.7
11.	Recommended dietary practices for the prevention of overweight and obesity	52.9
12.	Recommended physical activity guidelines	46.1
13.	Dietary habits helpful in the prevention of overweight	56.7
14.	Coping with food shortage in college	78.8
15.	Reason why fast foods and soft drinks are considered unhealthy	72.7

The overall knowledge score was the total correct responses per a respondent, expressed as a percentage. Majority of the respondents (57.7%) possessed moderate knowledge levels (low ≤40 %, moderate 41–69 %, and high ≥70 % knowledge (Kigaru et al., 2015) (Table 4.10).

Table 4.10: *Nutrition Students' Knowledge by Categories*

Level of knowledge	Frequency (N= 293)	Percent

Low (less than 40%)	32	10.9
Moderate (41 – 69%)	169	57.7
High score (> 70%)	92	31.4

4.3.2 Economic Food Access

The economic food access of the students was majorly determined by the amount of pocket money. The mean pocket money in the previous month was Kshs 2,533. KMTC college students spent varying amounts of money for the various meals daily. This expenditure was majorly determined by the amount of pocket money (Table 11).

Table 4.11 ***Monthly pocket money and amount of money spent for various meals***

	N= 293	**Min.**	**Max.**	**Mean**	**Std. Deviation**
Monthly pocket money		200	9500	2533.2721	1740.654
Amount spent daily on breakfast (Kshs)		0	90	39.5	15.9
Amount spent daily on lunch (Kshs)		0	150	61.5	30.5
Amount spent daily on supper (Kshs)		0	300	76.9	41.8
Meals taken in campus in a week		0	100	10.1	12.3
Number of times meals were taken outside the campus the preceding week		0	55	3.0	5.5

4.3.3 Economic food access and eating habits of nutrition students

There was a significant association between the amount of pocket money and frequency of consumption of breakfast; those students with higher amounts of pocket were less likely to miss breakfast (x^2=340.793, df=168, p=0.001). There was a significance association between the amount pocket money and meal frequency (x^2=40.847, df=24, p=0.017). There was a significant relationship between employment status of the parent/ guardian, skipping breakfast (x^2=50.709, df=21, p=0.001) and meal frequency (x^2=113.544, df=72, p=0.001). Respondents

whose parents had permanent jobs were more likely to take breakfast than those of contract employment, casual labourer and unemployed respectively. Moreover, more number of meals was noted among respondents whose parents had permanent job compared to others (Table 4.12).

There was a positive relationship between the amount of money spent daily for breakfast and the frequency of consumption of breakfast weekly (pearson product moment correlation r=-0.121, p=0.042). If more money was spent, the student also consumed breakfasts in more number of days in a week. Looking at how much was spent for lunch in comparison to the number of days a student prepared meals for himself in a 7-days period, a negative correlation was observed (r=-0.021, p=0.150). Meals preparation attracted a higher cost (Table 4.12).

No cooking was permitted in the students' hostels as reported in the FGDs conducted. Hence, the respondents purchased food from kiosks outside the campus, or ate at the college cafeteria. The students were responsible of making choices about their meals, including where to take the meals from. The break time was not always sufficient to allow access of food, often due to congestion as many students bought food at this particular time. The distance to the kiosks outside the college, where students could afford meals was also far (between 1.5- 2 KM). It was also reported that the cost of food at the college cafeteria was high. Moreover, the portions were small and lacked variety. Lack of variety in foods was attributed to finances, seasonality of some foods such as vegetables, time spent waiting to be served (as much as one hour), long distances to kiosks, and other times, later comers never got food. One respondent indicated that, *"due to lack of adequate finances, eating healthy food is a huge challenge*" (FGD

participant 1, 2021). Another respondent reported that "*the foods of choice are mainly determined by the purchasing power*" (FGD participant 2, 2021).

Table 4.12: ***Influence of economic food access on eating habits of nutrition students (skipping breakfast, meeting recommended meal frequency, purchasing food from informal eateries, and consumption of breakfast in 7 days)***

	(χ^2)	**d.f**	**p-value**
Associations between the amount of pocket money and:			
Skipping breakfast	340.793	168	0.001
Meeting recommended meal frequency (5 meals/day)	40.847	24	0.017
Purchasing food from informal food outlets/ eateries	147.195	72	0.012
Association between employment status of the parent/guardian and:			
Skipping breakfast in 7 days	50.709	21	0.001
Meeting recommended meal frequency (5 per day)	113.544	72	0.001
Variables correlated			**P-value**
Associations between how many days breakfast was eaten in 7 days and amount of money spent daily for breakfast			P value = 0.042 r = 0.121
Associations between amount of money spent for lunch and number of times student prepared meals for himself the previous week			P value = 0.021 r=0.150

4.4 Social and Physical Environmental Factors associated with eating habits among KMTC students

4.4.1 Physical food access

Majority of the KMTC students took their meals from informal food kiosks/ eateries. Majority of the students also preferred eateries that were between 1.6 and 2 KM away as they offered affordable, even though unhealthy food. This indicates that considerable time was taken to access meals (Table 13).

Table 4.13: ***Physical food access***

	Frequency	**Percent**
Informal food kiosk	149	50.9
School mess	137	46.8
Restaurant / hotel (outside college)	7	2.3
Total	293	100.0
Distance to preferred eatery	**Frequency**	**Percent**
< I km	56	19.1
1- 1.5 km	77	26.3
1.6- 2 km	160	54.6

4.4.2 Influence of family, media and peers on eating habits of nutrition students

While 34.8% of the respondents had their dietary habits influenced positively by the college environment, 32.8% were influenced negatively, and 32.4% felt the college environment influenced them in no way. 35.2% of the respondents never received reminders from their families concerning their meals while at college. This indicated that while they were at the college, they were responsible of guarding their eating habits. 89.4% of the respondents were supported by their parents through being sent for pocket money while 3.1% received no support (Table 4.14). This indicates that the financial status of the parents had a great influence on the eating habits of respondents.

Over half of the respondents (56.7%) took their meals with the fellow nutrition students while 30.7% ate alone. The fellow nutrition students can either be a positive or negative influence on the eating habits, since 57.7% of the respondents further reported that those they take meals with normally influenced their food choices. Furthermore, 76.3% indicated that the influence was positive, while 23.7% of the respondents indicated it was negative. On the same note, eating alone might make some students be prone to either positive or negative influences.

Slightly over half (51.5%) of the participants reported that their peers influenced their food choices, and 67.5% further reported that this influence was positive. Majority (68.6%) respondents reported that their campus administration did not support healthy diet choices (Table 4.14).

Table 4.14: ***Influence of family, peer and school environment on the eating habits***

Characteristics	**N=293 n(%)**
Influence of the school environment on healthy eating habits	
Yes, positively (by providing healthy meals)	102 (34.8%)
Yes, negatively (limited access to healthy foods, time constraints, peer pressure, no cooking)	96 (32.8%)
No	95 (32.4%)
Frequent follow-ups from family about meals while at the college	
Yes	103 (35.2%)
No	190 (64.8%)
How parents support	
Supplying me with food (either raw or cooked)	22 (7.5%)
Send me pocket money	262 (89.4%)
No support offered	9 (3.1%)
Peers influence on food choices	
Yes	151 (51.5%)
No	142 (48.5%)
Nature of the influence by peers (N= 151)	
Positive (positive role modelling, supportive accountability, eating out together)	102 (67.5%)
Negative (unhealthy food choices, skipping meals, peer pressure)	49 (32.5%)
Campus support on meal consumption among the students	
Yes (providing healthy meals)	92 (31.4%)
No	201 (68.6)

Further analysis showed that family control/ influence had a significant association and with selected eating habits; frequency of consuming soft drinks in a week (p=0.01), frequency of

consuming fruits and vegetables in a week (p=0.045), frequency of consuming 4PM snack weekly (p= 0.008), frequency of consuming fast-food weekly (p=0.003), and the choice for sausages/ smokies (p=0.004) and chocolate (p=0.007) (Table 4:15). Pearson product moment correlation established a significant association between media and influence on the choice of cakes (p=0.051), fruits (p=0.001), popcorns (p=0.023) and doughnuts (p=0.019). There was no significant association between family control and choice for cakes and popcorns (p=< 0.001). A significant association was observed between peers and the consumption of meals at appropriate time, consuming the 10 AM snack, and choice for popcorns, sweets, sausages/ smokies, and chocolate p=<0.05. No association was established between choice for doughnuts and peer influence (p=< 0.001).

Table 4.15a: ***Association between media influence and selected eating habits***

Associations between media influence and selection of eating habits			
	(χ^2)	**d.f**	**p-value**
Number of meals consumed daily in last 24 hours	34.627a	24	0.074
Breakfast consumption over a 7-day period	8.120	7	0.322
Snacking over a 7-Day period	3.297a	5	0.654
Consumption of main meals and snacks at the recommended time	1.350	1	0.245
Regular consumption of cakes	12.539a	6	0.051
Regular consumption of fruits	25.066a	7	0.001
Regular consumption of Popcorns	14.717a	6	0.023
Regular consumption of Sausages/ smokies	2.041a	6	0.916
Regular consumption of Chocolate	12.052a	7	0.099
Regular consumption of Artificial juice	8.581a	7	0.284
Regular consumption of soft drinks	11.751a	6	0.068
Regular consumption of Chips	12.082a	6	0.06
Regular consumption of Doughnuts/ "KDF"	15.141a	6	0.019

Table 4.15b: ***Association between family control and selected eating habits***

Associations between family control and selected eating habits			
	(χ^2)	**d.f**	**p-value**
Breakfast consumption over a 7-day period	17.053a	14	0.253
Glasses of water taken daily	23.702a	18	0.165
Meals consumption at appropriate time	0.985a	2	0.611
Soft drinks consumption over a 7-day period	23.323a	10	0.01
Fruits and vegetables consumption over a 7-day period	15.813a	8	0.045
4 PM snack consumption over a 7-day period	23.858a	10	0.008
10 am snack consumption over a 7-day period	11.254a	10	0.338
Fast food consumption over a 7-day period	26.988a	10	0.003
Where often do you take your meals	4.881a	6	0.559
Choice for cakes	37.420a	12	< 0.001
Popcorns	44.499a	12	< 0.001
Sweets	8.808a	14	0.843
Doughnuts/ KDF	20.221a	12	0.063
Sausages/ Smokies	28.899a	12	0.004
Chocolate	30.304a	14	0.007
Chips	16.784a	12	0.158
Carbonated drinks	15.869a	12	0.197
Artificial juice	21.126a	14	0.098

Table* 4.15c: *Association between peer influence and selected eating habits

Associations between peer influence and selected eating habits			
	(χ^2)	**d.f**	**p-value**
Fast food consumption over a 7-day period	22.355	15	0.099
Regular place from where meals are consumed	12.261	9	0.199
Glasses of water taken daily	27.209	27	0.453
Consumption of meals at appropriate time	8.765	3	0.033
Soft drinks consumption over a 7-day period	17.889	15	0.269
Fruits and vegetables consumption over a 7-day period	7.869	12	0.795
10 am snack consumption over a 7-day period	27.429	15	0.025433
Fruits or vegetables consumption over a 7-day period as snack	17.689	15	0.279
Food choice for fruits	19.869a	21	0.53
Cakes	28.128a	18	0.06
Popcorns	40.439a	18	0.002
Sweets	32.763a	21	0.049
Doughnuts/ KDF	62.430a	18	< 0.001
Sausages/ smokies	36.001a	18	0.007
Chocolate	46.053a	21	0.001
Chips	10.824a	18	0.902
Carbonated drinks	22.664a	18	0.204
Artificial juice	31.169a	21	0.071

According to the FGD, families to the participants supported them by sending money meant to buy food. However, the pocket money ranged between Kshs. 200 to 9500. This indicates that some students never had adequate money to enable them engage in proper eating habits. Respondents agreed that peers influenced the participants' food choices and preferences. One respondent noted, "*My peers often make me buy expensive food so as to maintain the standards they set, even if it calls for looking for alternative sources of money, including from sponsors"* (FGD participant 3, 2021). However, some participants reported that their peers never influenced them, and that they usually ate what was within their means. Others were influenced positively. The social media also influenced the food choices, including advertisements on YouTube, Instagram and Facebook. One of the participants indicated that, "*social media advertisements are usually very tempting and I have on several occasions tried out the food being advertised"* (FGD participant 4, 2021). Participants reported that the food offered within and around was not always safe as evidenced by diarrhoea. It was also not nutritious as it was often overcooked and too fatty. Acquiring nutritious foods was also highly dependent on one's finances and choice. The food was also expensive for the participants to afford, even though some such as vegetables were affordable. The main factors attributed to food choice and preferences were cost, taste, peer influence, food appearance, appetite, cooking method, psychological state, media, time, and physiological/ health status.

4.5 The Nutrition Status of KMTC Nutrition Students

A majority of the participants (65.8%) had a normal BMI. However, 20.5% were overweight, 5.5% obesity I and 2.0% obesity II. 1.7% of the students had severe malnutrition. Male students had higher levels of severe and mild malnutrition, both at 8.5%, compared to females who had

0% and 1.8% respectively. However, levels of moderate malnutrition (1.8%), obesity I (6.8%) and obesity II (2.7%) were higher among female students (Table 4.16).

Table 4.16: ***Nutrition Status Based on BMI and Gender***

	TOTAL N= 293		**Female**		**Male**	
	Frequency	**%**	**Frequency N=222**	**%**	**Frequency N=71**	**%**
Severe underweight (BMI <16)	5	1.7	0	0.00	6	8.5
Moderate underweight (BMI 16-16.9)	4	1.4	4	1.8	0	0.00
Mild underweight (18.5- 24.9)	9	3.1	4	1.8	6	8.5
Normal (25- 29.9)	193	65.8	146	65.7	42	59.2
Overweight (>/equal 30)	60	20.5	47	21.2	15	21.1
Obese 1 (30- 34.9)	16	5.5	15	6.8	2	2.7
Obese 2 (35- 39.9)	6	2.0	6	2.7	0	0.00
Obese 3 (>40)	0	0	0	0	0	0

***WHO (2000) BMI classification**

Based on Waist/ Hip Ratio, central obesity was observed among 17.8% of the respondents. Based on WHR, obesity levels were higher in males (63.4%) compared to females (4.1%) (Table 4.17).

Table 4.17: ***Nutrition Status Based on WHR and gender***

	TOTAL N=293		Female		Male	
	Frequency	**%**	**Frequency N=222**	**%**	**Frequency N=71**	**%**
Obesity	52	17.8	9	4.1	45	63.4
No Obesity	241	82.2	213	95.9	26	36.6

(Central Obesity: >0.85= Women and >0.90= Men)

4.6 Physical Activity

The majority of the respondents (46.1%), their work entailed of moderate-intense activities that lead to small increases in the heart rate (Table 4.20). Slightly less than a third of the respondents engaged in vigorous-intensity activities that leads to huge increases in the heart rate (26.3%) and low- intensity activities (27.5%). Therefore, 27.5 % of the participants led a sedentary lifestyle, therefore at risk of chronic diseases. Nonetheless, 53.2% used a bicycle or walk for a continuous ten minutes, at least, to get to or from places. However, majority (59.7%) never engaged in vigorous-intensity fitness, sports, or leisure activities that led to huge increases in the heart rate for at least ten minutes. (Table 4.18).

Table 4.18: ***Physical activity levels among nutrition students***

	%
High physical Activity	77 (26.3)
Moderate physical activity level	135 (46.1)
Low physical activity level	81 (27.5)
Use of a bicycle or walking for a continuous ten minutes	156 (53.2)
Engagement in any vigorous- intensity fitness, sports, or leisure activities	118 (40.3)

4.7 Relationship between individual factors, social and physical environmental factors, eating habits and BMI

4.7.1 Relationship between socio-demographic and -economic factors and respondent's nutrition status

The association between socio- demographic and -economic factors and the nutrition status of the respondents is indicated in table 4.19. A significant relationship was established between the amount of pocket money and nutrition status (AOR = 1.917), p = 0.044).

Table 4.19 ***Relationship between socio-demographic and -economic factors and respondent's nutrition status***

Factor	**Characteristics**	**N=293 COR (CI)***	**P****	**N=293 AOR (CI)*****	**P**
Marital status	Married ref.		0.999		0.403
	Divorced		0.996	1.00(1.00 – 1.00)	1
	Single		0.999	1.222(0.684 – 2.182)	0.498
	Separated		0.996	9.563(0.972 – 3.079)	0.053
	Widow		0.996	1.00(1.00–1.00)	1
Amount of Pocket Money	<2500 ref.			1.00(0.00 – 0.00)	0.001
	≥2500	1.263 (0.491 – 3.249)	0.629	1.917(1.016 - 3.615)	0.044****
Parents employment status	Not employed ref.		0.622		
	Employed	0.836(0.444- 1.573)	0.578	0.856(0.462- 1.586)	0.622
Money spent for breakfast		1.006(0.979- 1.034	0.655	1.008(0.994 - 1.021	0.287
Money spent on lunch		1.007(0.986 - 1.028)	0.520	1.005(0.995- 1.016)	0.325
Money spent on supper		1.012(0.997 - 1.027)	0.125	0.998(0.991- 1.005)	0.613
Number of meals taken in campus		0.989(.977 - 1.002)	0.094	1.001(0.978- 1.025)	0.918

COR [CI]*: acronym for the crude odds ratio and the confidence intervals

** p = p-value: p < 0.05 significance level

***AOR [CI] =adjusted odds ratio with the confidence intervals. Adjustments were made for age, gender and physical activities

****significant relationship with WHR

4.7.2 Association between individual factors and nutrition status

A positive correlation was observed between BMI and the present employment status of the parents (x^2=30.364, p=0.034), where being employed was associated with better nutrition status (Table 4.20). A significant association was also observed between gender and BMI (p=0.001), age and WHR (p=0.004), and present employment status of the guardian and WHR (p=0.004). No association was established between BMI and age, and the marital status (p=< 0.001). The current study established a positive correlation between the BMI of nutrition students and the reasons quoted for skipping meals (p=0.009). There was also a positive correlation between nutrition knowledge and BMI (p=0.001), and dietary diversity and WHR (p=0.004) (Table 4.20).

Table 4.20: ***Association between nutrition status and students' individual factors***

Associations between	**Chi-square Value (χ^2)**	**df**	**p-value (Chi-square)**
Gender and Waist Hip Ratio	135.142	1	.000
Marital status and Waist Hip Ratio	1.972	4	0.741
Present employment status of guardian and WHR	13.239	3	0.004
Age and WHR	26.17	10	0.004
Gender and BMI	23.606	6	0.001
Marital status and BMI	278.128	24	< 0.001
Present employment status of guardian and BMI	30.364	18	0.034
Age and BMI	105.089	60	< 0.001
Reasons for skipping a meal and WHR	2.062	4	0.724
Reasons for skipping a meal and BMI	43.192	24	0.009
Skipped breakfast in the last 24 hours and BMI	3.260a	6	0.775639
Skipped breakfast in the last 24 hours and WHR	1.090[a]	1	0.296
Nutrition knowledge and BMI	33.768	12	0.001
Nutrition knowledge and WHR	3.744	2	0.154
Dietary diversity and WHR	11.002	2	0.004
Dietary diversity and BMI	6.776	10	0.746

***BMI= Body Mass Index, WHR= Waist Hip Ratio**

4.7.3 Association between nutrition status and physical activity levels

There was positive correlation between the physical activity and BMI (x^2=25.198, df=12, p=0.014) (Table 4.22). There was a significant relationship between the BMI and moderate intense fitness (p=0.001). Moreover, spending more time on exercise led to a smaller WHR (Table 4.21).

Table 4.21 ***Association between nutrition status and physical activity levels***

Variables	**Chi-square**	**p-value**

	Value (χ^2)	
Associations between BMI and use of a bicycle or walking for a continuous ten minutes, at least, to get to or from places	25.198	0.014
Associations between BMI and engagement in any moderate- intensity fitness, sports, or leisure activities which cause a small increases in heart rate for at least ten minutes	72.604	0.001
	r	**p-value**
Associations between BMI and number of days one engages in moderate - intense activities in an ordinary week	-0.126	0.035
Associations between BMI and the total amount of time spent sitting or travelling [exclude sleeping] in a typical day	-0.142	0.018
Associations between WHR and amount of time spent doing the moderate-intense activities at work in a typical day	-0.128	0.029

***BMI= Body Mass Index, WHR= Waist Hip Ratio**

4.7.4 Relationship between nutrition knowledge and eating habits

A simple linear regression was used to assess whether nutrition knowledge significantly predicted the eating habits of the study participants (dietary diversity, consumption of water, and weekly fast-food consumption). The results of regression suggested that nutrition knowledge explained 1.6% of the variance ($R^2 = 0.016$, $F(1,291) = 4.6975$, $p = 0.031$). This means nutrition knowledge significantly influenced the food habits ($\beta = -0.008$, $t = 2.167$, $p = 0.031$). The study showed that when the level of knowledge increased by one unit, there was a reduction by 0.008 in bad/poor food habits.

A binary logistics regression established an association between nutrition knowledge and some selected food habits. Respondents who were more knowledgeable were 26.5% (AOR = 0.265, p = 0.006), and were more likely to be adequately rehydrated compared to those with less knowledge (Table 4.22).

Table 4.22 ***Relationship between nutrition knowledge and eating habits***

Factor **Nutrition knowledge vs**	**Characteristics**	**N=293** **COR (CI)***	**P****	**N=293** **AOR (CI)*****	**P-value**
Frequency of fast-food consumption	None Ref.		0.231		0.4
	Once	0.247 (0.026 - 2.306)	0.22	0.284(0.033 -2.451)	0.252
	Rarely (twice weekly)	0.783(0.076 - 8.078)	0.837	0.899(0.091 - 8.868)	0.927
	Sometimes (4-3 times weekly	0.208(0.018 - 8.078)	0.207	0.263(0.025 - 2.789)	0.267
	Often (5- 6 times weekly	0.683(0.034 - 13.648)	0.803	0.757(0.04 - 14.306)	0.853
	Almost always (greater than once daily)	1.382(0.072 - 26.521)	0.83	0.488(0.049 - 4.907)	0.543
Hydrated as recommended	Yes, adequate	4.626(1.602 - 13.36)	0.005	0.265(0.103 - 0.68)	**0.006**
	Yes	0.574(0.201 - 1.643)	0.301	0.532(0.209 - 1.354)	0.185
Dietary diversity	< 4 food groups			0.757(0.04 - 14.306)	0.853
	>/ equal 4 food groups		0.998	0.899(0.091 - 8.868)	0.998

COR [CI]*: acronym for the crude odds ratio and the confidence intervals

** p = p-value: p < 0.05 significance level

***AOR [CI] =adjusted odds ratio with the confidence intervals. Adjustments were made for the employment status of parents, amount of pocket money, gender and age

4.7.5 Relationship between nutrition knowledge and nutrition status (BMI and WHR)

Nutrition status was regressed on predicting variable nutrition knowledge. A binary logistics regression did not establish an association between the nutrition knowledge and nutrition status of the study participant (Table 4.23). Nutrition knowledge was not a significant predictor of nutrition status.

Table 4.23: ***Relationship between nutrition knowledge vs nutrition status***

Characteristics	**N=293** **COR (CI)***	**P****	**N=293** **AOR (CI)*****	**P**
Nutrition Knowledge Vs BMI				
Low (less than 40%) REF.		0.79		0.530
Moderate (41 - 69%)	0.645(0.053 - 7.866)	0.731	1.385(0.151 - 12.715)	0.774
A high score (greater than 70)	0.796(0.064 - 9.865)	0.859	1.891(0.201 - 17.769)	0.577
Nutrition Knowledge Vs waist circumference				
Low (less than 40%) REF.		0.877		0.303
Moderate (41 - 69%)	0.816(0.07 - 9.545)	0.871	1.192(0.13 - 10.937)	0.877
A high score (greater than 70)	0.961(0.081 - 11.451	0.975	1.836(0.196 - 17.187)	0.594
Nutrition Knowledge Vs WHR				
Low (less than 40%) REF.		0.281		0.724
Moderate (41 - 69%)		0.999		0.999
A high score (greater than 70)		0.999		0.999

COR [CI]*: acronym for the crude odds ratio and the confidence intervals

** p = p-value: $p < 0.05$ significance level

***AOR [CI] =adjusted odds ratio with the confidence intervals. Adjustments were made for food habits, gender and physical activities

4.7.6 Relationship between physical environmental factors and nutrition status

On the environmental factors, where respondents often took their meals was noted as a predictor of nutrition status among the respondents. Consumption of food in the school mess had a significant association on nutrition status of the study respondents (AOR 1.10, $p<0.05$; 95%

CI: 0.987-1.013 Multinomial Logistic regression). As number of meals consumed in the school mess increased by one unit, the odds /probability of increasing BMI increased by 1.1 units.

Respondents with employed parents were 47% (AOR = 0.534, p = 0.001) less likely to have normal nutrition status compared to those whose parents were not employed. Respondents with more pocket money were 92% (AOR = 1.917, p = 0.044) more likely to be obese (have a high WHR) compared to those with low amounts of pocket money (Table 4.24).

Table 4.24 ***Relationship between selected individual factors and respondent's nutrition status***

Factors associated	**Characteristics**	**N=293**	**P****	**N=293**	
		COR (CI)*		**AOR (CI)*****	**P**
Parent's employment vs Nutrition status	Waist circumference	0.301(0.121- 0.751)	0.01	0.849(0.485 - 1.487)	0.568
	BMI	0.271(0.06 - 1.232)	0.091	0.585(0.171 - 1.996)	0.392
	WHR	0.426(0.147- 1.229)	0.114	0.534(0.113 - 1.429)	**0.001**
Amount of pocket Money vs Nutrition status	Waist circumference	1.824 (0.796 – 4.18)	0.155	.998(0.570- 1.749	0.994
	BMI	1.156 (0.267- 5.00)	0.846	0.640(0.385 - 1.067)	0.087
	WHR	1.348 (0.500 – 3.636)	0.556	1.917(1.016 - 3.615)	**0.044**

COR [CI]*: acronym for the crude odds ratio and the confidence intervals

** p = p-value: p < 0.05 significance level

***AOR [CI] =adjusted odds ratio with the confidence intervals. Adjustments were made for age, gender and physical activities

4.7.7 Relationship between eating habits and nutrition status

Significant statistical associations were established between the nutrition status and consumption of fast food, skipping meals, dietary diversity and consumption of snacks (Table 4.25).

Table 4.25 ***Relationship between eating habits and nutrition status***

Characteristics	**N=293** **AOR (CI)*****	**P value**
Nutrition status (BMI) vs fast food consumption	1.382(0.072 - 26.521)	0.001
Nutrition status (BMI) vs skipping meals	1.192(0.13 - 10.937)	0.029
BMI vs Consuming meals at the recommended time	0.574(0.201 - 1.643)	0.004
BMI vs Dietary diversity	0.816(0.07 - 9.545)	0.014
BMI vs Consumption of snacks	9.563(0.972 – 3.079)	0.032

COR [CI]*: acronym for the crude odds ratio and the confidence intervals

** p = p-value: p < 0.05 significance level

***AOR [CI] =adjusted odds ratio with the confidence intervals. Adjustments were made for gender and physical activities

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5. 1 Discussion

This section details the discussion to the research findings, as guided by the objectives.

5.1.1 Socio-Demographic and Socio-Economic Characteristics of KMTC Nutrition Students

Majority (62.5%) of the participants were aged between 22- 25 years, with a mean age of 22.7 (±2) years. This was similar to findings by Ndung'u, Waudo and Kobia (2024), where the college-age population was reported to be between 18 and 29 years. More females (76%) pursued the Nutrition and Dietetics diploma course compared to males, which was similar to findings by Annamalai and Gopichandran (2022). The mean monthly pocket money was 2533.27 (±1740.65) Kshs, and ranged between 200 and 9500 Kshs. This implies that some students were financially advantaged than others, which greatly affected the eating habits.

Socio-economic characteristics such as guardian's marital status, present employment status, and education level had an association with the eating habits of college students, since they influenced the amount of pocket money sent to a student. The guardian's marital status can influence the eating habits of a student, where married guardians might be well empowered financially to support the college students. At the same time, the education level of a guardian was likely to determine the status and level of employment, which in turn influenced the income and ability to support college students, both in terms of pocket money and advice. This agrees with Hoque, Hoque

and Thanabalan (2018) who noted that the incomes of parents had a significant association with healthy eating habits among students. Unemployed guardians might face challenges in supporting college students with adequate finances.

5.1.2 Eating Habits of Nutrition Students (dietary diversity, meal frequency from the food groups, skipping meals, types of snacks and frequency of consumption)

Majority of the students do not meet the recommended healthy eating habits according to the Kenyan guidelines for healthy diets (2017). This was confirmed in the current study, where main meals among students constituted of *ugali* kales, rice beans/green grams, *chapati* beans/ green grams, rice carrot peas and *ugali* cabbage. Moreover, the students' food choices were greatly determined by the purchasing power. Based on the findings of our study, the students' meals did not reflect the 'My Plate Model', as starches constituted the larger portion of their diets. In the current study, variety and adequacy principles were ignored. A majority of the respondents consumed water or fruit juice during or immediately after meals, and fruit salads/ juices were often consumed in place of the main meals. Similarly, Almoraie et al. (2024), in a study among university students established that 96.33% of the students in first year exhibited suboptimal feeding habits. Other studies also established similar findings, where college students consumed fewer whole grains (Awoke et al., 2022), vegetables and fruits daily, and reported higher high-calorie, high fat foods' intake (Kriaucioniene, et al., 2021; Ferrara et al., 2022; Almansour, Allafi & Al-Haifi, 2020). This indicates the need for college institutions to offer an environment where the healthy eating guidelines can be attained.

5.1.2.1 Consumption of Breakfast, Meal frequency, and Water Intake among the Respondents

In this study, on average, breakfast was consumed six days in a week. However, some respondents skipped the breakfast. Almansour, Allafi and Al-Haifi (2020) also observed the habit of skipping meals among college students. This can be associated with low socio-economic backgrounds. Awoke et al. (2022) also observed that breakfast was substituted with unhealthy alternatives. This poses a challenge since Barnes et al. (2021) noted that adolescents who took breakfast regularly were highly likely to have high nutritious diets compared to those who never had. The minimum recommended meal frequency per day was not met, with about two meals being consumed in a day. The minority (44.4%) attained the recommended meal frequency of five meals per day. About 5 glasses of water were consumed in a day, which was below the recommended dietary allowance of 12 glasses per day. This agrees with the findings of Awoke et al. (2022) who noted that for both college men and women, the recommended daily intake was way below the recommendations.

5.1.2.2 The Frequency of Snacking among Nutrition Students

In the current study, artificial juice and chips were consumed over five times in a day by 3.2% of the respondents. Carbonated drinks, chocolate, sausages/ smokies, doughnuts/ KDF, sweets, popcorn and cakes were consumed as snacks by a considerable proportion of the respondents, as many as more than five times daily. Similar findings were reported by Almasi and Rakicioglu (2021) who established that college students exceed maximum level intakes suggested for trans and saturated fats, refined sugars, and sodium through energy-dense snacks' over- consumption. Fruits were consumed by only 37.2% of the respondents as a snack on a daily basis.

5.1.2.3 Snacking, Fast Food and Soft Drinks, Fruits and Vegetable Consumption habits

In the current study, about a third (32.4%) of the respondents reported consumption of fast food twice weekly. Nearly a fifth (17.4%) of the respondents consumed fast foods more than once daily. For the soft drinks, only 17.4% of the respondents declined consumption. About a third 34.2% of the respondents consumed fruits and vegetables 3-4 times weekly, while 26.6% consumed them more than once daily and 5-6 times weekly. While 23.5% of the respondents consumed the 4 PM snack about twice weekly, 28.1% reported never to consume the 4 PM snack. Similarly, 26.0% of the respondents took the 10 AM snack about twice weekly whereas 21.5% never took the snack. This implies that majority of the college students did not value the importance of snacking in their diets. About a third of the respondents (34.2%) consumed fruits and vegetables 3-4 times a week. This implies to the majority, fruits and vegetables were not consumed regularly. Variety in the consumption of fruits and vegetables was also limited. Less than a quarter (23.2%) of the respondents had consumed more than one kind of vegetable 3-4 times in 7 days. A quarter (25%) of the respondents consumed more than a single kind of fruit more than once daily. Tiwari, Singh and Chaudhary (2023) established that personal preferences for fast food and vending machine snacks are identified as barriers to healthy eating among adolescents.

5.1.2.4 Dietary Diversity among Nutrition Students

Considering foods from the various food groups, the current study found out that there was an under consumption since very few respondents frequently (3-4 times

weekly) consumed the foods from the food groups. The recommended dietary diversity score of more than 4 food groups was met by 87.03% of the respondents. The minimum recommended meal frequency per day was met by 44.4% of the respondents only. This agreed with the findings of HealthyPeople.gov. (2018) that a majority of the students do not meet the goals and guidelines of Healthy People 2030, making it important for college institutions to support eating in college.

Therefore, with the suboptimal and inappropriate eating habits, the nutrition college students from KMTC face an increased risk of lifestyle chronic conditions (Jayedi et al., 2020; Almoraie et al., 2024; & Przybyłowicz & Danielewicz, 2022) and poor maternal health in the future among females (Waweru, 2020). Despite the nutrition knowledge possessed by the students in the current study, the recommended dietary habits were not practiced. According to Almasi and Rakicioglu (2021), the poor diets ill-health effects are not immediate, a possible reason for failing to practice the recommended dietary habits. Awoke et al. (2022) advocated for healthy eating habits for reduced weight gain.

5.1.3 Nutrition Knowledge of KMTC Nutrition Students

The current findings established that a majority of the respondents (57.7%) possessed moderate knowledge levels. Knowledge scores, are likely to favour healthy eating habits. Therefore, considering the moderate knowledge levels observed, suboptimal eating habits were expected from the respondents. Considering the upsurge in alternative nutrition information sources such as peer interactions (Maunder, 2018) and advertising mass media (Mogeni & Ouma, 2022), emphasis needs to be laid to ensure college students acquire and possess accurate nutrition information. Akujobi (2022)

further noted that nutrition knowledge plays a very crucial role in promoting positive attitudes that ultimately influence the dietary habits. According to Coman et al. (2024), raising the levels of accurate nutritional knowledge can help in reducing the burden of lifestyle conditions among young adults. Therefore, the connection between accurate nutritional knowledge, positive attitudes, eating habits, and chronic lifestyle conditions should not be ignored by college institutions. However, other factors that influence the eating habits needs to be understood and addressed since Akujobi (2022) noted that nutrition knowledge does not consistently translate to appropriate dietary practices among students in university colleges.

5.1.4 Association of physical food access on eating habits of nutrition students

Among the three campuses, only Karen had the arrangement of a cafeteria in college, from which the students could access meals. However, not all the students consumed their meals from the cafeteria. The distance to the kiosks outside college where students ate their meals was not close. And this was reported to be one of the reasons for skipping breakfast by (4.8%) of the students. Lunch and tea breaktimes were not always adequate for food access, often due to congestion, which could be attributed to skipping of meals. At the same time, students eating from the cafeteria still engaged in inappropriate eating habit, such as taking fruits in place of the main meals, partly because of peer pressure.

In this study, eating in college was quoted as a major challenge due to high cost of food, small portions, lack of variety in foods related to limited finances, seasonality of some foods such as vegetables, time spent waiting to be served (as much as one hour), long distances to kiosks, and other times, later comers never get food. This indicates that the

college students really struggled with eating. This is supported by Almoraie et al. (2024) who noted that for the others, although the intent and willingness is there, healthy eating patterns remain theoretical than practical. In this study, students skipped meals due to lack of money, demanding activities, maintain body shape, religion, and eatery too far. Competing activities was quoted by Almasi and Rakicioglu (2021). These findings are similar to Kariuki (2021) who established that eating habits formed a key concern among the Mount Kenya university students in Rwanda, particularly because of the changeover from home environments.

The current study established a positive relationship between the amount of pocket money and the number of meals consumed ($p=0.001$), as well as taking meals on time ($p=0.017$). This indicates that college students should be supported adequately with finances from their guardians for optimal eating habits. Moreover, the study established a positive relationship between the present employment status of the parent and the number of meals consumed daily ($p=0.001$). This indicates that employed guardians were in a better position to support the students financially. Respondents whose parents had permanent jobs had taken more breakfast than those of contract employment, casual labourer and unemployed respectively. Moreover, more number of meals was noted among respondents whose parents had permanent job compared to others. Students with adequate money ended up taking more meals. Almansour, Allafi and Al-Haifi (2020) found out that eating disorders, malnutrition, and under-nutrition among Kuwait university students was caused by issues such as living in dorms, separation from family, and economic status.

5.1.5 Influence of Family, Media and Peers on Eating Habits of KMTC Nutrition Students

Families to the participants supported them by sending money meant to buy food. However, the amount sent usually influenced the number and quality of meals consumed. Respondents reported that peers influenced the participants' food choices and preferences. However, some participants reported that their peers never influenced them, and that they usually ate what was within their means. The social media also had some positive influence the choice of some foods (cakes, fruits, sausages/ smokies, and doughnuts ($p=<0.05$), including advertisements on YouTube, Instagram and Facebook.

Our findings further indicate 34.9% of the respondents reported that their dietary habits were influenced positively by the school environment, whilst 32.7% were influenced negatively, and 32.4% felt the school environment influenced them in no way. The positive and negative influences of the college environment are supported by Szabo and Piko (2019) who established that the school environment greatly influences eating habits through the foods available, school health and nutrition curricula, nutritional policies, and peer and teacher modeling. Slightly over half (65.2%) of the respondents never received reminders from their families concerning their meals while at college. This indicated that while they were at the college, they were responsible of guarding their eating habits. Most (90.5%) of the respondents were supported by their parents through being sent for pocket money while 2.5% received no support. This indicates that the financial status of the parents had a great influence on the eating habits of respondents. Over half of the respondents (57.1%) took their meals with the fellow nutrition students while 30.8% ate alone. Of the 151 respondents who agreed that their

peers influenced their food choices, 67.5% reported the influence was positive while 32.5% reported a negative influence.

5.1.6 Nutritional Status of KMTC Nutrition Students

Majority of the respondents (65.8%) had a normal BMI, followed by overweight at 20.5%. There was a 1.7% severe malnutrition, 5.5% obesity I and 2.0% obesity II. The statistics from this study compare closely with by Ndung'u, Waudo and Kobia (2024), who established 24.1% of obesity and overweight. The prevalence of overweight from the current study also compares closely to the 16.5% prevalence by Ndung'u, Waudo and Kobia (2024) among students from KU. However, while the current study established a 7.5% of obesity, which compares closely to the 7.6% of prevalence documented by Ndung'u, Waudo and Kobia (2024), Rotich et al. (2023) reported a 19.7% prevalence of general obesity.

The male students had higher levels of severe and mild malnutrition (8.5%) compared to the females. These findings agree to the results by Ndung'u, Waudo and Kobia (2024) who reported a higher underweight prevalence (57.1%) among the males. There was a higher prevalence of moderate malnutrition (1.8%), overweight (21.2%), obesity I (6.8%) and obesity II (2.7%) among female students. These findings agree to those of Ndung'u, Waudo and Kobia (2024), who reported that female adolescents from KU had higher obesity (63.2%) and overweight (73.2%). Based on the current research, while males were more likely to suffer from undernutrition, females were more predisposed to overnutrition. This is also similar to the findings by Awoke et al. (2022) among 1st and 2nd year students in food, nutrition, and exercise in Virginia, who established that women had significantly higher body fatness compared to the males.

Using the Waist/ Hip Ratio, obesity was in 17.8% of the respondents in the current research, suggesting a risk of chronic non-communicable diseases. This compares very closely to the findings by Ndung'u, Waudo and Kobia (2024), who observed a 21.7% of central obesity. Centers for Disease Control and Prevention (2017) reported that the rates of cancer, heart disease, and obesity have remained stagnant among the 18- 24-year-olds over the previous decade. Based on WHR, obesity levels were higher in males (63.4%) compared to females (4.1%), which contrasts to the findings by Ndung'u, Waudo and Kobia (2024) who confirmed a higher female prevalence of abdominal obesity (87%). The current study suggests that central obesity risk factors are gender-based. Therefore, the nutrition students suffer from under- and over-nutrition, despite possessing nutrition knowledge. There is a direct relationship between poor dietary habits and BMI.

5.1.7 Physical Activity among the Nutrition Students

In the current study, exercise levels were quite limited among the participants, and majorly a sedentary lifestyle. Slightly less than three- quarters (73.7%) and about a half (53.9%) of the participants never engaged in vigorous- and moderate- intense activities respectively. Physical activity influences the nutrition status and health condition (Person & Flodmark, 2017), and therefore needs to be promoted in college institutions. In college, study-related activities hinder engagement in physical activity. Absence of physical activity promote poor health records that lead to premature death, obesity, and coronary heart disease (The World Counts, 2024).

5.1.8 Relationship Between Individual Factors, Social and Physical Environmental Factors, Eating Habits and Weight Status of the Nutrition Students

A positive correlation was noted on nutrition status and the present employment status of the parents (p=0.034), where being employed led to an acceptable nutrition status. A relationship was observed between nutrition status and physical activity (p=0.014). There was a significant relationship between the BMI and moderate intense fitness (p=0.001), whereas one increased the other decreased. Therefore, weight decreased with physical activity and increase in the time used for travelling. Moreover, spending more time on exercise led to a smaller WHR. This indicated that physical activity promoted the acceptable nutrition status. Nutrition knowledge significantly influenced the food habits, which was also pointed out by Waweru (2020), and it also significantly predicted the nutrition status of the study respondents (p=0.022). Some of the respondents with nutrition knowledge could have a low nutrition status, just as those without nutrition knowledge. The attitude possessed by the nutrition students, which was not assessed in this study, can influence the nutrition knowledge. This indicates that in addition to nutrition knowledge, there is a wide range of other factors that can influence the nutrition status. Many factors also affect the eating habits, including the nutritional goals and objectives.

A significant relationship was established between the amount of pocket money and nutrition status (AOR = 1.917), p = 0.044). This indicates that students with adequate pocket money were better placed nutritionally compared to students with inadequate money, and supports the findings by Hoque, Hoque and Thanabalan (2018). Respondents with more pocket money was associated with obesity (a high WHR) (AOR

= 1.917, p = 0.044). Respondents with more knowledge were more likely to engage in the recommended eating habits compared to their counterparts (AOR = 0.265, p = 0.006). A binary logistics regression did not establish an association between the nutrition knowledge and nutrition status of the study participant. This indicates that nutrition status was determined by a myriad of factors, in addition to nutrition knowledge.

5.2 Conclusion

5.2.1 Summary of the Findings

The mean age of the participants was 22.7 (±2) years. The mean pocket money for the previous month was 2533.27 (±1740.65) Kshs. Most of the parents/guardians were married (69.8%). Nearly a third of the guardians were either unemployed (34.5%) or in permanent formal employment (35.4%). The hypothesis that there is no significant association between socio-demographic and socioeconomic characteristics and eating habits of the KMTC nutrition students was nullified.

The main meals constituted of *ugali* kales, rice beans/green grams, *chapati* beans/ green grams, rice carrot peas and *ugali* cabbage. During meals, starches constituted the larger portion in a plate, and the variety and adequacy principles were not observed. Water and fruit juice were taken during or immediately after meals, and fruit salads/ juices consumed in place of the main meals. Minimum recommended meal frequency per day was met by 44.4% of the respondents while the recommended dietary diversity score of more than 4 food groups was met by 87.03% of the respondents. Water intake was below the recommended 12 glasses per day. Artificial juice, carbonated drinks, chips, chocolate, sausages/ smokies, doughnuts/ *KDF*, sweets, popcorn and cakes were

snacked on, with some as high as five times daily. About a fifth (17.4%) of respondents consumed the fast food more than once daily while only 6.1% never consumed the fast food. For the soft drinks, only 17.4% of the respondents declined consumption. Less than a third (28.1%) of the respondents never consumed the 4 pm snack, while 21.5% never consumed the 10 am snack. The recommended dietary diversity score was not met by the majority.

Majority of the respondents (57.7%) possessed moderate knowledge levels, considering performances of low ≤40 %, moderate 41–69 %, and high ≥70 %. Food choices were greatly determined by the purchasing power. The number and quality of meals was determined by the amount of pocket money. The employment status of the guardian also determined the number of meals the respondents consumed.

Cooking was not permitted in the students' hostels, which left them with the option of obtaining food from kiosks outside the campus or eating at the cafeteria. Long distance to the kiosks, inadequate break time, high cost of food, and seasonality of some foods were quoted as some of the reasons why eating was a major challenge in college. Reasons for skipping meals included lack of money, demanding activities, maintain shape, religion, and eatery being too far. This study, therefore, nullified the hypothesis there is no significant association between physical environmental factors and eating habits.

Most (90.5%) of the respondents were supported by their parents through being sent for pocket money for buying food, which ranged between 200- 9500 Kshs. About a half of

the respondents (51.5%), reported that peers influenced their food choices and preferences, for which 67.5% and 32.5% reported a positive and negative influence respectively. The social media also influenced some food choices, including advertisements on YouTube, Instagram and Facebook. The main factors attributed to food choice and preferences were cost, taste, peer influence, food appearance, appetite, cooking method, psychological state, media, time, and physiological/ health status. 59 % of the respondents engaged in specific action plans or implementation intentions that guided their food intake. Slightly more than a third (34.9%) of the respondents reported that their dietary habits were influenced positively by the school environment whereas 32.7% were influenced negatively, and 32.4% felt the school environment influenced them in no way. In addition, 65.2% of the respondents never received reminders from their families concerning their meals while at college. Over half (58%) of the respondents further reported that those they take meals with normally influenced their food choices either positively or negatively. The findings of the study, therefore, nullified the hypothesis that there is no significant association between social environmental factors and the eating habits.

Majority of the respondents (65.8%) had a normal BMI, followed by 20.5% overweight, 5.5% obesity I, 2.0% obesity II, and 1.7% severe malnutrition. The male students had higher levels of severe and mild malnutrition (8.5%) while there was a higher prevalence of moderate malnutrition (1.8%), overweight (21.2%), obesity I (6.8%) and obesity II (2.7%) among female students. Using the Waist/ Hip Ratio, obesity was in 17.8% of the respondents, and the obesity levels were higher in males (63.4%) compared to females (4.1%). Therefore, the study accepts the null hypothesis that there is no significant association between nutrition knowledge of the students and their

eating habits. This also nullifies the hypothesis that there is no significant association between eating habits and nutrition status. A majority of the respondents led a sedentary lifestyle that was devoid of vigorous- and moderate-intense activities, and the physical activity levels were limited among the participants.

The present employment status of the parents had a substantial relationship with the respondents' BMI (P=0.034) and WHR (P=0.004). Moreover, physical activity promoted the acceptable nutrition status of respondents (p=0.014). In the current study, nutrition knowledge significantly influenced the eating habits. There was an association between WHR and dietary diversity (p=0.004). Having pocket money determined the nutrition status (AOR = 1.917), p = 0.044), where more pocket money predicted obesity (high WHR). More knowledge was associated with better eating habits (AOR = 0.265, p = 0.006), but there was no relationship to the nutrition status. Consumption of food in the school mess had a significant relationship to the nutrition status of the study respondents.

5.2.2 Conclusions

The socioeconomic and socio-demographic characteristics of the guardians were key determinants of the college students' meals. Parents played a crucial role to college students through sending pocket money for purchasing food. The current employment status of a parent was related to the respondents' nutrition status.

The nutrition students from KMTC campuses portrayed poor eating habits including suboptimal diets in terms of diversity, taking water and fruit juices during/ immediately after meals, taking fruit salads/ juices in place of main meals, intensive use of unhealthy

snacks, and skipping meals. Many of the nutrition students skipped meals for different reasons. Moreover, meal frequency and dietary diversity was not met by all respondents.

Majority of the nutrition students did not possess high levels of accurate nutrition knowledge, which is highly recommendable, since it can greatly be linked to the eating habits. Nutrition knowledge did not have a significant association with the nutrition status, since other factors, such as physical activity, are likely to influence the nutrition status, despite the nutrition knowledge levels possessed.

Nutrition students at KMTC campuses either obtained food from the college cafeteria or eateries outside the campus. Eating is a major challenge for the college students, including long distance to eateries outside the college. Peers, cost, taste, food appearance, appetite, cooking method, physiological state, time physiological/ health status and the social media have an influence on food choices and preferences. The college environment influenced the eating habits either negatively or positively. The study findings indicate that the students had poor eating habits as portrayed from the social media and peer influence as well as finances, time available, and food preferences.

Based on the findings of the current study, 8 in every 29 KMTC college students were overweight and obese. Despite possessing nutrition knowledge, some nutrition students at KMTC were either overweight or underweight. While the males were majorly underweight, the females were mainly overweight. Using the Waist/ Hip Ratio, 17.8% of the respondents had obesity, and the obesity levels were higher in

males (63.4%) compared to females (4.1%), indicating the risk of suffering from chronic conditions in future. With the limited physical activity levels and a sedentary lifestyle, the participants were at risk of chronic conditions.

There was a significant relationship between the nutrition status and eating habits. Students who engaged in inappropriate eating habits were likely to be overweight and obese. PAL (Physical Activity Level) were significantly associated with the nutrition status. Active physical activity promotes an acceptable nutrition status. Having pocket money can boost the nutrition status of a college student, but can also lead to obesity. Even though possessing nutrition knowledge leads to recommendable eating habits, it might not predict the nutrition status, which is impacted upon by different factors. This still indicates that the eating habit of college nutrition students is determined by varying factors.

5.3 Recommendations

5.3.1 Recommendations for Practice

1. KMTC College students from the nutrition department should be encouraged to observe the recommended healthy eating habits, guided by the nutrition knowledge acquired and make physical activity part of the daily routine for better nutrition and health outcomes.
2. KMTC management should provide an environment that is supportive of healthy eating habits, including presence of functional and sustainable eateries within, that offer healthy foods at an affordable price to enable students make healthy food choices despite the socio-environmental factors.

3. KMTC students should implement the healthy eating guidelines, while targeting long-term dietary and behavioural changes among college students.
4. The department of Nutrition and Dietetics (KMTC) should continuously sensitize the students on healthy eating habits

5.3.2 Recommendations for Policy

1. Ministry of Health to ensure implementation of healthy eating guidelines in tertiary institutions

5.3.3 Recommendations for Further Research

1. Further research is required to investigate why nutrition knowledge does not translate into healthy eating habits and practices among college students.
2. Additional research is needed to establish effective interventions of improving eating habits at the college level.

REFERENCES

Akujobi, I. C. (2022). Nutrition Knowledge, Attitude, Body Composition, and Dietary Patterns of Female Undergraduate Students in Owerri Metropolis. *Journal of Dietitians Association of Nigeria (JDAN), 13*(2), 7-18.

Almansour, F. D., Allafi, A. R., & Al-Haifi, A. R. (2020). Impact of nutritional knowledge on dietary behaviors of students in Kuwait University. *Acta Biomed, 91*(4), 2020183. Doi: 10.23750/abm.v91i4.8716. PMID: 33525277; PMCID: PMC7927513.

Almasi, N., & Rakicioglu, N. (2021). Assessing the Level of Nutrition Knowledge and its Association with Dietary Intake in University Students. *Balıkesır Health Sciences Journal, 10*(3), 274-280.

Almoraie, N. M., Alothmani, N. M., Alomari, W. D., & Al-amoudi, A. H. (2024). Addressing nutritional issues and eating behaviours among university students: a narrative review. *Nutrition Research Reviews*, 1-16. Doi: 10.1017/s0954422424000088

Annamalai, S., & Gopichandran, V. (2022). Knowledge, attitudes and utilization of food labels among undergraduate medical students in a medical college in Chennai – A cross sectional survey. *Indian Journal of Community and Family Medicine 8*(1),33-38. DOI: 10.4103/ijcfm.ijcfm_50_21

Arroyo, R. A., Ramos, J. V. C., Ugsod, A. M. L., Pangan, C. G., Copina, P. M., Modesto, I. R. P., Quiapan, M. K. Q., Llamas, T. J. T., Etulle, M. C., & Cabus, C. S. (2023). Level of Food Preferences among College Students of Central Mindanao University. *International Journal of Advanced Research in Science, Communication and Technology (IJARSCT),3*(1). DOI: 10.48175/IJARSCT-14008 65.

Awoke, M. A., Harrison, C.L., Martin, J., Misso, M.L., Lim, S., & Moran, L.J. (2022). Behaviour Change Techniques in Weight Gain Prevention Interventions in Adults of Reproductive Age: Meta-Analysis and Meta-Regression. *Nutrients, 14*, 209. https://doi.org/10.3390/nu14010209

Barnes, C., McCrabb, S., Stacey, F., Nathan, N., Yoong, S. L., Grady, A., Sutherland, R., Hodder, R., Innes-Hughes, C., Davies, M., & Wolfenden, L. (2021). Improving implementation of school-based healthy eating and physical activity policies, practices, and programs: a systematic review. *Translational Behavioral Medicine, 11*(7):1365-1410. doi: 10.1093/tbm/ibab037. PMID: 34080618; PMCID: PMC8320878.

Bhawna, Sharma, R., & Sharma, A. K. (2022). Unhealthy dietary behaviours among college going youth in Delhi. *Southeast Asian Journal of Health Professional, 5*(2), 33–37.

CDC. (2017). *Adolescent Health* Retrieved from https://www.cdc.gov/nchs/fastats/adolescent-health.htm.

Cochran, W. G. (1977). *Sampling Techniques*. John Wiley & Sons, New York.

Colleran, H. L., Fuller, T. M., & Silva, R. C. D. (2019). Assessment of Nutrition Knowledge of Students Enrolled in Human Performance and Leisure Studies Courses at Historically Black Colleges University. *Advances in Nutrition and Food Science:* ANAFS-144.

Coman, L.-I., Ianculescu, M., Paraschiv, E.-A., Alexandru, A., & Bădărău, I.-A. (2024). Smart Solutions for Diet-Related Disease Management: Connected Care, Remote Health Monitoring Systems, and Integrated Insights for Advanced Evaluation. *Applied Science*, *14*, 2351. https://doi.org/10.3390/app14062351

Contento, I. R. (2013). *Nutrition education: linking research, theory, and practice* (2nd ed.) Jones and Bartlett Publishers; Sadbury, Massachusetts.

Ejigu, B. A., & Tiruneh, F. N. (2023). The Link between Overweight/Obesity and Noncommunicable Diseases in Ethiopia: Evidences from Nationwide WHO STEPS Survey 2015. *International Journal of Hypertension, 2023*, 2199853. doi: 10.1155/2023/2199853. PMID: 38023617; PMCID: PMC10667048.MUN

Elmskini, F. Z., Bouh, A., Labyad, A., Elghoulam, N., Iraqi, H., Mehdad, S., Madkour, A., Moufid, A., Aabi, M., Boutayeb, S.,

Ferrara, M., Langiano, E., Falese, L., Diotaiuti, P., Cortis, C., & De Vito, E. (2022). Changes in Physical Activity Levels and Eating Behaviours during the COVID-19 Pandemic: Sociodemographic Analysis in University Students. *International Journal of Environmental Research and Public Health*, *19*, 5550. https://doi.org/10.3390/ijerph19095550

Gibney, M. J., Barr, S. I., Bellisle, F., Drewnowski, A., Fagt, S., Livingstone, B.,Masset, G., Moreiras, G. V., Moreno, L. A., Smith, J., Vieux, F., Thielecke, F., & Hopkins, S. (2018). Breakfast in Human Nutrition: The International Breakfast Research Initiative. *Nutrients, 10*(5): 559.

Healthy People 2030. (2024). *Adolescent Health*. Retrieved From https://health.gov/healthypeople/objectives-and-data/browse objectives/adolescents

HealthyPeople.gov. (2018). *Nutrition, Physical Activity, and Obesity*. Retrieved from https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi topics/nutrition- physical-activity-and-obesity/data

Hoque, K. E., Hoque, K. F., & Thanabalan, R. A. (2018). Relationship between Parents' Academic Backgrounds and Incomes and Building Students' Healthy Eating Habits. *Peer J., 6,* e4563.

Jayedi, A., Soltani, S., Abdolshahi, A., & Shab-Bidar, S. (2020). Healthy and unhealthy dietary patterns and the risk of chronic disease: an umbrella review of meta-analyses of prospective cohort studies. *British Journal of Nutrition, 124*(11), 1133- 1144.

Kariuki, J. M. (2021). Physical Activity and Dietary Patterns in Relation to Weight Status Among University Students in Nairobi County, Kenya. Retrieved from https://ir- library.ku.ac.ke/server/api/core/bitstreams/faab4fe3-0c04-456e-89be- 6a4ee3160348/content

KEMRI. (2024). *Non- Communicable Disease Program.* Retrieved from https://www.kemri.go.ke/non-communicable-diseases-ncd-program/

Kenya National Bureau of Statistics. (2022). *Kenya Demographic and Health Survey 2022: Key Indicators Report.* Retrieved from https://africa.unwomen.org/sites/default/files/2023-06/2022%20KDHS%20Key%20Indicators%20Report%5B100%5D.pdf

Khan, S. I., Zada, R., & Ismael, D. (2022). Effect of Healthy Eating Habits on the Academic Performance of Graduating Students. *Asia Pacific Journal of Health Management, 73*(2), 469.

Kigaru, D. M. D., Loechl, C., Moleah, T., Macharia-Mutie, C. W., & Ndungu, Z. W. (2015). Nutrition knowledge, attitude and practices among urban primary school children in Nairobi City, Kenya: a KAP study. *BMC Nutrition 1*:44. DOI 10.1186/s40795-015- 0040-8

Kim, J. (2023). *Nutrition Knowledge, Attitudes, and Beliefs Among College Students at Cal Poly Pomona.* Retrieved from https://scholarworks.calstate.edu/downloads/wp988s51x

Kiragu, Z. W., Rockers, P. C., Onyango, M. A., Mungai, J., Mboya, J., Laing, R., & Wirtz, V. J. (2022). Household access to non-communicable disease medicines during universal health care roll-out in Kenya: A time series analysis. *PLoS One, 17*(4), 0266715. doi: 10.1371/journal.pone.0266715. PMID: 35443014; PMCID: PMC9020677.

Kriaucioniene, V., Raskiliene, A., Petrauskas, D., & Petkeviciene, J. (2021). Trends in Eating Habits and Body Weight Status, Perception Patterns and Management Practices among First-Year Students of Kaunas (Lithuania) Universities, 2000-2017. *Nutrients, 13*(5):1599. doi: 10.3390/nu13051599. PMID: 34064684; PMCID: PMC8151775.

Maunder, R, E. (2018). Students' peer relationships and their contribution to university adjustment: the need to belong in the university community. *Journal of Further and Higher Education, 42*:6, 756- 768. DOI:10.1080/0309877X.2017.1311996.

Ministry of Health (2017). National Guidelines for Healthy Diets and Physical Activity. Government of Kenya. Nairobi. Retrived from https://arua-ncd.org/wp-content/uploads/2022/10/National-Guidelines-for-Healthy-Diets-and-Physical-Activity-2017.pdf

Ministry of Medical Services. (2010). *Kenya National Clinical Nutrition and Dietetics Manual*.1 st edition. GoK.

Mogeni, B. K., & Ouma, L. O. (2022). Dietary patterns, behaviours, and their associated factors among university students in coastal Kenya. *Cogent Food & Agriculture, 8*: 2132873. https://doi.org/10.1080/23311932.2022.2132873

Nayak, R. R., Jadhav, J., Kumar, N. G., Ranganath, T. S., Mathew, C. A. (2023). Knowledge, attitude and practice regarding food labels among undergraduate medical students of a government medical college, Bengaluru. *National Journal of Physiology, Pharmacy and Pharmacology,13*(08):1739-1743.

Ndung'u, J. M., Waudo, J., & Kobia, J. (2024). Assessment of Nutritional Status Among Undergraduate Students at a Nairobi Tertiary Institution Using BMI and Waist Circumference Metrics. *African Journal of Nutrition & Dietetics (AJND), 3* (1), 76- 89.

Obirikorang, C., Adu, E. A., Anto, E. O., Afum-Adjei Awuah, A., Fynn, A.N.B., Osei-Somuah, G., Ansong, P.N., Boakye, A.O, Ofori-Boadu, I., Obirikorang, Y., Adobasom-Anane, A.G., Nyarko, E.N., & Balmer, L. (2024). Prevalence and risk factors of obesity among undergraduate student population in Ghana: an evaluation study of body composition indices. *BMC Public Health, 24*(1), 877. doi: 10.1186/s12889-023-17175-5. PMID: 38515106; PMCID: PMC10958924.

Odenyo, A. (2017). *Survival for the fittest: Where KMTC students get food at* '*comrade' prices.* Retrieved from https://www.standardmedia.co.ke/evewoman/living/article/2001244083/survival-for- the-fittest-where-kmtc-students-get-food-at-comrade-prices

Olatona, F. A., Onabanjo, O. O., Ugbaja, R. N., Nnoaham, K. E., & Adelekan, D. A. (2018). Dietary habits and metabolic risk factors for non-communicable diseases in a university undergraduate population. *Journal of Health, Population and Nutr*ition, *37*: 21.

Oluyombo, R., Banjo, O. H., Soje, M., Obajolowo, O., & Karim, M. (2021). Obesity and CKD in Sub-Saharan Africa: A Narrative Review. *Kidney Medicine, 4*(2),100403. doi: 10.1016/j.xkme.2021.11.001. PMID: 35243313; PMCID: PMC8861962.

Peltzer, K., Pengpid, S., Samuels, T. A., Özcan, N. K., Mantilla, C., Rahamefy, O. H., Wong M. L., & Gasparishvili, A. (2014). Prevalence of Overweight/Obesity and Its Associated Factors among University Students from 22 Countries. *International Journal of Environmental Research and Public Health; 11*(7): 7425–7441.

Person, E. & Flodmark, S. (2017). *National Habits and Physical Activity Among University Students in Thailand.* Uppsala University: Department of Public Health and Caring Sciences. E (NCD)

Prnjak, K., Hay, P., Mond, J., Bussey, K., Trompeter, N., Lonergan, A., & Mitchison, D. (2021). The distinct role of body image aspects in predicting eating disorder onset in adolescents after one year. *Journal of Abnormal Psychology, 130*(3), 236–247.

Przybyłowicz, K. E., & Danielewicz, A. (2022). Eating Habits and Disease Risk Factors. *Nutrients, 14*(15), 3143. doi: 10.3390/nu14153143. PMID: 35956319; PMCID: PMC9370309.

Romero-Blanco, C., Hernández-Martínez, A., Parra-Fernández, M. L., Onieva-Zafra, M. D., Prado-Laguna, M. D. C., & Rodríguez-Almagro, J. (2022). Food Preferences in Undergraduate Nursing Students and Its Relationship with Food Addiction and Physical Activity. *International Journal of Environmental Research and Public Health, 19*(7), 3858. doi: 10.3390/ijerph19073858. PMID: 35409543; PMCID: PMC8998007.

Rotich, S., Kamau, J., Oketch, M. & Okube, O. (2023) Prevalence and Predictors of Obesity among Undergraduate Students at a Private University, Nairobi, Kenya. *Open Journal of Endocrine and Metabolic Diseases, 13*, 23-38. doi: 10.4236/ojemd.2023.132003.

Shriver, L. H., Betts, N. M., & Wollenberg, G. (2021). Dietary intakes and eating habits of college athletes: are female college athletes following the current sports nutrition standards? *Journal of American College Health, 61*(1):10-6. doi: 10.1080/07448481.2012.747526. PMID: 23305540.

Stroebe, W. (2023). Could implementation intentions improve the efficacy of behavioral weight-loss treatment? *Appetite, 186*, 106508

Sub-Bandura, A. (1986). *Social Foundations of Thought and Action: A Social Cognitive Theory*. Englewood Cliffs, NJ: Prentice Hall.

Szabo, K., & Piko, B. (2019). Likelihood of healthy eating among adolescents based on the health belief model. *Developments in Health Sciences, 2*(1), 22–27. DOI: 10.1556/2066.2.2019.004

Taghzouti, K., Aguenaou, H., & Benaich, S. (2024). Increased nutrition knowledge and adherence to the Mediterranean diet are associated with lower body mass index and better self-rated general health among university students. *Human Nutrition & Metabolism, 35,* 200240

The World Counts. (2024). *Statistics about obesity*. Retrieved on 29th July, 2024 from https://www.theworldcounts.com/challenges/people-and-poverty/hunger-and-obesity/statistics-about-obesity

Timlin, D., McCormack, J. M., Kerr, M., Keaver, L., & Simpson, E. E. A. (2020). Are dietary interventions with a behaviour change theoretical framework effective in changing dietary patterns? A systematic review. *BMC Public Health, 20*(1), 1857. doi: 10.1186/s12889-020-09985-8. PMID: 33272230; PMCID: PMC7713327.

Tiwari, J., Singh, S., & Chaudhary, S. (2023). Evaluation of fast foods preferences among college students of rural and urban areas. *The Pharma Innovation Journal, 12*(3), 4065-4070.

Vilaz, M. K., & Toledo, J. P. C. (2024). On fruit and vegetable consumption: integrating nutrition education and collaboration to promote healthy lifestyles. *Journal of Public Health*, 124. https://doi.org/10.1093/pubmed/fdae124

Waweru, G. (2020). A Cross Sectional Analysis of Dietary Practices and Nutrition Status of Female Undergraduate Students at Kenyatta University, Kenya. *American Journal of Food Sciences and Nutrition, 2*(1), 12–20. https://doi.org/10.47672/ajfsn.528

WHO (2022). *Physical activity: Recommended levels of physical activity for health*. Retrieved on 29th June, 2022 from http://www.emro.who.int/health-education/physical- activity/recommended-levels-of-physical-activity-for-health.html

WHO. (2022). *Global Physical Activity Questionnaire (GPAQ): WHO STEPwise approach to NCD risk factor surveillance*. Retrieved from www.who.int>ncds>surveillance>steps>GPAQ_EN

World Health Organization (WHO). (2024). *Overweight and Obesity*. Retrieved on 26th July, 2024 from https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight.

APPENDICES

Appendix A: Consent Form

Dear respondent,

My name is Bridget Nduta Mwaniki, a Masters student in MSc. (Food, Nutrition, & Dietetics) at Kenyatta University, City Campus. I am conducting a research on the environmental and individual factors associated with the eating habits, overweight and obesity among nutrition students from Kenya Medical Training College.

The purpose of this study and its findings is purely academic and can influence policy at the institution.

Procedures to be followed

Participation in this study will require you to fill the questionnaire, which will take about one hour only. I will also take your weight, height, hip and waist measurements.

Voluntarism

Participation in the study is voluntary. You are permitted to ask questions related to the study at any time.

Discomforts and risks

You will face no harm by participating in this research study.

Benefits

Your participation will help in generating information that will help guide policies at KMTC. Participating in this study will benefit you in that you will know about your nutritional status. In case you are found to have a poor nutritional status, relevant nutrition education will be offered.

Rewards

There is no financial costs, rewards or compensations from the participation.

Confidentiality

You are assured that all information provided will be handled and treated with utmost confidentiality. Your name will not be indicated on the questionnaire and all

questionnaires will be under the custody of the researcher throughout. All information will be kept private and only shared with the study team.

Contact Information

For further information or questions about the study, my contacts are +254795106181. However, if you have questions regarding your rights as a study participant, you can contact Kenyatta University Ethical Review Committee Secretariat on chairman.kuerc@ku.ac.ke.

Participant's statement

The information above concerning my participation is clear. Information pertaining to the research study has been explained, and I have been given a chance to ask questions. I understand that participation is voluntary and all my information will be treated questions confidentially. Signing below indicates your desire to participate.

Signature of the participant……..

Date……

Signature ……..

Investigator's statement

I, the undersigned, have given the research participant information about the study and its procedures. I have also explained about the risks and benefits involved.

Name……

Date…….

Signature ……

Appendix B: Questionnaire
Questionnaire Number:……..

Institution:……

Campus:…….. Program:…….

Year of Study:……

College Number:…….

Date……..

Section A: Demographic Information and Socio-economic Status

1. Age …….
2. Ethnicity…….
3. Gender M ☐ F ☐
4. Previous month's pocket money (Shs) _____

5. Marital status of the guardian
   A. Married ☐
   B. Divorced ☐
   C. Single ☐
   D. Separated ☐
6. Education level of the guardian
   A. Primary ☐
   B. Secondary ☐
   C. University/college ☐
   D. Never attended school ☐
   E. Others (specify)……
7. Present employment status of your guardian;
   A. Permanent formal employment ☐
   B. Contract employment ☐
   C. Casual laborer ☐
   D. Unemployed ☐
8. Anthropometric measurement

Measurements	1st	2nd	Average
Height (cm)			
Weight (kg)			

Waist circumference			
Hip circumference			

Section B: Nutrition Knowledge Levels

1. Which among the following are the high biological value protein foods?
   A. Peas, avocado, liver
   B. Chicken, green grams, sausage
   C. Liver, eggs, milk, fish
   D. Nuts, cabbage, beans, pawpaw
2. Which is the source of recommended good fats?
   A. Dairy products
   B. Vegetable oils
   C. Both (a) and (b)
   D. None of the above
3. ……is the % contribution of fat to total energy needs in young adults.
   A. 30% or less
   B. 40%
   C. 35%
   D. 32%
4. The consumption of----------fats is discouraged.
   A. Polyunsaturated
   B. Saturated
   C. Monounsaturated
   D. Cis fats
5. What is the recommended amount of water intake in a day?
   A. 2.0 litres
   B. 1 litre
   C. 1.5 litres
   D. None of the above
6. Which among the following are nutrition and health conditions associated with diets rich in sugar and fats?

A. Obesity, Diabetes,

B. High blood pressure, Brucellosis

C. Osteoporosis, Gout

D. Atherosclerosis, Anaemia

7. What are the recommended servings of animal proteins, fruits and vegetables from the food guide pyramid, in the correct order?

A. 2-3, 2-4, 3-5

B. 3-5, 2-4, 2-3

C. 2-4, 2-3, 3-5

D. 6-11, 2-3, 3-5

8. Which among the following is not a tool for successful meal planning?

A. Plate model

B. Food exchange list

C. Food composition tables

D. Microtoise

9. Which one of the following is not a basic diet planning principle?

A. Moderation

B. Variety

C. Balance

D. Accessibility

10. Which one is not a consequence of unhealthy dietary habits among adolescents?

A. Chronic conditions

B. Inability to concentrate

C. Preferred societal image

D. Eating disorders

11. Which of the following is a recommended dietary practice in the prevention of obesity?

A. Taking meals immediately before sleeping

B. Regular physical exercise

C. Avoiding junk food

D. Reading articles on obesity

12. What is the recommended physical activity guideline?

A. 30 minutes for 5 days weekly

B. 15 minutes for 7 days weekly

C. 20 minutes for 7 days

D. 25 minutes for 3 days weekly

13. The following habits can help in overweight prevention, except?

A. Skipping meals

B. Consuming varied foods

C. Regular physical activity

D. Consuming three snacks daily

14. In college, how would you cope when experiencing food shortage?

A. Selling of assets

B. Redistribution of children

C. Reduced number of meals

D. Permanent migration

15. Fast foods and soft drinks are considered unhealthy for the following reasons except?

A. Contains unhealthy preservatives

B. Not everyone can afford them

C. Contains hidden sugars and salt

D. Gradually leads to obesity

Section C: Eating Habits

1. Please describe the foods (snacks and meals) that you took yesterday during the night and day, amounts, where you took the meals, and preparation methods. Start with the drink or food taken first in the morning.

	Food Description	Household amount (cup, glass, bowl, plate, spoon)	Preparation method	Ingredients	Where taken	Time taken
Breakfast						

10 AM snack						
Lunch						
4 PM snack						
Dinner						
Snack						

2. How many days did you eat breakfast within the last seven days?_____
3. How many meals did you consume daily within the last seven days (including snacks)?_____
4. How many glasses of water do you take daily?_____
5. Do you normally take the main meals at the appropriate time?
   A. Yes
   B. No

	Almost always (> once daily)	Often (5-6 times weekly	Sometimes (4-3 times weekly	Rarely (about twice weekly)	Once	No
6. How often do you take fast food in a week?						
7. How often do you take soft drinks in a week?						
8. How often do you take fruits and vegetables in a week?						
9. How often do you take your 10AM snack in a week?						

10. How often do you take your 4 PM snack in a week?						
11. In a week, how often do you eat fruit or vegetables as snacks?						
12. Within the previous seven days, did you eat more than one kind of vegetable?						
13. Within the previous seven days, did you eat more than one kind of fruit?						

14. Where often do you take your meals?

    A. Cook for myself

    B. School mess

    C. Food vendor

    D. Restaurant/ hotel

15. If you do not cook for yourself as in question 14, would you consider the food offered at the School mess, Food vendor, or Restaurant/ hotel;

A. Adequate	Yes	☐	No	☐
B. Varied	Yes	☐	No	☐
C. Cooked appropriately	Yes	☐	No	☐
D. Balanced	Yes	☐	No	☐
E. Safe and hygienic	Yes	☐	No	☐

16. Kindly indicate the frequency with which you took the following foods within the previous month;

	Frequency- WHO Food Groups								
Food Item	Never/ Rarely	1-3 times/ month	1-2 per week	3-4 per week	5-6/ week	Daily	23/ day	4-5/ day	6+ per day
Starchy staples (grains, roots, tubers)									
Legumes- Beans and peas									

Nuts and seeds									
All dairy (milk, yoghurt, cheese)									
Meat and meat products									
Fish andfish products									
Eggs									

Dark green leafy vegetables (spinach)									
Other vegetables (cabbage, cauliflower, cucumber, tomato, eggplant, green pepper)									
Fruits									

17. Kindly indicate the frequency with which you snack on the following;

	Frequency							
Food Item	Never/ Rarely	1-3 times/ month	1-2 per week	3-4 per week	5-6/ week	Daily	2-3/ day	4+
Sugary/ sweetened drink								
Artificial juice								
Carbonated drink								
Fast foods								
Chips								
Chocolate								
Sausages/ Smokies								
Doughnuts/ *KDF								
Sweets								
Popcorns								
Cakes								

Fruits								

Section D: Factors related to the Eating Habits

1. How much do you spend daily for breakfast?_____
2. How much do you spend daily for lunch? _____
3. How much do you spend daily for supper?_____
4. In one week, how many meals do you take on campus?_____
5. How many times did you eat outside the campus last week? _____
6. How many times did you prepare meals for yourself last week?_____
7. What would make you skip a meal?
   A. Demanding activities [ ]
   B. Lack of money [ ]
   C. Maintain body shape [ ]
   D. Religion [ ]
   E. Eatery too far [ ]
8. Do you engage in specific action plans or implementation intentions that guide your food intake?
   A. Yes B. No
9. Does the school environment influence your dietary habits?
   A. Yes, positively
   B. Yes, negatively
   C. No
10. Do you get frequent reminders from your family about your meals while at the college? A. Yes
    B. No
11. In which ways do your parents support you with your meals?
    A. Supplying me with food (either raw or cooked)
    B. Send me pocket money
    C. No support offered
12. With whom do you take your meals?
    A. Student relatives

B. Fellow nutrition students

C. Non-nutrition college-mates

D. Alone

13. Do those you normally take meals with influence your food choices?

A. Yes

B. No

14. If Yes in No. 13 above, what is the nature of the influence?

A. Positive

B. Negative

15. Do your peers influence your food choices?

A. Yes

B. No

16. Does the media influence your food choices?

A. Yes

B. No

17. If Yes in No. 16 above, what is the nature of the influence?

A. Positive B. Negative

18. How does your campus support meal consumption among the students?

A. Yes B. No

Appendix C: Focus Group Discussion Question Guide

1. What is the college's policy in relation to food provision within the campus?
2. Is your break time (10AM, lunch, and 4PM) during college days enough to enable you access healthy foods (distance)?
3. What solutions do you have for acquiring food?
4. In your own view, is eating a major challenge while in college?
5. What foods majorly constitute your main meals?
6. Do you always have adequate finances to acquire healthy foods?
7. In what ways do your families support you with meals while at the college?
8. How do your peers influence your food choices and preferences?
9. How does the media influence your food choices and preferences?
10. Are the foods offered within and around safe, nutritious, and cheap?
11. What main factors (either positive or negative) would you attribute to your choice and preferences of food?

Appendix D: Observation Checklist

1. Variety of the foods consumed (should reflect good diet)
2. Portion sizes (against the standard measuring equipment)
3. Types of food consumed
4. Reflection of ‘My Plate’ model
5. Fluids taken with or immediately after meals

Appendix E: Physical Activity Questionnaire

This questionnaire captures the time spent on different kinds of physical activity on a weekly basis. Consider all vigourous-intensity and moderate-intensity activities, including work. **A. Activity at Work**

1. Does your work entail of vigorous-intense activities, which results to huge increases in heart rate?

   A. Yes

   B. No (If No, proceed to Q4).

2. In an ordinary week, how many days do you engage in vigorous-intensity activities in your work?_____Days.

3. In a typical day, how much time is spent doing the vigorous-intensity activities at work?_____Hours_____Minutes.

4. Does your work entail of moderate-intensity activities, which results to small increases in heart rate?

   A. Yes

   B. No (If No, proceed to Q7).

5. In an ordinary week, how many days do you engage in moderate-intensity activities in your work?_____Days.

6. In a typical day, how much time is spent doing the moderate-intensity activities at work?_____Hours_____Minutes.

B. Travels

7. Do you use a bicycle or walk for a continuous ten minutes, at least, to get to or from places?

   A. Yes

   B. No (If No, proceed to Q10).

8. If Yes (Q7 Above), how many days in a typical week?.....Days.

9. If Yes (Q7 Above), how much time in a typical day do you spend bicycling or walking? _____Hours_____Minutes.

C. Recreational Activities

10. Do you engage in any vigorous-intensity fitness, sports, or leisure activities which causes a huge increases in heart rate for at least ten minutes?

    A. Yes

    B. No (If No, proceed to Q13).

11. If Yes (Q10 Above), how many days?_____Days.

12. If Yes (Q10 Above), how much time in a typical day is spent?
_____Hours_____Minutes.

13. Do you engage in any moderate-intensity fitness, sports, or leisure activities which cause a small increases in heart rate for at least ten minutes?

    A. Yes

    B. No (If No, proceed to Q16).

14. If Yes (Q13 Above), how many days?_____Days.

15. If Yes (Q13 Above), how much time in a typical day is spent?

    _____Hours_____Minutes.

D. Sedentary Behaviour

16. In a typical day, what is the total amount of time spent sitting or travelling (exclude sleeping)? _____Hours_____Minutes.

Appendix F: Training Schedule for the Research Assistants

Days	Topic	Learning Aids	Learning Methods
Day 1	The nature of the study Objectives Taking the anthropometric measurements	Handouts	Lecture PowerPoint presentations
Day 2	Data collection Review of the questionnaire, FGD guide, and observation checklist	Weighing scale Height scale Sample questionnaire Observation checklist FGD guide	Demonstration Role play
Day 3	Code of conduct/ ethics to be adhered to during data collection Work schedule	Work schedule	Lecture

Appendix G: Graduate School Approval Letter

KENYATTA UNIVERSITY
GRADUATE SCHOOL

E-mail: dean-graduate@ku.ac.ke
Website: www.ku.ac.ke

P.O. Box 43844, 00100
NAIROBI, KENYA
Tel. 810901 Ext. 4150

Internal Memo

FROM: Dean, Graduate School **DATE:** 13th March, 2020

TO: **Bridget Nduta Mwaniki**
C/o Food, Nutrition & Dietetics Department.

REF: H60/CTY/PT/38439/2016

SUBJECT: APPROVAL OF RESEARCH MASTERS PROPOSAL

We acknowledge receipt of your revised Proposal as per our recommendations raised by the Graduate School Board at its meeting of 29th January, 2020, Entitled, **"Eating Habits, Overweight and Obesity among Nutrition Students from Molo, Karen and Nyandarua Kenya Medical Training Colleges, Kenya".**

You may now proceed with data collection, subject to clearance with the Director General, National Commission for Science, Technology and Innovation and **Ethics Review Committee Kenyatta University.**

As you embark on your data collection, please note that you will be required to submit to Graduate School completed Supervision Tracking Forms per semester. The form has been developed to replace the Progress Report Forms. The Supervision Tracking Forms are available at the University's Website under Graduate School webpage downloads.

Thank you

EDWIN OBUNGU
FOR: DEAN, GRADUATE SCHOOL

C.c. Chairman, Department of Food, Nutrition and Dietetics

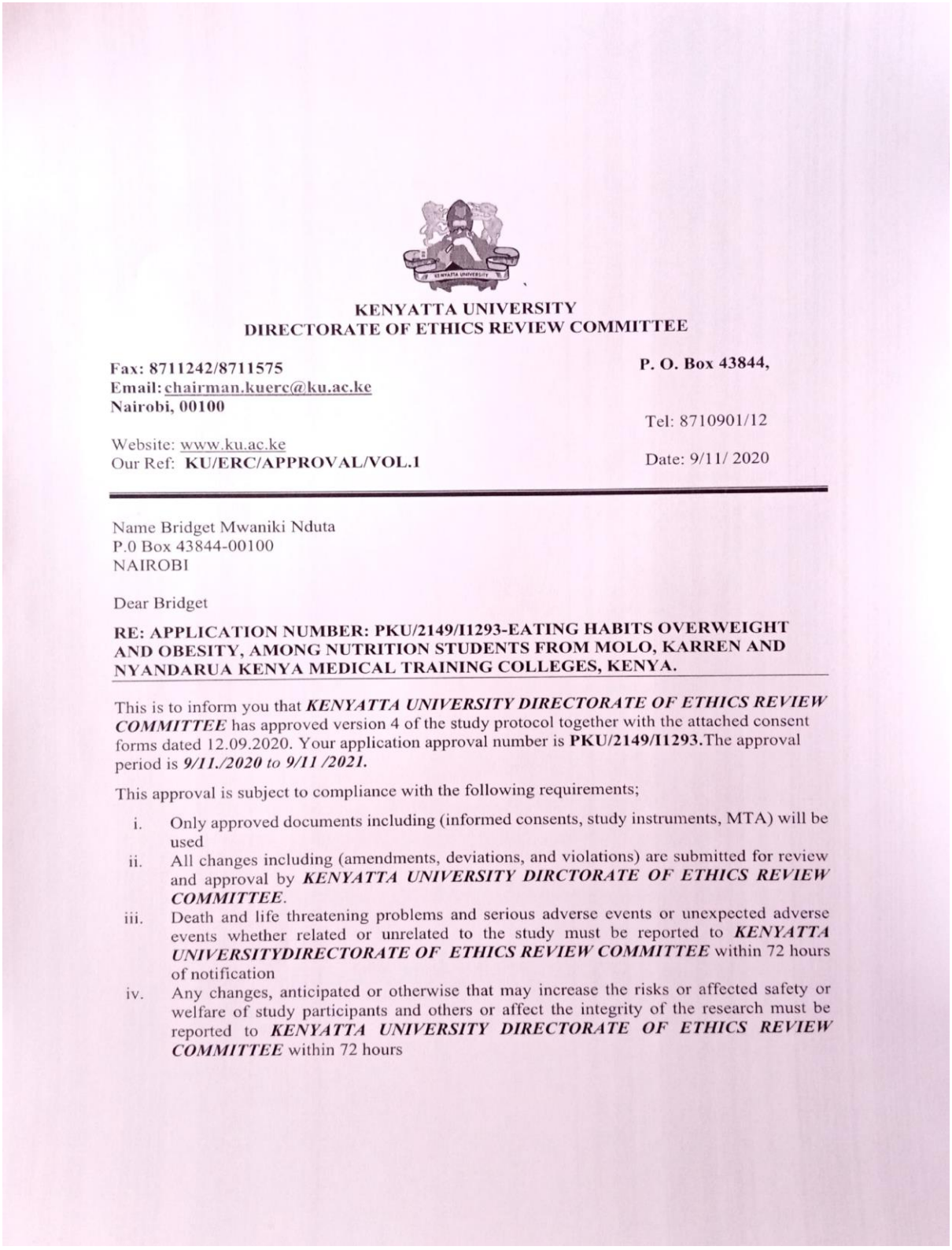
Supervisors:

1. Dr. Sophie Ochola
   C/o Department of Food, Nutrition & Dietetics
   Kenyatta University

2. Dr. Juilana Kiio
   C/o Department of Food, Nutrition & Dietetics
   Kenyatta University

EO/nn

Appendix Ha: KUERC Approval Letter



KENYATTA UNIVERSITY
DIRECTORATE OF ETHICS REVIEW COMMITTEE

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
Nairobi, 00100

P. O. Box 43844,

Tel: 8710901/12

Website: www.ku.ac.ke
Our Ref: **KU/ERC/APPROVAL/VOL.1**

Date: 9/11/ 2020

Name Bridget Mwaniki Nduta
P.0 Box 43844-00100
NAIROBI

Dear Bridget

RE: APPLICATION NUMBER: PKU/2149/I1293-EATING HABITS OVERWEIGHT AND OBESITY, AMONG NUTRITION STUDENTS FROM MOLO, KARREN AND NYANDARUA KENYA MEDICAL TRAINING COLLEGES, KENYA.

This is to inform you that ***KENYATTA UNIVERSITY DIRECTORATE OF ETHICS REVIEW COMMITTEE*** has approved version 4 of the study protocol together with the attached consent forms dated 12.09.2020. Your application approval number is **PKU/2149/I1293.**The approval period is ***9/11./2020*** *to* ***9/11 /2021.***

This approval is subject to compliance with the following requirements;

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by ***KENYATTA UNIVERSITY DIRCTORATE OF ETHICS REVIEW COMMITTEE.***
iii. Death and life threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to ***KENYATTA UNIVERSITYDIRECTORATE OF ETHICS REVIEW COMMITTEE*** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to ***KENYATTA UNIVERSITY DIRECTORATE OF ETHICS REVIEW COMMITTEE*** within 72 hours

Appendix Hb: KUERC Approval Letter Continued

v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to ***KENYATTA UNIVERSITY DIRECTORATE OF ETHICS REVIEW COMMITTEE***.

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

Yours sincerely

Prof. Judith Kimiywe

DIRECTOR- KENYATTA UNIVERSITY ETHICS REVIEW COMMITTEE.

Appendix Ia: NACOSTI

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 571512

Date of Issue: **18/November/2020**

RESEARCH LICENSE

This is to Certify that Ms.. Bridget Nduta Mwaniki of Kenyatta University, has been licensed to conduct research in Nairobi, Nakuru, Nyandarua on the topic: EATING HABITS OVERWEIGHT AND OBESITY, AMONG NUTRITION STUDENTS FROM MOLO, KARREN AND NYANDARUA KENYA MEDICAL TRAINING COLLEGES, KENYA. for the period ending : 18/November/2021.

License No: **NACOSTI/P/20/7723**

571512

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR
SCIENCE,TECHNOLOGY &
INNOVATION

Verification QR Code

NOTE: This is a computer generated License. To verify the authenticity of this document, Scan the QR Code using QR scanner application.

Appendix Ib: NACOSTI Continued

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013

The Grant of Research Licenses is Guided by the Science, Technology and Innovation (Research Licensing) Regulations, 2014

CONDITIONS

1. The License is valid for the proposed research, location and specified period
2. The License any rights thereunder are non-transferable
3. The Licensee shall inform the relevant County Director of Education, County Commissioner and County Governor before commencement of the research
4. Excavation, filming and collection of specimens are subject to further necessary clearence from relevant Government Agencies
5. The License does not give authority to tranfer research materials
6. NACOSTI may monitor and evaluate the licensed research project
7. The Licensee shall submit one hard copy and upload a soft copy of their final report (thesis) within one year of completion of the research
8. NACOSTI reserves the right to modify the conditions of the License including cancellation without prior notice

National Commission for Science, Technology and Innovation
off Waiyaki Way, Upper Kabete,
P. O. Box 30623, 00100 Nairobi, KENYA
Land line: 020 4007000, 020 2241349, 020 3310571, 020 8001077
Mobile: 0713 788 787 / 0735 404 245
E-mail: dg@nacosti.go.ke / registry@nacosti.go.ke
Website: www.nacosti.go.ke

Appendix J: KMTC Authorisation Letter

Telegrams: "MEDTRAIN" Nairobi
TELEPHONE: NAIROBI 2725191, 2725711/14
Fax:2722907 Email: info@kmtc.ac.ke
Please address all correspondence to:
The Director
When replying please quote

Ref: No. KMTC/ADM/74/VOL.V

KENYA MEDICAL TRAINING COLLEGE
P.O. BOX 30195-00100
NAIROBI

Date 25th January, 2021

Bridget N. Mwaniki
KMTC Kabarnet Campus
P.O Box 401 - 30400,
KABARNET

Dear Madam,

RE: PERMISSION TO CONDUCT RESEARCH STUDY AT KMTC MOLO, KAREN AND NYANDARUA CAMPUSES

Reference is made to your letter dated 14th December 2020, requesting for authorization to carry out a study titled ***"Eating Habits, Overweight and Obesity among Students from Molo, Karen and Nyandarua Kenya Medical College, Kenya"*** for your Masters Degree thesis.

The study proposal has been reviewed by the College Research and Ethics Review Committee (CRERC) which is satisfied that no ethical issues shall be violated among the respondents in the process of data collection. However, there is need to consider the observations *(see attached document)* as made by the reviewers in your data collection process.

It is also noted that your study has received the relevant ethical clearance from the institution you are studying in and the required research license by NACOSTI.

Permission is therefore granted for data collection; should any unanticipated issues arise, please contact the research office.

Upon completion of the study, you are requested to submit one (1) hard copy and soft copy of the research report to the KMTC Director's office.

Thank you.

EGLAH J. KIPLAGAT
For: CHIEF EXECUTIVE OFFICER

Telegrams: "MEDTRAIN" Nairobi
TELEPHONE: NAIROBI 2725191, 2725711/14
Fax:2722907 Email: info@kmtc.ac.ke
Please address all correspondence to:
The Director
When replying please quote

KENYA MEDICAL TRAINING COLLEGE
P.O. BOX 30195-00100
NAIROBI

Ref: No. KMTC/ADM/74/VOL.V

Date 25th January, 2021

No objection, noted & approved
the researcher can proceed to collect data
DP-Academics
Please assist the officer
1/2/2021

To: The Principal
KMTC Karen campus, KMTC Molo campus and KMTC Nyandarua campus

noted,
HOD, academics,
assist Le to collect
Let Objectives
01/2/2021
1/2/2021

Dear Madam/ Sir,

RE: LETTER OF INTRODUCTION

The bearer of this letter, Ms. Bridget N. Mwaniki is a Masters student at Kenyatta University and is currently working on a study titled ***"Eating Habits, Overweight and Obesity among Students from Molo, Karen and Nyandarua Kenya Medical Coileges, Kenya".***

Her study proposal has been reviewed and cleared by the KMTC College Research and Ethics Review Committee (CRERC) and the ERC Mount Kenya University. It has also received the relevant research license from NACOSTI.

The investigator has requested to collect data in your institution and is seeking your permission and support for this process.

Kindly accord her the necessary support; should any unanticipated issues arise in the process, please contact the research office.

Noted
HOD Nutrition (Susan)
assist Ms Lecture
to meet the objectives
03/2/21

Thank you.

EGLAH KIPLAGAT
DEPUTY REGISTRAR RESEARCH

KENYA MEDICAL TRAINING COLLEGE
KAREN CAMPUS
P. O. Box 21021-00505
NAIROBI
RECEIVED
Date 04/02/2021

Appendix K: Campus Authorization Letter

BRIDGET N. MWANIKI
KENYA MEDICAL TRAINING COLLEGE
P.O BOX 401 – 30400
KABARNET

8TH DECEMBER,2020

THE PRINCIPAL,
KMTC KAREN CAMPUS,
P.O BOX 24921 – 00502,
KAREN.

Approved, Response a schedule indicating when you will be away 8/2/2020

THROUGH THE PRINCIPAL,
KMTC KABARNET CAMPUS,
P.O. BOX 401-30400,
KABARNET

Noted, HOD, Academics Assist her to organize

Noted & Approved D.P. Academic TNA – Assist the researcher

Dear Madam,

APPROVAL TO CONDUCT RESEARCH IN YOUR CAMPUS: BRIDGET NDUTA MWANIKI-H60/CTY/PT/38439/2016

I am a postgraduate student at Kenyatta University, pursuing a Masters of Science degree in the Departmen of Food, Nutrition and Dietetics.

As part of the programme, I am required to conduct research. The research proposal is entitled "**EATING HABITS, OVERWEIGHT AND OBESITY AMONG NUTRITION STUDENTS FROM MOLO, KAREN AND NYANDURUA KENYA MEDICAL TRAINING COLLEGES, KENYA**"

Therefore, I write to request for your approval to collect data from the Nutrition and Dietetics students, wh are the participants in the study, once studies resume physically.

Following completion of the research, findings will be shared with you.

Your approval is highly appreciated.

Kind regards.

Yours Faithfully,

Bridget Mwaniki

01/02/2021

Lecturer Nutrition and Dietetics

Phone No.0795106181

BRIDGET N. MWANIKI
KENYA MEDICAL TRAINING COLLEGE
P.O BOX 401 – 30400
KABARNET

8TH DECEMBER,2020

THE PRINCIPAL,
KMTC MOLO CAMPUS,
P.O BOX 426-20106
MOLO

Approved. Prepare a schedule indicating when you will be away. 8/12/2020.

THROUGH THE PRINCIPAL,
KMTC KABARNET CAMPUS,
P.O. BOX 401-30400,
KABARNET

PRINCIPAL
KENYA MEDICAL TRAINING COLLEGE
KABARNET CAMPUS
P. O. BOX 401 - 30400, KABARNET

Noted & Approved
Nutrition Dept (Senior)
Chief Lecturer
Meet Learning objectives
8/12/20

Dear Sir,

APPROVAL TO CONDUCT RESEARCH IN YOUR CAMPUS: BRIDGET NDUTA MWANIKI-H60/CTY/PT/38439/2016

I am a postgraduate student at Kenyatta University, pursuing a Masters of Science degree in the Department of Food, Nutrition and Dietetics.

As part of the programme, I am required to conduct research. The research proposal is entitled "**EATING HABITS, OVERWEIGHT AND OBESITY AMONG NUTRITION STUDENTS FROM MOLO, KAREN AND NYANDURUA KENYA MEDICAL TRAINING COLLEGES, KENYA"**

Therefore, I write to request for your approval to collect data from the Nutrition and Dietetics students, who are the participants in the study, once studies resume physically.

Following completion of the research, findings will be shared with you.

Your approval is highly appreciated.

Kind regards.

Yours Faithfully,

Bridget Mwaniki

Lecturer Nutrition and Dietetics

Phone No.0795106181

BRIDGET N. MWANIKI
KENYA MEDICAL TRAINING COLLEGE
P.O BOX 401 – 30400
KABARNET

8TH DECEMBER,2020

Noted and approved. HOD to give the necessary support. 9/12/2020

Approved. Bepase a schedule indicating when you will be away 8/12/2020

THE PRINCIPAL
KENYA MEDICAL TRAINING COLLEGE
KABARNET CAMPUS
P. O. BOX 401 - 30400, KABARNET

THE PRINCIPAL,
KMTC NYANDARUA CAMPUS,
P.O BOX 751-20303,
OL KALOU

THROUGH THE PRINCIPAL,
KMTC KABARNET CAMPUS,
P.O. BOX 401-30400,
KABARNET

Dear Sir,

APPROVAL TO CONDUCT RESEARCH IN YOUR CAMPUS: BRIDGET NDUTA MWANIKI-H60/CTY/PT/38439/2016

I am a postgraduate student at Kenyatta University, pursuing a Masters of Science degree in the Department of Food, Nutrition and Dietetics.

As part of the programme, I am required to conduct research. The research proposal is entitled "**EATING HABITS, OVERWEIGHT AND OBESITY AMONG NUTRITION STUDENTS FROM MOLO, KAREN AND NYANDURUA KENYA MEDICAL TRAINING COLLEGES, KENYA"**

Therefore, I write to request for your approval to collect data from the Nutrition and Dietetics students, who are the participants in the study, once studies resume physically.

Following completion of the research, findings will be shared with you.

Your approval is highly appreciated.

Kind regards.

Yours Faithfully,

Bridget Mwaniki

Lecturer Nutrition and Dietetics

Phone No.0795106181