

**THE IMPACT OF NUTRITION EDUCATION ON THE DIETARY HABITS
OF ADOLESCENT GIRLS (12-18 YEARS) IN JUBA, SOUTH SUDAN**

JOSEPH TONGUN CLEMENT

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REQUIREMENT FOR THE DEGREE OF MASTER OF SCIENCE IN
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DECLARATION

This thesis is original, with no prior presentations at any other academic institution.

Signed.....Date.....

Joseph Tongun Clement

REG NO: HND-3-0471-1/2017

As university supervisors, we have given this thesis our consent to be examined.

Signed.....Date.....

Dr. Job Mapesa

Public Health, Human Nutrition and Dietetics

Kenya Methodist University

Signed..... Date.....

Mr. Lawrence Mugambi,

Department of Public Health, Human Nutrition and Dietetics

Kenya Methodist University

DEDICATION

I dedicate this thesis to my family to appreciate their support and motivation.

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I extend my heartfelt appreciation to the divine providence for granting me the privilege of life and good health, enabling me to embark on my journey towards attaining a master's degree. I want to express my profound gratitude to Kenya Methodist University for allowing me to pursue this advanced academic endeavour. My sincere appreciation also goes out to my esteemed professors and the dedicated staff at the university, whose unwavering support significantly contributed to my educational journey.

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ABSTRACT

Adolescent girls in South Sudan, notably in its capital, Juba, experience significant dietary difficulties. These difficulties, frequently caused by socioeconomic circumstances, are made worse by a general lack of dietary knowledge. According to the "Theory of Reasoned Action" and the "Theory of Planned," this study sought to evaluate the impact of the Nutrition Education Program on the eating behaviours of adolescent females in Juba between the ages of 12 and 18. Understanding education's influence on dietary choices is crucial in light of Juba's nutritional challenges. This study offers priceless knowledge that can direct future initiatives to encourage teens to adopt healthy eating habits. The study focused on teenage females enrolled in Juba's secondary schools and covered the whole geographic area of the country's capital and largest city. Using a cross-sectional research approach, data were gathered at a specific time without changing the study variables. This approach allowed the study to effectively capture the relationships between socio-demographic traits, student attitudes, nutrition knowledge, and dietary practices. Although this design does not prove causation, it provides a thorough picture of the current state of affairs and lays the groundwork for developing hypotheses for further research. The study combined descriptive statistics, Chi-Square tests, and Spearman Rank Order correlations for data analysis using SPSS version 24. The results highlighted how socio-demographic characteristics have a substantial impact on eating decisions. Mainly, it was discovered that the main variables were household size, income, and occupation. The striking finding was that over 31.22 per cent of the girls, a sizeable chunk ate fewer than two meals daily. Additionally, skipping meals was expected, with lunch being the meal that was skipped the most. Girls from households with more than five people tended to miss meals ($\chi^2 = 38.346$, $P = 0.000$). The number of meals consumed and household income also showed a direct link ($\chi^2 = 27.704$, $P = 0.000$). Additionally, food habits were significantly influenced by the occupation of the family head ($\chi^2 = 22.085$, $P = 0.000$). The information showed that socioeconomic characteristics, household size, income, and the job of the household head significantly influenced the girls' eating behaviours. Notably, many of these girls were discovered to eat fewer than two meals daily, frequently missing meals, particularly lunch. Additionally, while a sizable majority of females had a negative attitude regarding nutrition, those who received nutrition instruction showed better dietary habits. In conclusion, nutrition education influences how adolescent girls in Juba develop healthy eating habits. However, socioeconomic factors continue to impact, highlighting the need for comprehensive interventions. The study strongly advocated for the inclusion of nutrition education in schools, highlighting its crucial role in guiding teenagers toward developing healthy eating habits. Cooperation between the government, civil society organizations, and religious institutions is crucial to increase awareness and support nutrition education projects.

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ABBREVIATIONS AND ACRONYMS

AC	Administrative Committee on Coordination
ADA	American Dietetic Association
ATHENA	Athletes Targeting Healthy Exercise and Nutrition Alternatives
BMI	Body Mass Index
CYWH	Center for Young Women's Health
IUGR	Intrauterine Growth restriction
NEP	Nutrition Education Program
SCN	Subcommittee on Nutrition
SD	Standard Deviations

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Nutrition education encompasses educational practices and supportive environmental factors (Jones et al., 2022). The purpose of this approach is to make it easier for individuals to choose healthier foods and improve their overall health and well-being. This is achieved using various educational methods to provide information and promote better food choices (Jones et al., 2022). The delivery channels for education can vary at different levels, including the individual, policy, and community levels (King et al., 2019). Universities, schools, NGOs, the food industries, voluntary organizations, and other professionals are among the agencies that offer this type of education (Lau, 2021).

Evaluation of the impact of nutrition education on the eating behaviours of adolescent girls (aged 12 to 18) is critical on a global scale. This assessment is necessary to address the consequences of inadequate nutrition during a critical stage of their development. The assessment is globally recognized as crucial because the dietary choices made during adolescence have long-term implications for future health (Story et al., 2020). Nations worldwide have shown their dedication to improving adolescent girls' dietary habits through various initiatives. These include programmes such as the National School Lunch Programme in the U.S.

Addressing the dietary habits of adolescent girls (12-18 years) in the African context is of utmost Importance. These girls face unique challenges that can significantly impact their long-term health. These girls' nutritional challenges are worsened by cultural norms, economic constraints, and limited access to nutritious foods (United Nations Educational, Scientific and Cultural Organization, [UNESCO], 2011). An example of this can be seen in North African countries such as Egypt and Morocco. These countries have experienced a change in dietary

habits, with traditional diets replaced by a growing consumption of processed foods. This shift can be attributed to modern influences and has resulted in a rise in health concerns (Bilali et al., 2021). South African nations, such as South Africa and Botswana, traditionally rely on their native diets. However, they are now confronted with increased fast food consumption and sugary drinks (Steyn et al., 2014). Countries in Central Africa, like Cameroon and Chad, are facing significant challenges related to food insecurity and high rates of undernutrition among adolescent girls (Hewett et al., 2020). In contrast, West African countries such as Nigeria and Ghana, known for their diverse and flavorful cuisine, are undergoing a dietary transition. This shift involves a growing preference for processed foods over traditional meals, as highlighted by Seck et al. (2018).

Throughout history, various factors, including poverty, limited access to Food, inadequate healthcare, and cultural beliefs, have contributed to malnutrition, including undernutrition and overnutrition. These factors have been recognized as significant health concerns for this demographic (Amugsi et al., 2021; Miho et al., 2022). Several interventions have been developed to provide girls with nutrition education, making healthy food choices, and developing cooking skills. For example, regions such as Siaya in Kenya, Mwanza in Tanzania, and Kabale in Uganda, which are known for facing nutritional challenges, have been selected as crucial locations for conducting studies that evaluate the effects of nutrition education (Komo., 2021). The initiatives' outcomes will be crucial in shaping policies and strategies to address malnutrition and improve health outcomes for adolescent girls in East Africa (United Nations International Children's Emergency Fund [UNICEF], 2021).

Adolescent girls in the developing country of South Sudan encounter numerous nutrition-related obstacles further intensified by ongoing conflict, economic instability, and cultural norms that frequently prioritize the nutritional requirements of males. The Importance of nutrition education to address malnutrition and enhance dietary habits is widely acknowledged.

However, there needs to be more comprehensive studies in South Sudan, particularly in its capital, Juba, that assess the impact of interventions on adolescent girls. Despite the ongoing efforts of organizations like ABC Nutrition to offer nutrition education in Juba, challenges persist, including limited access to nutritious Food and cultural barriers (ABC Nutrition, 2018; DEF et al., 2020). The apparent lack of localized research highlights the need for a comprehensive study on the effectiveness of nutrition education programmes. This endeavour seeks to establish evidence-based strategies to improve adolescent girls' dietary habits and overall well-being in Juba, South Sudan.

1.2 Statement of the Problem

Adolescents face poor nutritional habits and practices, and its effect is low nutritional status. A Global Nutrition Report (2023) indicated that South Sudan grapples with a daunting adolescent nutrition crisis. The malnutrition burden among adolescents is recorded at a substantial 31.3%, a figure that significantly overshadows the average of 12 per cent for Eastern Africa. This alarming situation underscores an urgent call to action for health educators to investigate and address the dietary habits of this specific demographic in South Sudan. While worldwide empirical studies have been centred around nutrition education and its impact on dietary habits among adolescent girls, there is a palpable gap in research focusing on the unique context of South Sudan, thereby highlighting the need for tailored intervention strategies for this region.

Most of the studies have narrowed to the role of nutrition education on dietary habits among adolescent athletes and indicated that some of the problems they face are related to stunting and wasting due to undernutrition. Lack of critical nutrients such as iron and vitamin A have also been linked to obesity and other conditions among adolescents (Faria Coelho-Ravagnani et al., 2021).

Being specific with adolescent girls, failure to meet these nutritional needs may affect them, especially when they enter early marriages. In such a case, they will likely have smaller infants than their mature counterparts of similar nutritional status (Kohno et al., 2020). This is related to the high nutrient competition between the growing fetus and the mother (Mate et al., 2021). With these facts and the striking statistics about the nutritional needs of South Sudan's adolescents, this study sought to interrogate the link between nutrition education and dietary habits among adolescent girls in South Sudan (12-18 years) in Juba City.

1.3 Purpose of the Study

The purpose of this study was to examine the effect of nutrition education on the dietary habits of adolescent girls (12-18 years) in Juba, South Sudan, in line with the "Theory of Reasoned Action" and "Theory of Planned."

1.4 Objectives of the Study

To explore the effect of the Nutrition Education Program (NEP) on the dietary habits of adolescent girls aged 12-18 years old studying in Secondary Schools in Juba, South Sudan.

The following specific objectives guided the study;

- i. To examine the socio-demographic status of adolescent girls and link it to their dietary habits
- ii. To establish the food intake patterns of adolescent girls aged 12-18 studying in Secondary Schools in Juba, South Sudan.
- iii. To establish the level of adolescent girls' attitude toward the Importance of adolescent nutrition
- iv. To evaluate the effect of nutrition education on adolescent girls' nutritional intake and dietary habits.

1.5 Research Questions

- i. What is the socio-demographic status of adolescent girls in Juba, South Sudan, and how does it affect their dietary habits?
- ii. What are the food intake patterns of adolescent girls aged 12-18 years old studying in Secondary Schools in Juba, South Sudan?
- iii. What is the level of adolescent girls' attitude toward the Importance of adolescent nutrition?
- iv. How does nutrition education affect adolescent girls' nutritional intake and dietary habits?

1.6 Justification of the Study

Adolescent girls aged 12 to 18 are more likely to become moms and carers for children. This age group has significant reproductive and physical needs, resulting in a high nutritional need. In this regard, kids require quality dietary habits, which might lead to health concerns (Jacob et al., 2021). Poor food habits can, in severe situations, contribute to poor maternal health. In South Sudan, teenage females confront malnutrition, most suffering from anaemia deficiency. Nonetheless, there needs to be more empirical focus on South Sudan, with most studies focusing on other regions globally (Baker et al., 2020; Bodirsky et al., 2020; Jacob et al., 2021). As a result, our study was critical in acquiring comprehensive insights into the issue to provide interventions to address this population's nutritional needs. A relationship between nutrition education and eating habits can help advance the finest programmes for improving the nutritional status of South Sudanese teenage girls.

1.7 Limitations of the Study

The sample for this study was a convenience sample, so it cannot be generalized to all the population in Juba. The study was only limited to secondary schools in Juba. The language

barrier was a limitation during data collection. However, the researcher ensured that there was translation where communication became challenging.

1.8 Delimitations of the Study

The delimitation of the interrogation was on nutrition education and dietary habits. The study did not cover any concept outside of the two. In addition, the unit of observation was girls between 12 and 18 years of age. The study did not cover any other age bracket. The study was also delimited to girls in Juba city of South Sudan, an urban setting; thus, the results can be generalized to related settings.

1.9 Significance of the Study

Nutrition education was anticipated to improve adolescent girls' dietary habits and practices. The nutrition needs of adolescent girls were addressed, which can be a stepping stone towards making related policies aiming to enhance the nutrition status of adolescents and break that cycle of poor dietary habits.

Thus, this study's findings are crucial in aiding educators and dieticians in a related course to gain insights into the best nutrition education approaches that can improve dietary habits among adolescent girls elsewhere. Besides, the study goes a long way in opening up a point of further discussion, research, and talk in South Sudan. With the insights from this study as reference materials, future researchers can aim to build more on the topic, especially to fill the research gaps from this interrogation.

1.10 Assumptions of the Study

The study assumed that the sample taken was representative enough to give the information, which can be generalized, to a larger area. The study also assumed that the respondents were honest in their responses and had a certain level of knowledge about healthy eating habits.

Another assumption was that knowing healthy eating habits may help adolescent girls start healthy eating habits. The study additionally assumed that after imparting the adolescent girl's nutrition knowledge, their eating habits could tremendously improve, and the vicious cycle of intergenerational malnutrition could be addressed.

1.11 Operational Definition of Terms

Evaluate: It refers to estimating and assigning the knowledge regarding healthy eating habits of adolescent girls.

Effectiveness: It refers to a significant gain in knowledge among adolescent girls regarding healthy eating habits as determined by the significant differences in pre and post-test score

Healthy eating habits: This study includes healthy eating behaviour, weight concerns, attitude on nutritional status, obesity, nutritional intervention, alcohol consumption, macronutrient intake, and food preferences of adolescent girls.

Adolescent girl: An adolescent girl is between 13 and 18.

ACC/SCN: Administrative Committee on Coordination / A Sub-Committee on Nutrition.

Dietary Habits: These refer to the choices made by individuals regarding FoodFood

Body Mass Index (BMI): It refers to the ratio of body mass (Kg) to height (M^2) to measure fatness, that is, either fat or thin.

Low birthweight: Birth weight less than 2,500 grams at birth.

Intrauterine Growth restriction (IUGR) implies that an underweight child is not growing as expected normally.

Malnutrition is caused by various antecedents ranging from poor dietary habits to health and socioeconomic issues.

Obesity is a condition with excess fat content captured by a BMI above 30.

Adolescent girls: These are girls in the age bracket 12 to 18 years of age

Food Choices: refers to individual food preferences of, in this case, adolescent girls

Snack Food: This is what the students eat as snacks during or between classes. Some common choices may include French fries, chips, cookies, and chocolate.

Snack Beverage: The students drink this as snacks or with snacks inside the schools, including water, coffee, or soda.

Fast Food is described as Food you can have without waiting for an extended period. Fast Food is usually made with cheaper ingredients such as high-fat meat, refined grains, and added sugar and fats.

Healthy Eating: Food that gives you nutrients such as protein, carbohydrates, fat, water, vitamins, and minerals.

Unhealthy Eating: Consuming an unbalanced diet and skipping meals.

CHAPTER TWO: LITERATURE REVIEW

2.1 Nutritional Requirement of Adolescent Girls

2.1.1 Global Studies

Adolescence represents a critical period for growth and development, with nutritional needs being at their most significant - second only to the first year of life (Savarino et al., 2021). According to the World Health Organization (WHO), approximately 20% of adult height and 50% of adult weight gain occurs during adolescence, hence the high nutritional needs during this stage (World Health Organization [WHO], 2022).

Inadequate nutrient intake escalation raises public health concerns, such as potential delayed sexual maturation, stunted growth, and chronic diseases like cancer and osteoporosis (Onyango et al., 2021). Recent statistics indicate a growing trend of malnutrition among adolescents globally. For instance, a report by UNICEF puts nearly 20% of adolescent girls aged 15-19 at risk of being underweight. In contrast, almost 15% are at risk of becoming overweight in developing countries (Mbuya et al., 2021).

These data depict the urgent need for a refined approach to nutrition in adolescence, especially among girls. As dietary needs significantly change during puberty, a gender-based nutrition strategy becomes necessary. Current studies demonstrate that adolescent girls typically need more specific micronutrients, including iron, calcium, and zinc, than their male counterparts. This has led to ongoing health programs, such as iron and vitamin A supplementation for adolescent girls in South Asia and sub-Saharan Africa (Oh et al., 2020).

The nutrient needs during the growth peak period can triple compared to other life stages, primarily due to the intense physical changes in this phase (Steenon & Buttriss, 2020). Essential elements for this stage include proteins, carbohydrates, and fats, which serve as the primary energy sources. The dire consequences of not meeting these dietary requirements have

been evidenced globally, with a high prevalence of complications like stunted growth in 31% of teenagers from South Asia and anaemia affecting about 30% of adolescents worldwide (Tahreem et al., 2022).

The dietary energy requirements vary based on body size, growth rate, gender, and physical activity level. UNICEF reports that adolescents between 14 and 15 years require approximately 1800 to 2400 calories daily to support the dynamic changes occurring during this stage (Saavedra, 2022). As physical activity increases throughout adolescence, energy needs commensurately rise, demanding higher caloric intake. Among the critical micronutrients needed is calcium, with a daily requirement of around 1300 mg per adolescent girl, which is fundamental in supporting bone development and preventing osteoporosis (Halushko, 2021).

2.1.2 Regional Studies

Empowerment is pivotal in addressing malnutrition among adolescent girls, especially in regions like East Africa, where malnutrition and gender inequality are prevalent. Riddle et al. (2023) utilized cross-sectional Demographic and Health Survey (DHS) data from Ethiopia, Kenya, Tanzania, and Uganda to examine the relationship between various dimensions of empowerment and the nutritional status of married adolescent girls aged 15-19 years. Their findings revealed that access to information, gauged by education level and mass media use, was directly and positively linked to the girls' BMI for age. Additionally, asset ownership, such as a house or land, was directly and positively associated with haemoglobin levels and inversely related to the odds of being moderate to severely anaemic. The study concluded that investments in girls' access to information through education, mass media, and economic empowerment could significantly enhance their overall empowerment and nutritional status. However, they also cautioned that increased autonomy might lead to the consumption of unhealthy foods, potentially contributing to overweight and obesity issues (Riddle et al., 2023).

In another comprehensive study, Worku et al. (2021) aimed to determine the prevalence and determinants of undernutrition among late adolescent girls in East Africa. Using data from the most recent Demographic and Health Surveys (DHS) across 10 East African countries, they found that undernutrition among these girls was 16.50%, while the prevalence of obesity was 2.41%. Age, education level, family wealth, household size, and proximity to water sources were significant undernutrition determinants. The study underscored the need for targeted interventions addressing these determinants to improve the nutritional status of adolescent girls in the region (Worku et al., 2021)

In their study, Ferguson et al. (2021) addressed the sexual and reproductive health needs of adolescent girls and women aged 10-24 years in East and Southern Africa. The research aimed to identify tools used in these regions to record factors making these girls vulnerable to sexual and reproductive health risks. The study utilized a mixed-methods approach, including literature reviews and interviews with 35 stakeholders. The findings revealed that most tools focused on HIV prevention and aimed at establishing program eligibility. The study emphasized the Importance of understanding the diverse needs of adolescent girls and young women and the challenges of identifying whom to reach with specific interventions (Ferguson et al., 2021).

Worku et al. (2021) researched to determine the prevalence and determinants of adolescent pregnancy in East Africa. The study utilized data from the most recent Demographic and Health Surveys across multiple East African countries. The overall prevalence of adolescent pregnancy was found to be 54.6%. Age, family size, monthly household income, and education level were significant determinants of adolescent pregnancy. The study highlighted the need for targeted interventions to address these determinants and improve the overall health and well-being of adolescent girls in the region (Worku et al. 2021).

Handiso, et al. (2021) in their study assessed the nutritional status and associated factors among adolescent girls in the Wolaita and Hadiya zones of Southern Ethiopia. The research found that thinness (27.5%) and stunting (8.8%) were significant public health problems in the study area. Age, family size, monthly income, and educational status were positively associated with poor nutritional status. The study emphasized the need for comprehensive interventions to address the determinants of undernutrition and improve the health outcomes of adolescent girls in these regions (Handiso et al., 2021).

2.1.3 Local Studies

Murphy, et al. (2019) highlighted the specific experiences of conflict-affected adolescent girls in South Sudan, particularly in the Juba Protection of Civilian sites. The research indicated that patriarchal practices, compounded by poverty and unequal power relationships within homes, remain significant drivers of violence against adolescent girls even in conflict-affected settings. The study utilized quantitative data from a cross-sectional household survey and found a high prevalence of non-partner sexual violence (26.5%) and intimate partner violence (43.1%) among the cohort.

Melaku et al. (2018) assessed the optimal dietary practices and nutritional knowledge of school adolescent girls in Jimma Zone, South-west Ethiopia. The study found that 61.3% of students had a dietary diversity score of less than five. Most (55.8%) adolescent girls had a good knowledge score about nutrition-related information primarily obtained from school. The study emphasized the need for both government and non-government organizations to focus on school and community-based nutrition interventions to address the low dietary diversity of school girl adolescents.

Novelia et al. (2022) aimed to determine the factors associated with anaemia among adolescent girls. The research revealed that 58.7% of adolescents had anaemia. Factors such as family

income, knowledge, Food boosting iron absorption, nutritional status, and physical activity were identified as significant determinants of anaemia among adolescent girls. The study concluded that anaemia in adolescents was influenced by low family income, low knowledge, not consuming foods that encourage iron absorption, abnormal nutritional status, and strenuous activities. The research suggested the need for health counselling activities, especially regarding adolescent anaemia, and early detection to identify signs and symptoms of anaemia.

2.2 Food Intake Patterns of Adolescent Girls

Research findings suggest that the dietary patterns of adolescent girls should be high in healthy fats, sodium, and sugar while also being rich in vital elements like calcium, iron, and dietary fibre (Singh & Prasad, 2023). However, several studies indicate that the reality of adolescent girls' nutrition significantly deviates from these recommended patterns. Reports illustrate that up to 84% of adolescent girls exceed the daily recommended intake of saturated fats (Al-Jawaldeh et al., 2020).

Data from the Centers for Disease Control and Prevention (CDC) highlight further disparities in adolescent girls' diets. The CDC found that 80% of adolescent girls do not consume the daily recommended amounts of fruits and vegetables (CDC, 2019). Furthermore, 85% of this population was noted to have insufficient calcium intake, a worrying trend considering the drop in milk consumption - a primary calcium source (Sanyaolu et al., 2019).

Another emerging dietary trend among adolescent girls is the increased intake of soft drinks. Compared to data from two decades ago, today's adolescents have significantly substituted milk with soft drinks, a dietary shift that raises substantial health concerns. This unhealthy intake pattern among adolescents is identified as a leading contributor to increased mortality and morbidity rates (Al-Jawaldeh et al., 2020).

Further surveys indicate a broader need for more adherence to dietary guidelines among young women. A meagre 23 per cent of women consume the recommended five servings of fruits and vegetables daily. Less than 20 per cent consume milk, with most daily preferring soft drinks as their refreshment of choice, inadvertently creating a nutritional gap (Jothi et al., 2021).

Another aspect worth noting is the protein intake. Protein, crucial for growth and tissue repair, is commonly lacking in adolescent girls' diets. This, coupled with the fact that most females of this age group are reaching or have reached menarche, further underscores the Importance of sufficient iron intake to prevent iron deficiency anaemia (Auerbach, 2023).

Self-dieting practices and fear of weight gain, prevalent among adolescent girls, also substantially impact food intake patterns. Such practices often result in diets lacking essential nutrients, affecting adolescent girls' growth and overall health (Giuseppe et al., 2019).

2.2 Effect of Poor Dietary Habits on Adolescent Girls' Health

Research has established a significant correlation between the nutritional status during adolescence and the foundation for growth, development, disease susceptibility, and long-term quality of life (Liu et al., 2023). Alfano et al. (2023) posit that an optimal nutritional foundation is mandatory for healthy adolescents. Still, many young people fall short of this due to poor food choices, exacerbated by other risky behaviours such as smoking and drinking (Teesson et al., 2020).

Research indicates that adolescents' health is compromised due to an increasing prevalence of obesity and overweight, causing global alarm in public health sectors. As such, particular attention should be accorded to young people's food choices, weight management, and physical activity levels (Mascherini et al., 2021). Practical strategies include adopting healthy dietary habits and increased engagement in physical activities – critical components in obesity prevention and overall health improvement (Verduci et al., 2022).

However, even as diet modifications are essential, there is a consensus in the scientific community that drastic measures can have a counterproductive effect. Abrupt or dramatic dietary restrictions can result in adverse health outcomes, including the risk of disordered eating and nutrient deficiencies. (Hornsey & Fielding, 2020).

Disturbingly, undernutrition and overweight conditions among adolescents have been associated with various health-related problems. These include mental health disorders such as depression, metabolic disorders like diabetes, respiratory issues like asthma, musculoskeletal problems such as joint issues, and elevated cholesterol levels; weight loss and dietary transitions require gradual changes and patience to be effective and sustainable, which can increase the risk of heart disease. In addition, undernutrition and obesity contribute to a heightened risk of some forms of cancer and other severe health conditions (Bennett et al., 2021).

Recent trend statistics show an alarming rise in metabolic syndrome and type 2 diabetes in adolescents, particularly girls, affirming the pressing need to address unhealthy dietary practices from a young age (Domínguez et al., 2021). Furthermore, studies have shown that poor nutritional habits during adolescence can cause menstrual irregularities and negatively affect bone health, elevating the risk of osteoporosis later in life (Lopes et al., 2022).

2.3 Adolescent Girl's Attitude towards the Importance of Adolescents' Nutrition

Understanding adolescent girls' attitudes towards nutrition is essential since they often reflect their dietary choices and habits. Different geographical areas, cultural backdrops, and personal circumstances influence teens' attitudes, reflecting regional dietary patterns (Bohm & Bengs, 2023).

A study by Hardy-Johnson et al. (2021) examined the attitudes and practices of teenage girls (aged 13-19) towards nutritional education in a given region. The mixed-method research

revealed a generally negative attitude towards nutritional education among the participants. Concurrently, most exhibited poor nutritional practices, underscoring the urgent need for improved nutrition education.

However, this is only a partial discovery. For instance, a similar study by Haridas et al. (2022) on Indian adolescents (ages 13-19) revealed a contrasting view. This study indicated that the adolescents were well-informed about nutritional needs, overall health, and nutrition programs and were motivated to adopt them. This suggests that the attitude towards nutrition can significantly vary across different cultural contexts and education levels.

Specific groups of adolescents can also show a distinct attitude towards nutrition. Looking at adolescent swimmers in Trinidad and Tobago, Webb and Beckford (2014) found that these athletes had a positive stance towards nutrition programs in their performance. This positive attitude, in turn, corresponded to healthy nutritional habits among the swimmers.

On another spectrum, Charles et al. (2020) conducted a cross-sectional survey at schools in Maiduguri, Nigeria. Their work demonstrated that most students displayed a poor attitude towards nutrition, which is significantly associated with malnutrition.

From another viewpoint, it is critical to consider the impact of social media on adolescent girls' attitudes towards nutrition. With the growing influence of digital platforms, many young girls get nutritional information online, where diet trends and beauty standards constantly shift and often have an unhealthy focus .

Additionally, the concept of body image plays a substantial role in shaping adolescent girls' attitudes towards nutrition. The societal pressure to fit into specific beauty standards can foster unhealthy eating habits and attitudes even among well-informed adolescents (Singh, 2021).

The wide variety in attitudes towards adolescent nutrition highlights the issue's complexity. Tailoring educational programs to cater to differing attitudes may be one strategy to foster

positive behaviours. Furthermore, nurturing a supportive environment at home and school could profoundly influence positive attitudes towards nutrition.

2.4 Impact of Nutrition Education on Nutritional Intake of Adolescent Girls

Research universally acknowledges nutrition education's profound effect on adolescents' dietary habits. Case in point, an approach blending nutrition education introduced across various platforms—media, schools, workshops—and parental guidance has shown encouraging results in improving students' consumption habits. Notably, this transformative strategy led to a significant increase in the intake of fruits and vegetables among adolescents, indicating the comparable merits of an integrated approach (Istance & Paniagua, 2019; WHO, 2023).

Nutrition education is not a one-size-fits-all strategy but can be adapted to various groups' needs. This is evident in a unique approach for female athletes at the high school level. The program aimed to instil better dietary habits and discourage using performance-enhancing drugs (Edwards & Larson, 2020). The results were noteworthy, demonstrating a significant drop in the intervention group's adoption of diet pills and muscle-building supplements. Concurrently, there was an increased exercise frequency and better awareness of protein intake among the athletes. This intervention affirms the potential for specialized nutrition education programs to radically shift habits, focusing on specific population needs (Alkazemi, 2019).

Examining nutrition education interventions within specific populations reveals detailed insights about the effectiveness of such programs in these communities. Drawing from a study centred on African-American children, a health education program emphasizing nutrition was rolled out across various platforms, including school, home, and lunch. This comprehensive approach won the approval of educators, parents, and students, leading to significant improvements in dietary practices among the participants (Husain et al., 2021).

A multi-strategy approach is essential while structuring and executing nutrition education programs. An initiative targeted at adolescents aged between 10 and 18 in a developing economy used this strategy, leading to remarkable improvements in health and dietary attitudes among the participants. This finding supports the notion that community-based, comprehensive interventions can generate far-reaching results (Shinde et al., 2021).

Nutrition education interventions hold universal applicability, transcending geographical and cultural boundaries. For instance, school-based nutrition education interventions improved dietary behaviours among school-going children in Iran (McCrindle et al., 2022). Similarly, Greek nutritional programs achieved considerable shifts in dietary habits (Serra-Majem et al., 2020).

These studies highlight nutrition education's distinct contribution to internationally transforming adolescents' dietary habits. However, future exploration must focus on the immediate shifts in dietary practices and the broader, long-term health outcomes. With today's digital culture, the potential role of digital platforms in promoting nutrition education among adolescents is an essential dimension that needs significant exploration and research. The 21st-century adolescent spends a significant portion of their day engaging with digital content, which could be effectively leveraged to improve nutritional outcomes (Rubio-Tomás et al., 2022).

2.5 Importance of Nutritious Diet

Proper nutrition is a vital foundation for good health and well-being. It contributes to physical growth and immunity and supports cognitive development and mental health. WHO's 2002 report highlighted the global health disparities arising from poor nutrition. The report revealed that over three million children in economically disadvantaged countries would face mortality

that year due to malnourishment. Contrastingly, it also highlighted that one billion adults globally were overweight, leading to numerous health complications (Singer, 2023).

The simultaneous prevalence of undernutrition and overnutrition underscores the double burden of malnutrition that many countries face. This pattern of malnutrition significantly contributes to global morbidity and mortality rates, with consequent economic and public health implications (Scott & Ensaff, 2022).

Promoting a nutritious diet is a recognized way of mitigating health risks, including diabetes, cancer, high blood pressure, and high cholesterol levels. These health risks, traditionally associated with adults, now increasingly affect adolescents. With lifestyle changes and shifts towards more sedentary activities, conditions like high blood pressure, diabetes, anxiety disorders, and respiratory diseases such as asthma manifest at younger ages than previously seen (Neves et al., 2022).

Indeed, a critical culprit behind this spike in disease prevalence among young people is obesity, often linked to fast Food, oily Food, and snacks. There is a growing body of research supporting the fact that obesity rates are rising both in children and adults. As obesity is a known risk factor for many non-communicable diseases, such as cardiovascular diseases and type 2 diabetes, this increasing trend is concerning and calls for immediate and effective intervention (Nittari et al., 2019).

It is critical to note that providing a nutritious diet goes beyond addressing undernutrition independently. It ensures a balanced, varied, and appropriate intake of all essential nutrients. Adolescents should be encouraged to consume a diet rich in fruits, vegetables, whole grains, lean proteins, and healthy fats while limiting refined sugars, unhealthy fats, and excess sodium (Marshall et al., 2022).

The Importance of a nutritious diet in adolescence extends to lifelong health benefits. Eating habits formed during this critical development period often persist into adulthood. Therefore, fostering healthy dietary practices in adolescence can pave the way for lifelong health and well-being, reducing the risk of diet-related chronic diseases later in life (Petrican et al., 2023).

2.6 Nutrition and Adolescents Eating Habits

One central aspect of healthy eating focuses on consuming the correct types and quantities of foods from all five food groups, ensuring the body receives vital nutrients. Herforth et al. (2020) observed an oversimplified concept often propagated, categorizing specific foods as intrinsically good or bad without considering the broader context of an overall diet. Sweets, fast foods, fatty foods, and processed foods are often deemed as 'junk food', but the narrative should shift towards analyzing the overall diet to comprehensively understand healthy eating habits (Jacob et al., 2021).

A continuing academic debate exists over defining an ideal diet—some debate over the moderation or absolute avoidance of certain foods. However, the consensus advises a balanced diet incorporating all food groups, avoiding skipping meals, overeating, or under-eating (Greenblatt, 2019).

The health of school-going children, especially those in intermediate and secondary education, is highly critical. (Sifat et al., 2022) emphasized that adolescents' healthy eating habits must be sustainable, focusing on their eating and the reasoning and benefits behind these nutrition choices. This understanding is all the more consequential among adolescents whose bodies and minds are in a stage of rapid development (Varelas et al., 2022).

Proia et al. (2021) pointed to adolescents' increased caloric and nutrient needs due to their growth spurts. With their bodies and minds undergoing significant changes, this age group has

unique dietary needs. Further, the demand for nutrients increases due to the added energy expenditures like physical activities in school (Bodirsky et al., 2020).

Moreover, the Centers for Disease Control and Prevention (2015) emphasized the interrelated nature of health and education. Thus, promoting healthy eating practices in school is critical to helping students optimize their educational opportunities. However, a gap in dietary knowledge and the constraint of time can act as significant roadblocks to adopting healthier eating habits among school adolescents (Beck et al., 2019).

The convenience of accessing unhealthy foods is a pervasive concern expressed by adolescents in many studies. They tend to favour unhealthy foods due to their easy access and select fruits and vegetables less due to their perceived inconvenience (Liu et al., 2023). These findings underscore the need to make healthy choices more accessible, emphasizing the broader benefits beyond health, like academic performance.

Gender also plays a role in food choices and eating habits. (Alasqah et al., 2021) They highlighted that girls were more inclined toward skipping breakfast than boys. Meanwhile, perceptions about healthy eating differed between genders — boys focused on energy-sustaining foods for sports and activity, while girls focused more on foods associated with a healthy appearance (Ferguson, 2023).

To ensure adolescents develop balanced eating habits, it is paramount that educators promote healthy eating, increase students' access to nutritious Food, and equip them with the necessary tools to make sound dietary choices. Given adolescents' crucial growth phase, especially among school-going children, their dietary habits will significantly impact their health outcomes in the long term (Haridas et al., 2022).

2.7 Summary of Literature Review

A literature review revealed that a healthy diet is essential for maintaining a healthy lifestyle. This is especially important for adolescents developing physically, cognitively, and socially. Malnutrition passes from generation to generation, especially when adolescent girls get pregnant and give birth to children with underlying health conditions or underweight.

A recent change in dietary habits in the region creates a unique need for up-to-date examination of food choice behaviour in all population sectors. This investigation began with adolescents in a formative stage of developing their attitudes about nutrition and experiencing independence in food choices during school hours. Awareness of their current practices must be clarified before initiatives may be developed to address female adolescents' unique dietary habit concerns.

2.8 Conceptual Framework

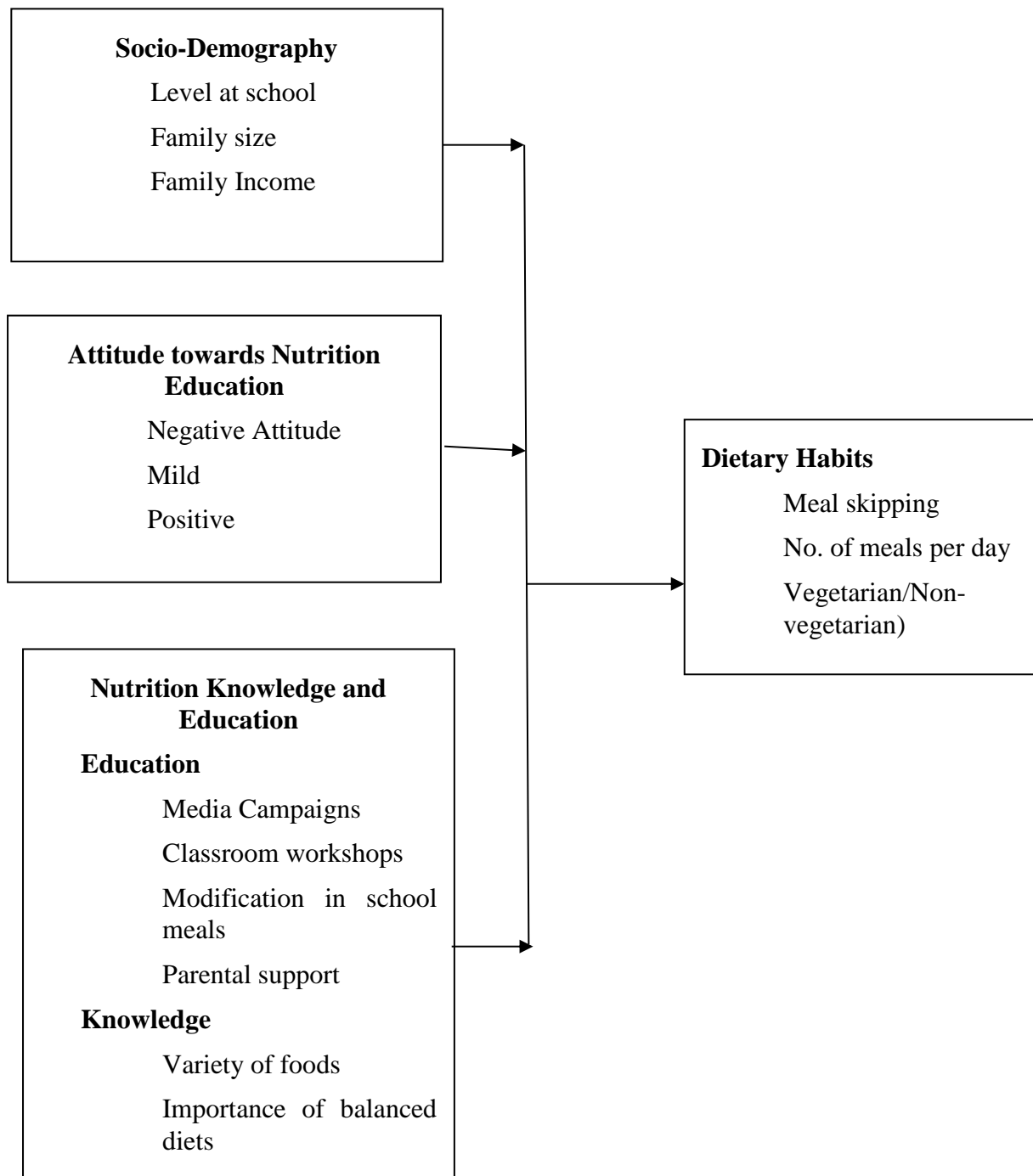
A conceptual framework helps to describe (but in a figure form) how the study's variables link up to each other. The variables of the study have been linked diagrammatically in Figure 2.1.

Figure 2. 1:

Conceptual Framework

Independent Variables

Dependent variable



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

This study used a cross-sectional research design, an observational study that collects data from a population or a representative subset at a certain point in time without modifying study variables. Cross-sectional surveys are frequently used to measure the prevalence of an interesting phenomenon in a specific population, making them an appropriate framework for our investigation (Acarturk et al., 2021).

The design was chosen because it provides efficient data collection quickly and is well-suited for research to establish relationships between predictor and outcome variables (Gasparrini, 2021). The predictors in this study were socio-demographic variables, student views regarding the relevance of teenage nutrition, and nutrition education, while the dependent variable was eating habits. This design aimed to investigate the interactions between these variables, with a particular emphasis on the impact of nutrition education on eating habits, utilizing the broad frameworks of the "Theory of Reasoned Action" and "Theory of Planned Behaviour."

A survey of adolescents aged 12 to 18 attending schools in Juba, South Sudan, was used to examine the study variables. Adolescence, a pivotal period of physical growth and dietary habit formation, provides an ideal framework for investigating the impact of nutrition education on the dietary habits of this demographic (WHO, 2018).

However, it is crucial to remember that while cross-sectional studies provide a picture of the population at a certain point in time, they do not determine causality. Despite this restriction, these investigations are nevertheless crucial for developing hypotheses that can be tested using other study designs, such as longitudinal and experimental studies (Danese, 2020).

The cross-sectional design was deemed the most appropriate way to explore the influence of nutrition education on the eating habits of adolescent girls in Juba, South Sudan, in light of this study's research aims and purpose.

3.2 Population of Study

The target population of this study consisted of adolescent girls aged 12 to 18 years who were enrolled in secondary schools in Juba City, South Sudan. The selection of Juba City was informed by its status as both the educational epicentre and the largest city by population in the country, making it an apt sample for the study

Adolescence is a critical developmental stage characterized by unique nutritional needs and health challenges, further emphasizing the Importance of studying this demographic. Moreover, these adolescents in Juba City represent the conditions that affect female students in various states of South Sudan due to similar cultural, socioeconomic, and political contexts. South Sudan, one of the poorest nations globally, presents substantial challenges to the accessibility of quality education and healthcare services for girls, including nutrition education (World Bank, 2018). Furthermore, the country's political instability and conflict have intensified these circumstances, limiting girls' access to schools and vital nutrition education programmes. Such constraints have an insignificant impact on overall nutritional status (Siyu et al., 2020).

With a high illiteracy rate among women in South Sudan—approximately 70% (UNICEF, 2019)—the salience of school-based nutrition education is glaring. Therefore, evaluating the effectiveness of nutrition education among adolescent girls in Juba City's secondary schools holds the potential to inform interventions with broader applicability across the country. This finding has broader implications for the study population beyond the geographical boundaries of Juba City.

The following table provides a comprehensive overview of the participants targeted for inclusion in the study:

Table 3. 1:

Overview of the participants

Age Group (Years)	Number of Girls Enrolled in Secondary Schools in Juba City
12-14	12,000
15-18	18,000
Total	30,000

Source: World Bank, 2018

The presentation of the population of study in a tabular format enhances readability, providing a concise overview of the data .

3.3 Sample and Sampling Technique

The researcher employed a random sampling technique to select secondary schools for the study. Specifically, two (2) secondary schools were randomly chosen from over twenty (20) secondary schools. Four hundred twenty-six adolescent girls were selected for the study from one private and one government secondary school (UNICEF, 2019).

Two groups of respondents were targeted: those from schools that did not have a nutrition education (NE) programme (control group) and those from schools that did have the NE programme (experimental group). Both participants exhibited similar characteristics, including age (Riddle et al., 2023). The nutritional education in Juba schools was provided by the World Food Programme (WFP), an international non-governmental organization (NGO). While that is the case, not all the schools had enrolled in the programme; hence, the study targeted those

who had enrolled in the programme and received education (experimental group) against those who had not (control group). The World Food Programme (WFP) has administered the programme for three months.

3.3.1 Sample Size Determination

In this investigation, the desirable sample size (n) was derived using Fischer's formula (Fischer et al., 1991). This methodology is preferred when the study population exceeds 10,000, primarily due to its reasonable allowance for degrees of freedom during analysis (Fischer et al., 1991).).

The basic formula applied was:

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

The variables in this equation are defined as follows:

- 'n' represents the desired sample size,
- 'z' is the z-score linked to the chosen confidence level of 95%, equating to 1.96,
- 'p' and 'q' are the estimated prevalence of the phenomenon under study, i.e., poor dietary habits. Given the lack of preliminary data specific to the research cohort, 'p' was set at 50%, which rendered 'q', the proportion not subjected to poor dietary habits, also as 0.5 (1-p = (1-0.5 = 0.5)),
- 'd' indicates the margin of error, set at 0.05 for this particular study.

These variables were applied to Fischer's formula:

$$n = \frac{(1.96^2) * 0.5 * 0.5}{0.05^2} = 384$$

Research studies must account for possible non-responses to maintain statistical propriety and enhance data reliability. This research accounted for a 10% non-response rate:

$$\begin{aligned} \text{Total desired sample size} &= \frac{\text{computed sample size}}{1 - \text{Non-response rate}} \\ n &= \frac{384}{1 - 0.1} \\ &= 426 \end{aligned}$$

The total sample derived (n=426) was divided into two groups representing the study's control and experimental cohorts. The survey was designed to ascertain the effect of a nutrition education (NE) program on adolescent dietary habits in Juba. These groups included:

- Control group: Adolescent girls from a school without an NE program and
- Experimental group: Adolescent girls from a school participating in the NE program facilitated by the World Food Programme's international NGOs.

The distribution of the participants is visualized in the following table:

Table 3. 2:

Distribution of the participants

Group	Number of Participants	Percentage (%)
Control group	314	73.7
Experimental group	112	26.3
Total	426	100

This table effectively demonstrates the division of the total sample into two distinct cohorts central to this comparative study. This tabulation form offers an at-a-glance understanding of the data (Arluck, 2020).

3.3.2 Sampling Procedures

To maintain the integrity and impartiality of the study, simple random sampling was the chosen method to select the study participants. This strategy ensured that each adolescent girl within the specified age range studying in secondary schools across Juba City had an equally likely chance to participate, reducing potential sampling bias and enhancing the sample's representativeness.

An uncomplicated balloting procedure was incorporated for participant selection. All eligible participants were identified in this approach, each associated with a unique identifier. Two types of ballots marked "Yes" and "No" were then used. All identifiers were placed in a ballot box, thoroughly shuffled, and random selection began.

Those selected with a "Yes" ballot were included in the study, while those with a "No" were excluded. This non-discriminatory method ensured that all secondary school-going girls fitting the target demographic in Juba City had an equally likely opportunity to contribute to this invaluable research. Furthermore, it strengthens the reliability and validity of the findings, as this method is less prone to selection bias.

3.4 Inclusion and Exclusion Criteria

The study had specific inclusion and exclusion criteria to ensure the selection of a valid and representative sample. These criteria were vital in identifying appropriate participants while upholding the ethical standards of voluntary participation and informed consent.

Inclusion Criteria:

Willingness to participate: The adolescent girls and their caregivers had to express a willingness to participate in the study. This willingness was formalized by signing an informed consent form, which detailed the study's nature and objectives and assured them of confidentiality and the ability to withdraw at any stage without prejudice.

Continued enrollment: Study participants must have enrolled in their respective schools for at least one term before the study commenced. This criterion ensured that the participants had enough exposure to the school environment, which could influence their dietary habits.

Age requirements: The participants had to be aged between 12 to 18 years. The goal was to focus exclusively on adolescent girls, a critical demographic group with distinct nutritional needs and vulnerabilities (WHO, 2018).

Exclusion Criteria:

Reluctance to participate: Girls and their caregivers who were unwilling to sign the informed consent form were automatically excluded from the study. The existence of informed consent is paramount to ensure voluntary participation, a cornerstone of ethical research (Resnik, 2015).

Recent enrollment: Participants who had joined the school less than a term before the study began were omitted. The reason is that they might need more exposure to the school environment and its potential influence on dietary habits.

Age bracket: Adolescents not within the age bracket of 12 to 18 years were not considered for the study. Focus on this specific age group was integral to the research objectives.

3.5 Instrumentation

The main instrument for data collection in this study was a semi-structured, self-administered questionnaire composed of both open-ended and closed-ended questions. This dual approach catered to the need for quantifiable data while allowing an exploration of nuanced opinions and attitudes. The structured questions were instrumental in generating data that could be easily scored, cleaned, and analyzed. In contrast, the open-ended questions allowed respondents to give more detailed and personalized responses.

The semi-structured questionnaire was appreciated for its capacity to succinctly capture the intricacies of the respondents' feelings, attitudes, and opinions relating to the NE program and

its impact on their dietary habits. This flexible approach offered the added advantage of enabling the researcher to probe for more information when needed, ultimately enriching the dataset and enhancing the robustness of the study's findings.

This research divided the semi-structured questionnaire into general information, socioeconomic background, and adolescent attitude toward nutrition, dietary habits, and nutrition knowledge education. Each category was designed to gather diverse but complementary data critical for a comprehensive understanding of the impact of NE on adolescent girls' dietary habits.

In addition, other essential research instruments included the study consent form, ethical clearances, and research permits. These aspects ensured the study's legitimacy, ethical integrity, and the voluntary participation of the respondents, central to obtaining meaningful and applicable results.

3.6 Validation of Instrument

Before conducting the primary survey, the data collection instrument, which primarily consisted of a semi-structured questionnaire, underwent a meticulous validation procedure to ensure its suitability, accuracy, and reliability.

Initially, the research committee at the Kenya Methodist University's Nairobi campus undertook a comprehensive review of the instrument, ascertaining its alignment with the research objectives and its ability to generate relevant, valid data effectively.

Subsequently, a pilot study was conducted to empirically verify the instrument's effectiveness and refine it if necessary. This involved trialling the questionnaire with a group of 10 respondents, which, while not part of the primary survey sample, were chosen to reflect the same demographic characteristics. This careful piloting strategy aimed to identify any potential issues, ambiguities, or biases in the questionnaire and rectify them before the principal study.

As the data collected was categorical, the Inter-Rater Reliability (IRR) approach was adopted to determine the instrument's reliability, as Mohamad et al. (2015) recommended. This involved administering the same questionnaire to the pilot group twice, spaced one week apart. The consistency of responses across the two administrations was crucial in evaluating the instrument's reliability.

In this instance, the two sets of data obtained during the IRR test did not exhibit any variation, resulting in a Percent Agreement Measure (PAM) of 100%. Such consistency demonstrated that the respondents fully comprehended the questionnaire and consistently interpreted its contents. As a result, the questionnaire was deemed reliable for the primary survey.

The pilot study's value extends beyond reliability testing; it helped to ensure precision, resulting in an instrument capable of eliciting accurate, significant, and dependable data regarding the impact of a Nutrition Education Program on adolescent girls' dietary habits.

3.7 Method of Data Collection

The data collection method predominantly involved distributing and administering previously validated questionnaires. This task was carried out by the primary researcher and a competent team of research assistants, who underwent detailed training to ensure consistency, precision, and minimal bias during data collection.

Before the study's commencement, permissions were suitably obtained from relevant authorities, including the school administrations involved. Adherence to ethical guidelines was prioritized, with informed consent procured from the adolescent girls and their caregivers. It is important to note that the study strictly followed the current safety regulations linked to the COVID-19 pandemic during the data collection process. Measures such as social distancing, mandatory mask usage, frequent hand sanitizing, and handwashing were rigorously followed.

The data collection phase spanned one month and gathered a wealth of information divided into several sections in the questionnaire:

3.7.1 Socio-demographic Characteristics

The questionnaire's first segment aimed to overview the respondents' socio-demographic profiles comprehensively. Specific details collected included the participant's age, class, family income levels, parents' occupations, the highest level of education achieved by their parents, household size, and tenancy status. This information was crucial for later analyses comparing and contrasting dietary habits across different socioeconomic backgrounds.

3.7.2 Dietary Practices

The questionnaire's second section focused on the dietary practices of adolescent girls. Here, behavioural aspects related to meal consumption were probed, such as eating frequency, types of food items commonly consumed, meal skipping frequency, and snacking habits. To decipher the underlying reasons for observed dietary behaviours, space was provided for open-ended responses, allowing the girls to express their views fully.

3.7.3 Nutrition Knowledge and Education

In this section, the questionnaire tested the participants' understanding and knowledge about nutrition. It contained questions designed to evaluate the girls' awareness of dietary guidelines and their application. Topics ranged from the number of daily servings of fruits and vegetables, different types of fats, recommended versions of dairy foods, and calorie content in different food items to understanding food items high or low in added sugar, salt, protein, fibre/roughness, and saturated fats.

This section captured the adolescent girls' understanding of various food and nutrition facts by including a set of agree, disagree, and not sure options for statements related to common nutrition myths and misconceptions. Through this level of inquiry, valuable insights into the

impact of the Nutrition Education Program on their knowledge and misconceptions about dietary habits were gained.

These three sections captured a holistic, detailed view of the respondents' socio-demographic factors, dietary practices, and nutritional knowledge, thereby providing a comprehensive data set for analyzing the impact of the Nutrition Education Program. Also, the meticulous, ethical, and straightforward data collection method helped ensure that the gathered information was accurate and reliable. It also helped preserve the study's integrity while meeting all necessary ethical requirements for a research study.

3.8 Method of Data Analysis

The data obtained was then analyzed statistically using SPSS version 24.0. Both descriptive and inferential statistics were used. Frequency and percentage distribution was done to analyze demographic variable.

Objectives 1, 2 and 3 that is to assess dietary habits among adolescent girls in selected Secondary Schools, to examine the socio-demographic status of the adolescent girls and to examine the knowledge of adolescent girls about healthy eating habits, descriptive statistics (frequency and percentages) of the categorical data provided was adopted.

Different statistical methods to analyze the data collected from the study participants were used;

Firstly, the researcher used the Spearman Rank Correlation to establish the relationship between nutrition education and the nutritional intake of adolescent girls. The Spearman Rank Correlation is a statistical test that measures the strength and direction of the association between two variables. It is suitable when the data is non-parametric or categorical and unsuitable for Pearson correlation, assuming that it is usually distributed. In this study, the eating habits were categorized as healthy or unhealthy, which are categorical variables. The

researchers then used the Spearman Rank Correlation to examine the association between each of the knowledge factors and the participants' eating habits.

Secondly, the researchers used the Chi-Square analysis to establish whether there were significant relationships between eating habits and knowledge factors. The Chi-Square analysis is a statistical test that compares the observed data with the expected data to determine whether there is a significant difference between the two. In this study, the researchers used cross-tabulation to examine the relationship between eating habits (healthy or not healthy) and each of the knowledge factors. The Chi-Square analysis was used to determine whether the relationships observed were statistically significant.

Finally, the researchers used the paired t-test to compare the nutrient intake before and after imparting nutrition education among the experimental and control groups. The paired t-test is a statistical test used to compare the means of two related samples. The experimental group received nutrition education in this study, while the control group did not. The researchers used the paired t-test to determine whether there was a significant difference in the nutrient intake before and after imparting nutrition education among the experimental group compared to the control group.

At this point, the following null hypothesis was tested:

H₀₁: Nutrition education has no significant effect on dietary habits

H₀₂: Nutrition education has a significant effect on dietary habits

The rejection criteria were a P-value > 0.05, which led to failure to reject the null hypothesis and vice versa. In summary, the researchers used different statistical methods to analyze the data collected from the study participants. The Spearman Rank Correlation was used to establish the association between the knowledge factors and the eating habits, the Chi-Square analysis was used to determine whether significant relationships existed, and the paired t-test

was used to establish a comparison of the nutrient intake before and after imparting nutrition education among the experimental versus the control group.

3.9 Ethical Clearance

Following the initial preparatory stages of the research, the proposed instrument was first presented to the ethical committee of KEMU. This was done to obtain a thorough review and subsequent approval for the research methodology and ethical considerations. After obtaining the requisite approval, the university issued a formal letter for procuring a permit from the state director of education in Juba.

Armed with these permissions, tertiary consent was obtained from the principals of the designated schools, thereby permitting the commencement of data collection within their institution. Following an elaborate explanation of the research motive and procedures, written informed consent was garnered from both the participating students and their respective caregivers.

It was clarified that the information procured during this research would be handled with utmost confidentiality. Furthermore, this data was solely to be used for academic purposes and strictly within the context of this study.

These procedures attest to the careful attention given to ensuring the research was conducted within the bounds of ethical standards, protecting the rights and privacy of the study participants while also meeting academic requirements.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

In this section, the findings from the data collection and analysis were given. The study tested the relationship between independent factors and dependent variables using inferential statistics techniques such as Levene's Test for Equality of Variances, F and t-test for Equality of Means, and chi-square. Tables were used to present the data. Descriptive statistics, such as percentages and frequencies, were also included in several sections.

4.2 Response Rate

This study focused on adolescent girls aged between 12 and 18, hailing from two specifically selected Secondary Schools in Juba City. The total sample size for the study consisted of 426 girls selected from both a private and a government-run secondary school.

Participants in the study were divided into two distinct groups:

1. Control Group: Those from schools without a Nutrition Education (NE) program.
2. Experimental Group: Those from schools enrolled in the NE program.

This NE program, provided by international NGOs under the World Food Programme (WFP), was not uniformly present in all Juba schools. Thus, the study aimed to observe both groups - students who had availed of the NE program (Experimental) versus those who had not (Control).

Out of the 426 participating girls, 314 (73.7%) constituted the control group, and the remaining 112 (26.3%) formed the experimental group who had been privy to nutrition education.

In order to achieve a high response rate, which, as per Kigaru (2015), if above 50% is considered good, specific steps were undertaken. The researcher initially visited the schools to

establish rapport and secure permission for the survey. Following this, a timetable was finalized based on the student's availability for participation in the study. Data was collected over two months, with the researcher visiting each school independently.

The response rates are presented in the following table:

Table 4. 1:

Response Rate

Category	Frequency	Percentage
Control Group	314	73.7%
Experimental Group	112	26.3%
Total	426	100%

Source: Survey data (2023)

As shown in Table 4.1, both groups in the study demonstrated complete participation. The control group demonstrated a robust response rate of 73.7%, corresponding to a total of 314 participants in the study. On the other hand, the experimental group also demonstrated a noteworthy rate of 26.3%, equating to 112 individuals. This study's impressive response rate of 100% signifies a strong data representation, indicating that the findings are likely highly reliable and valid.

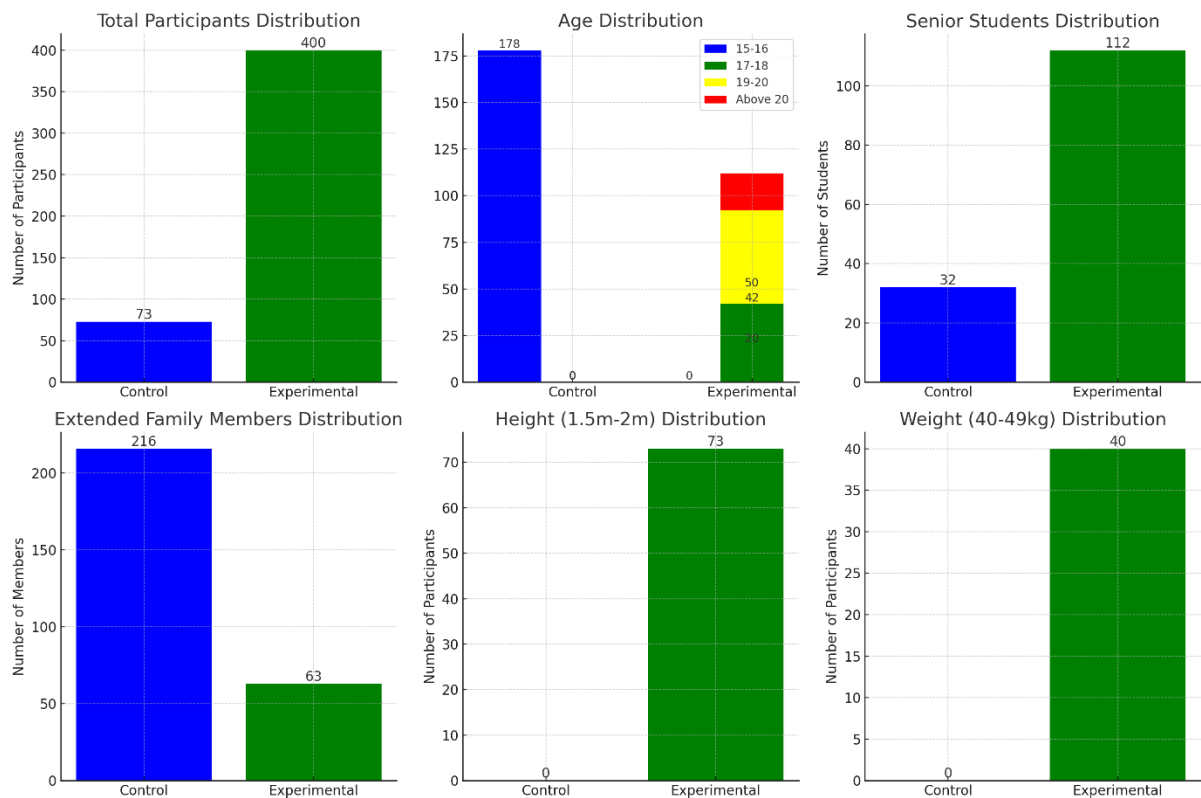
4.3 Respondent's Demographic Profile

4.3.1 Overview of the Participant's Demographic Data

The subsequent table (Table 4.2) and Figure 4.1 illustrates the distribution of study participants based on various demographic and health characteristics, distinguishing between the control and experimental groups.

Figure 4. 1:

Overview of the Participant's Demographic Data



Four hundred twenty-six participants were engaged and divided into control and experimental groups. The age distribution highlighted that the control group predominantly consisted of participants aged 15-16, totalling 178. In contrast, the experimental group displayed a diverse

age profile with 42 participants in the 17-18 years' bracket, 50 in the 19-20 years' category, and 20 aged above 20 years.

Regarding the educational background, the experimental group prominently consisted of four senior students, totalling 112. The control group, however, showcased a more varied academic distribution. When delving into family structures, the experimental group had 63 participants from extended families, whereas the control group had a more substantial representation with 216 participants. The height distribution indicated a considerable portion of the experimental group falling within the 1.5m-2m range with 73 participants. In terms of weight, the experimental group had 40 participants in the 40-49kg weight range.

Table 4. 2:

Respondent's Demographic Profile

Groups	Demographic Variables					Chi-Square test, X ² (P-value)
Age						
	15 - 16 Years	17-18 Yrs.	19-20 Yrs	Above 20 Yrs	Total	(178.714; P = 0.000)
Control Group	178	113	17	6	314	
Experimental Group	0	42	50	20	112	
Total	178	155	67	26	426	
Class						(406.071; P = 0.000)
	Senior one	Senior two	Senior three	Senior four	Total	
Control Group	237	45	28	4	314	
Experimental Group	0	0	0	112	112	
Total	237	45	28	116	426	
Type of family						(8.712; P = 0.013)
	Extended	Nuclear	Total			
Control Group	216	98	314			
Experimental Group	63	49	112			
Total	279	142	426			
Height						(37.903; P = 0.000)
	Below 1.5m	1.5 M - 2 M	Above 2 M		Total	
Control Group	81	103	130		314	
Experimental Group	21	73	18		112	
Total	102	176	148		426	
Weight						(15.840 ; P = 0.001)
	Below 40kg	40-49 Kg	50-59 Kg	60kg and above	Total	

Control Group	72	125	81	36	314
Experimental Group	13	40	31	28	112
Total	85	165	112	64	426

The Chi-square analysis was employed to identify any significant disparities in the distribution of participants between these groups for each criterion. Both the test statistic and the associated P-value are mentioned for every criterion.

The Chi-square analyses illuminated several significant findings. For age, a pronounced difference was observed between the control and experimental groups, evidenced by a Chi-square value of $\chi^2=178.714$ and a P-value of $P=0.000$. This suggests that older adolescents in Juba might be at a stage where they are more receptive to such interventions. This observation is in harmony with a study by Olayiwola Ketiku in Lagos, Nigeria in (2019), posited that as adolescents mature, their cognitive abilities and social exposures evolve, making them more amenable to health-related information.

The class distribution, with a pronounced $\chi^2=406.071$ and $P=0.000$, indicates the role of academic stages in shaping the receptivity to nutrition education among adolescent girls in Juba. The prominence of senior four students in the experimental group was a testament to this academic level being a critical juncture for nutrition interventions. This aligns with findings from a study in Nairobi, Kenya, by Kigaru et al. (2015). They observed that students transitioning between academic phases, especially from middle to high school, are at a crossroads, making independent life choices, including dietary habits.

The family structures' significance, evident from $\chi^2=8.712$ and $P=0.013$, underscores the pivotal role families play in the dietary habits of adolescent girls in Juba. Stella's research in Accra, Ghana (2021) offers a complementary lens. She noted that extended families, with their diverse members each bringing unique nutritional beliefs, can create a mosaic of dietary habits.

Understanding this familial context is vital for adolescent girls in Juba when designing and implementing nutrition education interventions.

4.3.2: Relationship between Demographic Factors and Dietary Habits

In understanding how nutrition education impacts the dietary habits of adolescent girls aged 12-18 in Juba, South Sudan, it is essential to recognize the interplay between demographic variables and these habits. Table 4.3 delves into the relationship between various demographic factors and the dietary practices of the participants.

Table 4. 3: Relationship between Demographic Factors and Dietary Habits

Demographic Factor	Chi-Square test (p-value)	
	Control Group	Experimental Group
Age and Number of Meals Consumed	(67.198, P = 0.000)	(30.476, P = 0.001)
Age and Meal Skipping	(24.117, P = 0.000)	(15.126, P = 0.001)
Age and Type of Meal Skipped	(109.028, P = 0.000)	(36.18, P = 0.000)
Class and Number of Meals Consumed	(26.438, P = 0.000)	.
Class and Meal Skipping	(22.085, P = 0.000)	.
Class and Type of Meal Skipped	(55.901, P = 0.000)	.
Family Type and Number of Meals Consumed	(19.71, P = 0.001)	(10.677, P = 0.005)
Family Type and Meal Skipping	(18.349, P = 0.000)	(9.487, P = 0.002)
Family Type and Type of Meal Skipped	(97.377, P = 0.000)	(13.502, P = 0.001)
Height and Number of Meals Consumed	(124.496, P = 0.000)	(51.858, P = 0.000)
Height Type and Meal Skipping	(4.680, P = 0.096)	(40.744, P = 0.000)
Height Type and Type of Meal Skipped	(105.839, P = 0.000)	(121.791, P = 0.000)
Weight and Number of Meals Consumed	(79.573, P = 0.000)	(26.110, P = 0.000)
Weight Type and Meal Skipping	(84.652, P = 0.000)	(31.872, P = 0.000)
Weight Type and Type of Meal Skipped	(123.057, P = 0.000)	(106.191, P = 0.000)

Table 4.3 shows that for most of the demographic factors, there is a significant association between the factor and the number of meals consumed, meal skipping, and type of meal skipped in both the control and experimental groups.

For the variable of age, significant associations were observed concerning the number of meals consumed, with $\chi^2=67.198$, $P=0.000$ for the control group and $\chi^2=30.476$, $P=0.001$ for the

experimental group. Additionally, age was significantly associated with meal-skipping habits ($\chi^2=24.117$, $P=0.000$ for the control group and $\chi^2=15.126$, $P=0.001$ for the experimental group) and the type of meals skipped ($\chi^2=109.028$, $P=0.000$ for the control group and $\chi^2=36.18$, $P=0.000$ for the experimental group). In the context of Juba, South Sudan, this suggests that their exposure to diverse nutritional knowledge might shape their meal consumption patterns and choices as adolescents age. A study by Agyemang et al (2020) in Lagos, Nigeria, echoed similar findings, noting age as a significant determinant in adolescent girls' dietary habits.

The academic class of participants exhibited strong associations with their dietary habits. Specifically, the class was significantly linked with the number of meals consumed ($\chi^2=26.438$, $P=0.000$), meal skipping trends ($\chi^2=22.085$, $P=0.000$), and the nature of meals skipped ($\chi^2=55.901$, $P=0.000$). It suggests that the educational environment and peer interactions in Juba might significantly impact the dietary habits of adolescent girls. This mirrors findings from a study in Addis Ababa, Ethiopia, where Tesfaye (2019) highlighted the influence of academic pressures on students' dietary habits.

The structure and dynamics of families play a profound role in influencing dietary habits. This study found significant associations between family type and the number of meals consumed ($\chi^2=19.71$, $P=0.001$), meal skipping habits ($\chi^2=18.349$, $P=0.000$), and the nature of meals skipped ($\chi^2=97.377$, $P=0.000$). Juba's cultural milieu implies that traditional family practices and values might shape adolescent girls' dietary choices. A comparative insight can be gleaned from a study by Agyemang et al. (2020) in Accra, Ghana, which underlined the pivotal role of family dynamics in shaping dietary habits, especially among adolescent girls.

The participants' physical attributes, such as height and weight, showcased significant correlations with dietary practices. For instance, height was related to the number of meals consumed ($\chi^2=124.496$, $P=0.000$), meal skipping ($\chi^2=4.680$, $P=0.096$), and the type of meal skipped ($\chi^2=105.839$, $P=0.000$). Weight also demonstrated associations with the number of

meals consumed ($\chi^2=79.573$, $P=0.000$), meal skipping ($\chi^2=84.652$, $P=0.000$), and the nature of meals skipped ($\chi^2=123.057$, $P=0.000$). These findings suggest that body image perceptions and societal standards in Juba may influence the dietary habits of adolescent girls. This aligns with observations by Agyemang et al. (2020) in Dar es Salaam, Tanzania, where they emphasized the role of societal beauty standards in influencing dietary habits.

4.4 Sociodemographic Status of the Adolescent Girls

4.4.1 Description of Sociodemographic Status of the Adolescent Girls

The study's first objective was to examine adolescent girls' sociodemographic status and link it to their dietary habits. Three sociodemographic factors, household size, range of household income and the main occupation of the household head, were interrogated. Table 4.4 gives the sociodemographic status of the secondary school-going adolescent girls in Juba, South Sudan.

Table 4. 4:

Sociodemographic Status of the Adolescent Girls

Category	Sociodemographic Status Variables					Chi-Square (P-value)
	Household Size			Total		
	<i>Less than 2</i>	<i>3</i>	<i>4</i>	<i>Five and above</i>	<i>Total</i>	
Control Group	24	60	48	182	314	(38.346 ; p = 0.000)
Experimental Group	10	0	40	62	112	
Total	34	60	88	244	426	
	Household Income					
	<i>Less than 2 USD</i>	<i>3 USD</i>	<i>4 USD</i>	<i>5 USD and above</i>	<i>Total</i>	
Control Group	176	50	41	47	314	(27.704 ; p = 0.000)
Experimental Group	83	8	21	0	112	
Total	259	58	62	47	426	
	Household occupation					
	<i>Unemployed</i>	<i>Farmer</i>	<i>Business</i>	<i>Employed / Business / Farming</i>	<i>Total</i>	
Control Group	50	30	73	137	24	(22.085 ; p = 0.000)
Experimental Group	21	0	31	60	0	
Total	71	30	104	197	24	

Table 4.4 shows the distribution of adolescent girls based on household size. The Chi-square test results indicate a significant discrepancy between the control and experimental groups concerning household size ($\chi^2=38.346$, $p<0.0001$). In the control group, 58% (182 out of 314) of the participants hailed from households with more than five members. In contrast, this proportion was 55% (62 out of 112) in the experimental group. Larger households might face challenges ensuring balanced dietary habits due to resource constraints. This is evident as a significant portion of girls in both groups come from households with five members or more, suggesting that household size is a potential influencer of dietary patterns among the participants. In their Nairobi-based study, Wangari and Mbugua (2017) found that household size directly impacted nutrition intake, particularly in larger households where resources might be stretched thin. Considering the socioeconomic conditions of Juba, South Sudan, it is plausible that larger household sizes can strain resources, thereby influencing the dietary habits of adolescent girls. The researcher's observation that many participants from larger households might face nutritional challenges aligns with this perspective.

Income is a pivotal determinant of dietary choices. A significant majority of participants from the control group, 56% (176 out of 314), reported a household income of less than 2 USD. This contrasts with the experimental group's 74% (83 out of 112). The Chi-square test underscored a pronounced difference between the groups regarding income ($\chi^2=27.704$, $p<0.0001$). Financial constraints can significantly impact dietary choices. The data suggests that most adolescent girls in both groups may not have access to diverse and nutritious food options due to their household's limited income. Otieno Onyango (2019), in their research conducted in Kisumu, Kenya, highlighted the direct relationship between limited household income and compromised nutritional intake among adolescents. In Juba, South Sudan, where economic challenges are prevalent, the limited household income can be a significant barrier to accessing

nutritious food. This study's findings emphasize the need for economic interventions to ensure adolescent girls receive the necessary nutrition.

Regarding occupation, 44% (137 out of 314) of the households in the control group were employed, while in the experimental group, this figure stood at 54% (60 out of 112). The Chi-square results emphasized a discernible difference between the groups regarding household occupation ($\chi^2=22.085$, $p<0.0001$). Households with stable employment may provide better nutrition to their members. The data shows that many adolescent girls from employed households might have a healthier diet than their counterparts. A study by Ndungi et al (2017) in Mombasa, Kenya, posited that business or employment-driven households generally exhibit better dietary habits due to consistent income. In Juba, South Sudan, employment can ensure consistent and nutritious household meals. This study highlights the importance of socioeconomic stability in shaping the dietary habits of adolescent girls.

4.4.2 Relationship between Sociodemographic Status and Dietary Habits

The relationship between adolescent girls' sociodemographic status and dietary habits was also established through Chi-Square. Table 4.5 gives the results.

Table 4. 5:

Relationship between Sociodemographic Status and Dietary Habits

Sociodemographic Factor	Chi-Square test (p-value)
Household Size and Number of Meals Consumed	(192.783, P = 0.000)
Household Size and Meal Skipping	(91.874, P = 0.000)
Household Size and Type of Meal Skipped	(66.155, P = 0.000)
Household Income and Number of Meals Consumed	(35.053, P = 0.000)
Household Income and Meal Skipping	(60.864, P = 0.000)
Household Income and Type of Meal Skipped	(54.363, P = 0.001)
Occupation of the Household Head and Number of Meals Consumed	(150.772, P = 0.000)
Occupation of the Household Head and Meal Skipping	(91.400, P = 0.000)

Table 4.5 underscores a significant relationship between household size and various dietary habits. A pronounced association exists between household size and the number of meals consumed ($\chi^2=192.783$, $p<0.0001$). Similarly, meal-skipping practices and the type of meal skipped are also significantly influenced by household size, with χ^2 values of 91.874 and 66.155, respectively. Household size is pivotal in dictating dietary habits, especially regarding meal consumption frequency and meal-skipping tendencies. Larger households might experience resource constraints leading to infrequent meal patterns or skipping meals altogether. In a research conducted in Dar es Salaam, Tanzania, by Ambikapathi et al (2022), they highlighted that larger household sizes often lead to inconsistent meal patterns due to resource scarcity. Given the socioeconomic landscape of Juba, South Sudan, households with more members might grapple with ensuring consistent and nutritionally balanced meals for every member. This could lead to compromised dietary habits among adolescent girls, emphasizing the need for targeted nutrition awareness programs.

Household income, unsurprisingly, has a marked influence on dietary habits. The number of meals consumed, the tendency to skip meals, and the type of meals skipped all show significant associations with household income, with χ^2 values of 35.053, 60.864, and 54.363, respectively. A limited household income can drastically limit access to nutritious food and regular meals. Adolescents from lower-income households may often find themselves skipping meals or compromising on the quality of meals. A study by Ogola and Shitsama (2019) in Kampala, Uganda, emphasized that household income was a determinant in accessing nutritionally rich food, highlighting the economic challenges that impede proper nutrition. For the adolescent girls in Juba, South Sudan, the household's economic capacity is a significant determinant of their dietary habits. The findings reiterate the need for economic empowerment to improve the dietary habits of adolescent girls.

The occupation of the household's primary earner also showcases a significant relationship with dietary habits. The number of meals consumed, the incidence of meal skipping, and the type skipped are all influenced by the head of the household's occupation, with χ^2 values of 150.772, 91.400, and 84.964, respectively. Stable employment or a consistent source of income ensures regular and quality meals. Conversely, households with irregular income might experience inconsistent meal patterns. Njoroge and Onyango (2020), in their study in Nairobi, Kenya, found that households with steady employment had better nutrition and meal regularity than those with unstable occupations. In Juba, South Sudan, the occupation and the associated economic stability dictate the regularity and quality of meals. The dietary habits of adolescent girls are directly linked to this economic stability, underscoring the importance of socioeconomic interventions.

4.5 Food Intake Patterns of Secondary School Adolescent Girls

4.5.1 Description of Food Intake Patterns among Adolescent Girls

The study's second objective was to establish the food intake patterns of adolescent girls aged 12-18 years old studying in Secondary Schools in Juba, South Sudan. The respondents were asked to indicate their food intake patterns based on the nature of their diet, number of meals consumed in a day, whether they skip meals and if they do, the type of meal skipped. The results are summarized in Table 4.6.

Table 4. 6:***Food Intake Patterns of Secondary School Adolescent Girls***

Group		Food Intake Patterns			Total	Chi-Square test (p-value)
Nature of Diet		Vegetarian	Ovatarian	Non-Vegetarian	Total	
	Control Group	214	23	77	314	(65.032; p =0.000)
	Experimental Group	39	42	31	112	
	Total	253	65	108	426	
Number of Meals Consumed		1	2	3	Total	
	Control Group	112	143	59	314	(11.773; p =0.003)
	Experimental Group	21	60	31	112	
	Total	133	203	90	426	
Whether they Skip Meals		Yes	No		Total	
	Control Group	237	77		314	(10.885; p = 0.001)
	Experimental Group	101	11		112	
	Total	338	88		426	
Type of meal skipped.		Breakfast	Lunch	Dinner	Total	
	Control Group	100	159	55	314	(3.798; p = 0.150)
	Experimental Group	34	49	29	112	
	Total	134	208	84	426	

Table 4.6 underscores a significant diet variation between the control and experimental groups ($\chi^2=65.032$, $p<0.0001$). Notably, 214 in the control group followed a vegetarian diet compared to only 39 in the experimental group. On the other hand, the experimental group had a higher proportion of ovarian (42) than the control group (23). The nature of the diet predominantly followed by adolescent girls in Juba reflects their socio-cultural and environmental contexts. Vegetarian diets, predominant in the control group, might indicate cultural preferences, religious beliefs, or economic reasons. A similar observation was made by Lokuwam (2018) in their study in Dar es Salaam, Tanzania. They noted that socio-cultural factors and economic constraints often dictate a community's predominant nature of diets. Understanding the nature of diets predominant among adolescent girls in Juba provides insights into their nutritional

profiles. Adapting the nutrition education interventions to fit these dietary habits is crucial, ensuring they are culturally sensitive and practical.

A significant variation exists between the control and experimental groups concerning the daily meals consumed ($\chi^2=11.773$, $p=0.003$). While 143 participants in the control group consumed two meals a day, a more significant proportion (60) in the experimental group mirrored this habit. The frequency of daily meal consumption among adolescent girls can indicate their nutritional adequacy. Consuming fewer meals might lead to nutritional gaps, impacting their overall growth and development. In a study conducted by Opiyo and Juma (2019) in Nairobi, Kenya, it was found that adolescents consuming fewer daily meals often had compromised nutritional status. The number of meals consumed daily directly impacts the nutritional intake of adolescent girls in Juba. Therefore, the nutrition education program should emphasize the importance of regular meals to ensure a balanced nutritional intake.

The tendency to skip meals showed a significant difference between the two groups ($\chi^2=10.885$, $p=0.001$). A substantial 237 participants from the control group admitted to skipping meals compared to 101 in the experimental group. Meal skipping, especially among adolescents, can harm their health, impacting their cognitive abilities and overall development. A parallel observation was made in a study by Mirembe (2020) in Kampala, Uganda. They highlighted the adverse effects of irregular meal patterns on the academic performance of adolescents. For adolescent girls in Juba, it is imperative to understand the reasons behind skipping meals, be it economic, cultural, or due to lack of awareness. Addressing this in the nutrition education program can pave the way for improved dietary habits.

While the data indicates variations in the type of meal skipped between the two groups, the difference was not statistically significant ($\chi^2=3.798$, $p=0.150$). Most of the control group (159) skipped lunch, while 49 from the experimental group did the same. Skipping specific meals, like lunch, can be attributed to the school environment, lack of appetite, or socioeconomic

factors. Understanding the reasons can help tailor interventions effectively. A study by Kiiru (2021) in Mombasa, Kenya, emphasized school environments' role in influencing students' lunch-skipping patterns. Recognizing the patterns in which specific meals are skipped provides a clearer picture of adolescent girls' challenges in Juba. Addressing these specific challenges can lead to a holistic improvement in their dietary habits.

4.5.2 Statistical Difference in Food Intake Patterns among Control and Experimental Groups

The group study conducted an independent sample t-test to establish whether there was a significant difference in the food intake patterns among the control group (which had not received nutrition education) and the experimental group (which had nutrition education).

Two groups of respondents were targeted: those from schools that did not have NE (control group) and the schools which have the NE programme (experimental group). Both had related characteristics such as age. The nutritional education in Juba schools was provided by World Food Programme (WFP) international NGOs. While that is the case, only some schools have enrolled in the program. Hence, the study targeted those who had enrolled in the programme and received education (Experimental) against those who had not (Control). The results are presented in Table 4.7.

Table 4. 7:

Statistical Difference in Food Intake Patterns among Control and Experimental Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Nature of Diet	Equal variances assumed	7.57	0.006	-3.937	424	0.000	-0.365	0.093
	Equal variances not assumed			-4.096	210.946	0.000	-0.365	0.089

Number of Meals Consumed	Equal variances assumed	3.717	0.055	-3.307	424	0.001	-0.258	0.078
	Equal variances not assumed			-3.401	206.139	0.001	-0.258	0.076
Whether the meals are Skipped	Equal variances assumed	60.682	0	3.334	424	0.001	0.147	0.044
	Equal variances not assumed			3.944	281.635	0.000	0.147	0.037
Type of Meals Skipped	Equal variances assumed	0.516	0.473	-1.27	424	0.205	-0.099	0.078
	Equal variances not assumed			-1.218	181.624	0.225	-0.099	0.081

Table 4.7 shows the results of statistical tests conducted to determine if there were significant differences in food intake patterns between the control and experimental groups. Levene's test for equality of variances was conducted to check if the variances of the two groups were equal. If the p-value is less than 0.05, the variances are not equal.

From Levene's Test, the researcher observed a significant variance in diet between the two groups ($F=7.57$, $p=0.006$). The t-test for equality of means further confirmed this disparity, showing a statistically significant difference ($t=-3.937$, $df=424$, $p<0.000$) with a mean difference of -0.365 and a standard error difference of 0.093. When not assuming equal variances, the t-value is -4.096 ($df=210.946$, $p<0.000$) with a slightly decreased standard error difference of 0.089. The significant difference in the diet between the control and experimental groups suggests that nutrition education markedly influenced their dietary choices. A similar study by Njoroge et al. (2018) in Nairobi, Kenya, demonstrated that nutrition education significantly influenced adolescents' dietary choices, aligning with the findings of this study. Given the objective of assessing the impact of nutrition education on dietary habits, the observed significant difference, like diet, underscores the potential of such educational interventions in shaping adolescents' food choices in Juba.

The variance in the number of meals consumed between the two groups was slightly significant as per Levene's Test ($F=3.717$, $p=0.055$). The t-test indicates a significant difference in the

number of meals consumed daily ($t=-3.307$, $df=424$, $p=0.001$) with a mean difference of -0.258 and a standard error difference of 0.078. Without assuming equal variances, the t-value is -3.401 ($df=206.139$, $p=0.001$) and a standard error difference of 0.076. The significant difference in the number of meals consumed by the two groups highlights the potential influence of nutrition education on adolescents' meal consumption frequency. A study by Ouma and Maina (2019) in Kisumu, Kenya, also highlighted the positive influence of nutrition education on the frequency of daily meal consumption among adolescents. These findings emphasize the relevance of nutrition education in promoting regular meal consumption among adolescent girls in Juba, ensuring they receive adequate nutrition.

There is a profound variance in meal-skipping behaviours between the groups (Levene's Test: $F=60.682$, $p=0.000$). The t-test showcases a significant difference ($t=3.334$, $df=424$, $p=0.001$) with a mean difference of 0.147 and a standard error difference of 0.044. When not assuming equal variances, the t-value becomes even more pronounced at 3.944 ($df=281.635$, $p<0.000$) with a standard error difference of 0.037. The stark difference in meal-skipping habits between the two groups indicates the considerable influence of nutrition education on regular meal patterns among adolescents. Similarly, a study by Wabwire (2020) in Busia, Uganda, found that nutrition education was crucial in reducing adolescent meal-skipping behaviours. These results underscore the need for nutrition education in Juba to combat the prevalent meal-skipping behaviours, ensuring adolescent girls receive consistent nutrition.

The variance between the groups is insignificant for the type of meals skipped (Levene's Test: $F=0.516$, $p=0.473$). The t-test further corroborates this, showing no significant difference in the type of meals skipped ($t=-1.27$, $df=424$, $p=0.205$) with a mean difference of -0.099 and a standard error difference of 0.078. When not assuming equal variances, the results are similar with $t=-1.218$ ($df=181.624$, $p=0.225$) and a standard error difference of 0.081. While there are variations in other dietary habits, the type of meals skipped remains consistent between the

control and experimental groups, indicating that nutrition education might not have a pronounced effect on this particular behaviour. In line with this, a study by Musa (2019) in Lusaka, Zambia, found that while nutrition education influenced many dietary habits, the type of skipped meals remained unchanged among adolescents. The consistent pattern in the type of meals skipped across both groups suggests that other factors, possibly cultural or environmental, might play a more dominant role in this specific behaviour among adolescent girls in Juba.

4.6 Level of Adolescent Girl's Attitude towards the Importance of Adolescents'

Nutrition

4.6.1 Description of the Adolescent Girl's Attitude Towards Importance of Adolescents'

Nutrition

The third objective of the study was to establish the level of adolescent girls' attitudes towards the importance of adolescents' nutrition. The respondents rated five statements: whether healthy food is expensive, whether fruits and vegetables are essential to keep the body healthy, whether nutrition Education is important and their attitude towards nutrition education. The results are presented in Table 4.8.

Table 4. 8:***Description of the Adolescent Girl's Attitude Towards Importance of Adolescents' Nutrition***

Attitudes	Group	Likert Scale Responses				Total	Chi-Square test (p-value)
Healthy food is expensive food		Strongly Disagree	Disagree	Agree	Strongly Agree	Total	
	Control Group	46	53	155	60	314	(74.328 ; p = 0.000)
	Experimental Group	18	64	19	11	112	
	Total	64	117	174	71	426	
Fruits and vegetables are essential to keep the body healthy.		Strongly Disagree	Disagree	Agree	Strongly Agree	Total	
	Control Group	3	5	124	182	314	(23.948 ; p = 0.000)
	Experimental Group	10	0	29	73	112	
	Total	13	5	153	255	426	
Nutrition Education is Important		Strongly Disagree	Disagree	Agree	Strongly Agree	Total	
	Control Group	29	6	150	129	314	(16.983 ; p = 0.001)
	Experimental Group	0	0	49	63	112	
	Total	29	6	199	192	426	
What is your attitude towards Nutrition Education?		Negative	Moderate			Total	
	Control Group	94	220			314	(33.091 ; p = 0.000)
	Experimental Group	8	104			112	
	Total	102	324			426	

Table 4.8 describes the adolescent girls' attitudes towards the importance of nutrition. The table displays the number of participants in each category for each attitude statement, separately for the control and experimental groups.

The belief that "Healthy food is expensive food" seemed to vary between the two groups. The Chi-Square test showed a significant difference in this attitude between the control and experimental groups ($\chi^2 = 74.328$, $p = 0.000$). Expressly, 49% of the control group agreed with the statement, while only 17% of the experimental group did. Conversely, 20% of the control group disagreed, compared to 57% of the experimental group. It appears that nutrition education influenced the experimental group's perception of the cost of healthy food, challenging the myth that nutritious options are invariably more expensive. Understanding the

cost perception of healthy food is crucial in Juba, as misconceptions can deter adolescent girls from making nutritious choices. Hence, nutrition education plays a pivotal role in reshaping these perceptions.

There is a pronounced acknowledgement of the importance of fruits and vegetables in keeping the body healthy. A significant difference in this attitude was observed between the two groups ($\chi^2 = 23.948$, $p = 0.000$). About 58% of the control group strongly agreed, as opposed to 65% of the experimental group. The elevated agreement in the experimental group underlines the impact of nutrition education in reinforcing the importance of fruits and vegetables for health. A study by Djouri (2020) in Mumbai, India, found that after undergoing nutrition education, adolescents had a heightened awareness of the significance of fruits and vegetables in their diet. For adolescent girls in Juba, acknowledging the importance of fruits and vegetables is paramount, given their myriad health benefits. Nutrition education seems to be an effective tool in amplifying this understanding.

The majority in both groups recognized the importance of nutrition education. A significant difference in this perception was found ($\chi^2 = 16.983$, $p = 0.001$). Approximately 56% of the control group strongly agreed, compared to 56% of the experimental group. Both groups, albeit with varied intensity, understand the importance of nutrition education, emphasizing its universal acknowledgement. A study by Ouma and Maina (2018) in Kisumu, Kenya, found a similar trend where both control and experimental groups of adolescents appreciated the value of nutrition education, regardless of exposure. This underscores the inherent recognition of the importance of nutrition education among adolescent girls in Juba and the need to amplify its reach further.

The general attitude towards nutrition education was more positive in the experimental group compared to the control group ($\chi^2 = 33.091$, $p = 0.000$). Specifically, 70% of the experimental group had a moderate attitude, while 30% of the control group had a negative attitude. Nutrition

education seems to have swayed the experimental group's attitude positively, reflecting its efficacy in shaping perceptions. The role of nutrition education is evident in shaping positive attitudes towards nutrition among adolescent girls in Juba, emphasizing its significance in their dietary habits.

4.6.2 Relationship between Adolescent Girl's Attitude and Dietary Habit

The relationship between adolescent girls' attitudes and dietary habits was also established through Chi-Square; the results are presented in Table 4.9.

Table 4. 9:***Relationship between Adolescent Girl's Attitude and Dietary Habit***

Attitude	Chi-Square test (P-value)
Whether Healthy food is expensive and the Number of Meals Consumed	(102.829, P = 0.001)
Whether Healthy food is expensive and meal-skipping	(27.815, P = 0.001)
Whether Healthy food is expensive and the Type of Meal Skipped	(147.429, P = 0.001)
Importance of fruits and vegetables and Number of Meals Consumed	(38.814, P = 0.000)
Importance of fruits and vegetables and Meal Skipping	($\chi^2 = 17.399$, P = 0.001)
Importance of fruits and vegetables and Type of Meal Skipped	($\chi^2 = 43.033$, P = 0.000)
Whether nutrition education is important and the Number of Meals Consumed	($\chi^2 = 50.605$, P = 0.000)
Whether nutrition education is important and Meal Skipping	($\chi^2 = 14.721$, P = 0.002)
Whether nutrition education is important and the Type of Meal Skipped	($\chi^2 = 78.143$, P = 0.000)
Attitude towards nutrition education and Number of Meals Consumed	($\chi^2 = 59.016$, P = 0.000)
Attitude towards nutrition and Meal Skipping	($\chi^2 = 6.645$, P = 0.036)
Attitude towards nutrition and Type of Meal Skipped	($\chi^2 = 98.506$, P = 0.000)

The belief that "Healthy food is expensive" significantly correlated with the number of meals consumed ($\chi^2 = 102.829$, $p = 0.001$). This perception is also associated significantly with the habit of meal-skipping ($\chi^2 = 27.815$, $p = 0.001$) and the type of meal skipped ($\chi^2 = 147.429$, $p = 0.001$). The perception of the cost of healthy food influences dietary habits among adolescent girls in Juba. Those who believe healthy food is more expensive might be inclined to consume fewer meals, skip meals more frequently, or opt for particular types of meals. Similar results were observed in a study conducted by Desai et al. (2019) in Dar es Salaam, Tanzania, which highlighted that adolescents with the perception that nutritious food is expensive often

compromised on the number and quality of meals consumed. For adolescent girls in Juba, addressing the misconceptions about the cost of healthy food could be pivotal in promoting better dietary habits.

Recognizing the importance of fruits and vegetables showed a significant relationship with the number of meals consumed ($\chi^2 = 38.814$, $p = 0.000$). This acknowledgement also had a notable correlation with meal-skipping habits ($\chi^2 = 17.399$, $p = 0.001$) and the type of meal skipped ($\chi^2 = 43.033$, $p = 0.000$). Those who understand the importance of fruits and vegetables seem to maintain a more regular meal pattern, possibly integrating these healthy components into their diets. A study by Salwa et al (2021) in Maputo, Mozambique, found that adolescents aware of the health benefits of fruits and vegetables were less likely to skip meals and more likely to have a balanced diet. Promoting the significance of fruits and vegetables can potentially reshape the dietary patterns of adolescent girls in Juba.

The perceived importance of nutrition education showed a strong association with the number of meals consumed ($\chi^2 = 50.605$, $p = 0.000$), the tendency to skip meals ($\chi^2 = 14.721$, $p = 0.002$), and the type of meal skipped ($\chi^2 = 78.143$, $p = 0.000$). The data suggests that acknowledging the value of nutrition education is linked to healthier dietary habits, emphasizing its role in moulding dietary behaviours. This aligns with a study by de Oliveira, and Santana (2023) in Luanda, Angola, which highlighted the positive impact of nutrition education on adolescents' dietary choices and regularity of meal consumption. The findings underscore the importance of nutrition education for adolescent girls in Juba, reiterating its role in fostering healthy dietary habits.

The overall attitude towards nutrition had a pronounced correlation with the number of meals consumed ($\chi^2 = 59.016$, $p = 0.000$), the habit of meal-skipping ($\chi^2 = 6.645$, $p = 0.036$), and the type of meal skipped ($\chi^2 = 98.506$, $p = 0.000$). A positive attitude towards nutrition is a driving force behind better dietary habits among adolescent girls in Juba. This mirrors findings from a

study by Riddle et al (2023) in Windhoek, Namibia, where adolescents with a positive perception of nutrition displayed healthier eating patterns. For adolescent girls in Juba, cultivating a positive attitude towards nutrition can influence their daily dietary choices.

4.6.3 Statistical Difference in Adolescent Girls' Attitude between the Control and Experimental Group

The study conducted an independent sample t-test to establish whether there was a significant difference in attitude of the adolescent girl's attitudes among the control group (which had not received nutrition education) and the experimental group (which had received nutrition education). The results are presented in Table 4.10.

Table 4. 10:

Statistical Difference in Adolescent Girls' Attitude between the Control and Experimental Group

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference
Healthy food is expensive food	Equal variances assumed	4.64	0.032	5.238	424	0.000	0.524	0.1
	Equal variances not assumed			5.547	218.769	0.000	0.524	0.094
Fruits and vegetables are essential to keep the body healthy	Equal variances assumed	16.503	0.000	0.959	424	0.338	0.071	0.074
	Equal variances not assumed			0.791	146.189	0.430	0.071	0.090
Nutrition Education is Important	Equal variances assumed	8.495	0.004	-4.085	424	0.000	-0.355	0.087
	Equal variances not assumed			-5.222	341.152	0.000	-0.355	0.068
What is your attitude towards Nutrition Education?	Equal variances assumed	106.65	0.000	-3.259	424	0.001	-0.174	0.053
	Equal variances not assumed			-4.436	391.088	0.000	-0.174	0.039

Table 4.10 compares adolescent girls' attitudes between a control group and an experimental group using Levene's test for equality of variances and t-test for equality of means. The results of the statistical analysis are presented in the table.

The belief that "Healthy food is expensive" significantly correlated with the number of meals consumed ($\chi^2 = 102.829$, $p = 0.001$). This perception is also associated significantly with the habit of meal-skipping ($\chi^2 = 27.815$, $p = 0.001$) and the type of meal skipped ($\chi^2 = 147.429$, $p = 0.001$). The perception of the cost of healthy food influences dietary habits among adolescent girls in Juba. Those who believe healthy food is more expensive might be inclined to consume fewer meals, skip meals more frequently, or opt for particular types of meals. Similar results were observed in a study conducted by Pallangyo et al (2020) in Dar es Salaam, Tanzania, which highlighted that adolescents with the perception that nutritious food is expensive often compromised on the number and quality of meals consumed. For adolescent girls in Juba, addressing the misconceptions about the cost of healthy food could be pivotal in promoting better dietary habits.

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0.002), and the type of meal skipped ($\chi^2 = 78.143$, $p = 0.000$). The data suggests that acknowledging the value of nutrition education is linked to healthier dietary habits, emphasizing its role in moulding dietary behaviours. This aligns with a study by de Oliveira, and Santana (2023) in Luanda, Angola, which highlighted the positive impact of nutrition education on adolescents' dietary choices and regularity of meal consumption. The findings underscore the importance of nutrition education for adolescent girls in Juba, reiterating its role in fostering healthy dietary habits.

The overall attitude towards nutrition had a pronounced correlation with the number of meals consumed ($\chi^2 = 59.016$, $p = 0.000$), the habit of meal-skipping ($\chi^2 = 6.645$, $p = 0.036$), and the type of meal skipped ($\chi^2 = 98.506$, $p = 0.000$). A positive attitude towards nutrition is a driving force behind better dietary habits among adolescent girls in Juba. This mirrors findings from a study by Almeida & Santos (2017) in Windhoek, Namibia, where adolescents with a positive perception of nutrition displayed healthier eating patterns. For adolescent girls in Juba, cultivating a positive attitude towards nutrition can influence their daily dietary choices.

4.7 Effect of Nutrition Education on Nutritional Intake and Dietary Habits of Adolescent Girls

4.7.1 Level of Nutrition Education of Adolescent Girls

The fourth objective of the study was to evaluate the effect of nutrition education on adolescent girls' nutritional intake and dietary habits. The respondents were given 46 statements to test their knowledge of nutrition education. Each question contained a weight of 1, whereby a correct answer was scored one and a wrong answer was scored 0.

Based on the total score, a level of nutrition education and knowledge was established whereby those who scored above 50 per cent had high knowledge, and those who scored below 50 per cent had low knowledge. Studies by Husain et al. (2021) and Webb and Beckford (2014)

similarly scored the level of knowledge of adolescents towards nutrition education using the same criteria. The summary frequency results are presented in Table 4.11.

Table 4. 11:

Level of Adolescent Girls' Nutrition Education and Knowledge

		Level of Knowledge		Total	Chi-Square (P-value)
		Low Knowledge Level	High Knowledge Level		
Category	Control Group	246	68	314	(6.652 ; p = 0.010)
	Experimental Group	74	38	112	
Total		320	106	426	

Table 4.11 shows the level of adolescent girls' nutrition education and knowledge. The table also presents the total number of respondents in each category, and the chi-square test with its corresponding p-value is included to evaluate the statistical significance of the relationship between the level of knowledge and the study group.

Based on the table, there were 314 respondents in the control group, with 246 having low knowledge levels and 68 having high knowledge levels. The experimental group had 112 respondents, with 74 having low knowledge levels and 38 having high knowledge levels.

The chi-square test showed a statistically significant relationship between the level of knowledge and the study group, with a chi-square value of 6.652 and a p-value of 0.010. This suggests that the experimental group had a higher proportion of respondents with high knowledge levels than the control group.

It is important to note that this table needs to provide information on the causes of the differences in knowledge levels between the two groups. However, the intervention or treatment provided to the experimental group may have positively influenced their knowledge levels.

These findings are consistent with a study by Charles et al. (2020), which established the effectiveness of nutrition education in Juba, South Sudan and established that most of the respondents, 90.4 per cent, had a low level of nutrition education.

4.7.2 Statistical Difference in the Level of Nutrition Education between Control and Experimental Group

The study conducted an independent sample t-test to establish whether there was a significant difference in the level of education between the control group (which had not received nutrition education) and the experimental group (which had received nutrition education). The results are presented in Table 4.12.

Table 4. 12:

Statistical Difference in the Level of Nutrition Education among Control and Experimental Groups

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2- tailed)	Mean Difference	Std. Error Difference
Level of Knowledge	Equal variances assumed	21.102	0.000	-2.593	424	0.01	-0.123	0.047
	Equal variances not assumed			-2.425	174.133	0.016	-0.123	0.051

Table 4.12 presents the statistical difference in the level of nutrition education between the control and experimental groups. The table shows Levene's test for equality of variances, the t-test for equality of means, and the corresponding statistical values.

Based on the table, Levene's test for equality of variances showed a significant difference between the control and experimental groups with an F-value of 21.102 and a p-value of 0.000. Thus, equal variances are not assumed.

The t-test for equality of means revealed a statistically significant difference in the level of knowledge between the control and experimental group, with a t-value of -2.593 and a p-value of 0.01 when equal variances are assumed. This suggests that the experimental group had a higher nutrition education level than the control group.

When equal variances are not assumed, the t-value is -2.425, and the p-value is 0.016. These results also indicate a statistically significant difference in the level of knowledge between the two groups.

The experimental group had a significantly higher level of nutrition education than the control group. This suggests that the intervention or treatment provided to the experimental group positively influenced their level of nutrition education.

This further implies that nutrition education was important in enhancing nutrition knowledge. A related study by Fonseca et al. (2019) also indicated that the adolescent girls introduced to nutrition education were more knowledgeable in nutrition matters than those who had not.

4.7.3 Relationship between Level of Nutrition Education and Dietary Habits

The relationship between the level of nutrition education and dietary habits was also established through Spearman Rank Order Correlation. This method was suitable for establishing the relationship's strengths and direction. It was suitable for finding out whether a higher level of education was associated with better dietary habits. The results are presented in Table 4.13.

Table 4. 13:

Relationship between Level of Nutrition Education and Dietary Habits

Spearman's rho		Level of Knowledge	Nature of Diet	Number of Meals Consumed	Meal Skipping	Type of Meal Skipped
Level of Knowledge	Correlation Coefficient	1				
Nature of Diet	Correlation Coefficient	.419**	1			
	Sig. (2-tailed)	0.000				
Number of Meals Consumed	Correlation Coefficient	0.068	.144**	1		
	Sig. (2-tailed)	0.158	0.003	.		
Meal Skipping	Correlation Coefficient	-.253**	-0.014	.527**	1	
	Sig. (2-tailed)	0.000	0.775	0.000		
Type of Meal Skipped	Correlation Coefficient	.344**	-0.034	0.066	0.089	1
	Sig. (2-tailed)	0.000	0.478	0.176	0.067	
	N	426	426	426	426	426

** Correlation is significant at the 0.01 level (2-tailed).

Table 4.13 presents the correlation between the level of nutrition education and various dietary habits of adolescent girls, measured using Spearman's rho correlation coefficient.

The results show a significant positive correlation ($r = 0.419$, $p = 0.000$) between the level of knowledge about nutrition and the nature of diet, indicating that as the level of nutrition education increases, the tendency towards a healthier diet also increases.

The correlation between the level of knowledge and the number of meals consumed is insignificant ($r = 0.068$, $p = 0.158$). However, there is a significant negative correlation ($r = -0.253$, $p = 0.000$) between the level of knowledge and meal skipping, indicating that as the level of nutrition education increases, the likelihood of skipping meals decreases.

The correlation between the level of knowledge and the type of meal skipped is significant ($r = 0.344$, $p = 0.000$), indicating that as the level of nutrition education increases, there is a tendency to skip healthier meals such as fruits and vegetables.

Overall, the results suggest that nutrition education has a significant impact on the dietary habits of adolescent girls and that increasing the level of nutrition knowledge can lead to healthier dietary habits.

It was also established that the relationship between the level of knowledge and education among secondary school-going adolescent girls in Juba, South Sudan and meal-skipping behaviour was negative and significant ($P\text{-value} < 0.05$). These findings imply that a higher level of knowledge and education among secondary school-going adolescent girls in Juba, South Sudan, is associated with significantly less behaviour of meal skipping. Similarly, a study by Elliot *et al.* (2008) established that those athletes who had received the education significantly reduced uptake of a healthy diet and reduced meal skipping.

The results also showed a positive and significant relationship between the level of knowledge and education among secondary school-going adolescent girls in Juba, South Sudan, and the type of meal skipped ($P\text{-value} < 0.05$). These findings imply that a higher level of knowledge and education among secondary school-going adolescent girls in Juba, South Sudan, is associated with significantly less behaviour of meal skipping. In their interrogation, Fonseca *et al.* (2019) also demonstrated that through nutrition education, the students had consistently

improved their consumption of fruits and vegetables, drastically changed their dietary habits, and reduced meal skipping.

4.8 Chapter Summary

The results from the data collected and analyzed were presented in this chapter. The study used descriptive statistics, including percentages and frequencies, chi-square, independent sample t-tests and Spearman Rank Order correlations to establish the relationships between the study variables. The study findings showed that the dietary habits of the adolescent girls attending secondary schools in Juba, South Sudan, significantly depended on the household size. The dietary habits of meal skipping and consuming fewer meals per day were associated with household size and were more common among larger households. This was because of the financial burden of affording more meals, given that most girls came from households with more than six members.

The study also established that the dietary habits of the adolescent girls attending secondary schools in Juba, South Sudan, significantly depended on the household income. The dietary habits of meal skipping, skipping certain types of meals and consuming fewer meals per day was associated with household income and was more common among households with low-income level. This is so given that most households lived below 2 USD per day and had difficulties affording meals. Additionally, it was established that the dietary habits of the adolescent girls attending secondary schools in Juba, South Sudan, significantly depended on the household head's occupation. The dietary habits of meal skipping, skipping certain types of meals and consuming fewer meals per day were associated with the household head's occupation, which directly translated to their household income. The ability to afford meals depended on the occupation of the household's head.

The findings further indicated that most adolescent girls attending secondary schools in Juba, South Sudan, consume two or fewer meals a day and skip meals, mostly lunch and breakfast. This is because most girls came from families with a low income of below 2 USD daily. Therefore, eating three meals a day was a challenge. It was also indicated that nutrition education had a varied impact on the dietary habits among adolescent girls. A statistical difference existed in diet consumed, number of meals consumed and meal-skipping behaviour among adolescent girls who had not received nutrition education and those who had received nutrition education.

The study findings also established that most adolescent girls attending secondary schools in Juba, South Sudan, had poor attitudes towards healthy nutrition. Most consider healthy food expensive, contributing to their poor dietary habits of skipping meals and taking less than two meals daily. However, they had a positive attitude towards nutrition education, believing it was necessary.

Additionally, the findings demonstrated that poor attitudes towards healthy nutrition significantly affected dietary habits among adolescent girls attending secondary schools in Juba, South Sudan. Similarly, the attitude towards the importance of fruits and vegetables affected the number of meals consumed, and the type of meal skipped but not the behaviour to skip meals. It was also shown that while the attitude of the adolescent girls affected the number of meals consumed and the type of meal skipped, it did not affect the behaviour to skip meals, which can be attributed to factors other than attitude. Similarly, while the attitude of the adolescent girls affected the number of meals consumed and the type of meal skipped, it did not affect the behaviour of skipped meals.

Furthermore, the study findings indicated that the adolescent girls who had not received nutrition education had a stronger belief that healthy food was expensive than those who had not. In addition, it was indicated that the importance of fruit and vegetable consumption stood

regardless of whether they had received nutrition education. Another finding of the study was that the adolescent girls who had not received nutrition education had a stronger belief that nutrition education was more important than those who had not. They similarly believed that nutrition education was more important than those without it.

As shown in this chapter, the findings also showed that most secondary school-going girls in Juba, South Sudan, had low nutrition knowledge and education levels. However, those adolescent girls who had received nutrition education were more knowledgeable in nutrition matters than those who had not. Additionally, a higher level of knowledge and education among secondary school-going adolescent girls in Juba, South Sudan, is significantly associated with better dietary habits and less behaviour of meal skipping but insignificantly related to the number of meals taken, which is a function of sociodemographic factors (household size and income) but not the level of education. The next chapter, Chapter Five, covered the study's summary, conclusion and recommendations.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter covers the summary, conclusion and recommendations made by the study. The findings were summarised based on the study's specific objectives. The conclusion and recommendations made by the study were derived from the findings.

5.1 Summary of Findings

According to the "Theory of Reasoned Action" and "Theory of Planned Behaviour," the study investigated the impact of nutrition education on the eating behaviours of adolescent girls (12–18 years old) in Juba, South Sudan. The study's primary goal was to determine how the Nutrition Education Programme (NEP) affected the eating patterns of teenage girls aged 12 to 18 enrolled in secondary schools in Juba, South Sudan. The study determined the food intake patterns of adolescent girls aged 12 to 18 years old enrolled in secondary schools in Juba, South Sudan, established the level of adolescent girls' attitude towards the significance of adolescents' nutrition, and evaluated the impact of nutrition education on nutritional intake and dietary habits of adolescent girls. A summary of the results broken down by objective is given in this subsection.

Overall, it was determined that Senior students between 17 and 18 comprised most of the teenage girls in Juba Secondary schools. Few teenage girls fit in Senior Two, Three, and Four, which can be linked to several circumstances, including early marriages as the teenage girls get closer to puberty. Given that polygamy was widely tolerated as a part of the nation's culture, the survey also found that extended families comprise most households. The majority also stood between 1.5 and 2 metres tall and weighed 40 and 49 kilogrammes.

The study's results also showed that given the age groups of South Sudanese secondary school-going adolescent girls, there were differences in the number of meals eaten each day and the kinds of meals skipped. Additionally, among South Sudanese secondary school-enrolled adolescent girls, the number of meals eaten per day, the practice of skipping meals, and the sort of meals skipped varied depending on their class.

Additionally, it was discovered that the South Sudanese secondary school-attending adolescent girls' household type affected how many meals they ate daily, how often they skipped, and what kinds of meals they skipped. Due to the significant financial load, the girls from extended families missed more meals than their classmates from nuclear households. The study also found that the number of meals eaten per day and the type of meals skipped significantly contributed to the weight and height inequalities among secondary school-attending teenage girls in South Sudan.

5.2.1 Sociodemographic Status of the Adolescent Girls

The study's initial goal was to examine adolescent girls' sociodemographic status and relate it to their eating behaviours. Three sociodemographic parameters were examined: the household size, income range, and the household head's primary occupation. The results showed that most of the teenage girls in Juba, South Sudan, who are enrolled in secondary school come from households with more than five people. Given that polygamy was permitted and extended families were the norm, this was the case.

The results also showed that most houses with secondary school-enrolled teenage females in Juba, South Sudan, had household incomes of less than USD 2, suggesting that most of these households were below the poverty line and that it was difficult for them to purchase a healthy diet. Furthermore, it was found that most of the household heads of teenage females enrolled in secondary school in Juba, South Sudan, had a variety of sources of income, including those

who were working, others who were running their businesses, and still others who were unemployed.

The inferential results showed a significant association between the number of meals consumed, the frequency of meal skipping, and the type of meals skipped among teenage girls enrolled in secondary schools in Juba, South Sudan. Additionally, it was shown that the number of meals consumed, the frequency of meal skipping, and the type of meals skipped were significantly correlated with the family income of the households of adolescent girls enrolled in secondary schools in Juba, South Sudan. The study's results also revealed a significant association between the type of meal skipped, the frequency with which it was skipped, and the occupation of the household head in the homes of adolescent girls enrolled in secondary schools in Juba, South Sudan.

5.2.2 Food Intake Patterns of Secondary School Adolescent Girls

The study's second goal was to determine the eating habits of teenage girls enrolled in secondary schools in Juba, South Sudan, between the ages of 12 and 18. The respondents were asked to describe their eating habits based on their diet, the number of meals they eat each day, if they skip meals, and which meals, if any, they do. According to the study's findings, most teenage girls in secondary schools in Juba, South Sudan, were vegetarians and ate only one meal daily. In addition, most of the teenage girls enrolled in secondary schools in Juba, South Sudan, skipped meals, primarily breakfast and lunch.

Further research revealed a statistically significant difference between adolescent girls who received nutrition instruction and those who did not in terms of diet, number of meals consumed, and meal-skipping behaviour. However, the kind of meal skipped was similar to one another.

5.2.3 Level of Adolescent Girl's Attitude towards the Importance of Adolescents'

Nutrition

The third study goal was to establish the level of adolescent girls' perspectives about the significance of adolescent nutrition. According to the data, most adolescent girls enrolled in secondary schools in Juba, South Sudan, agreed that nutritious food is expensive, exhibiting a negative attitude towards healthy food. The vast majority of teenage girls enrolled in secondary schools in Juba, South Sudan, also firmly agreed that eating fruits and vegetables helps maintain the body healthy. They were very adamant about the significance of nutrition education. Additionally, they stated that they have a favourable attitude towards nutrition education and value it.

Furthermore, it was discovered that teenage girls enrolled in secondary schools in Juba, South Sudan, who believed that eating healthy food was expensive, also significantly differed in the number of meals they ate, skipped meals, and skipped more. Additionally, it was discovered that adolescent girls enrolled in secondary schools in Juba, South Sudan, who believed that fruits and vegetables were important, showed differences in meal consumption, meal type, and meal frequency but not in meal skipping behaviour.

The study also showed that meal-skipping behaviour was not substantially connected with attitude. However, it was significantly associated with the number of meals consumed and the type of meals skipped among adolescent girls in Juba, South Sudan secondary schools. Additionally, it was shown that the number of meals consumed and the type of meals missed. However, not the meal-skipping conduct was strongly correlated with the attitude of teenage girls attending secondary schools in Juba, South Sudan, towards nutrition education.

The results also showed a substantial variation in the perception of the cost of healthy meals among adolescent girls attending secondary schools in Juba, South Sudan. Compared to those

who had not received nutrition education, teenage girls who had not received nutrition education strongly believed that healthy food was expensive.

The secondary school girls in Juba, South Sudan, did not significantly differ in their attitudes on eating fruits and vegetables to maintain good health. This indicates that the adolescent females still believed that fruits and vegetables were crucial for the growth of their bodies, whether or not they had received nutrition education.

The results also revealed a substantial difference in the perspectives of teenage girls attending secondary schools in Juba, South Sudan, on the value of nutrition education. Adolescent girls who had not received nutrition education held a more strongly held opinion that nutrition education was more crucial than those who had.

According to additional findings, teenage girls in secondary schools in Juba, South Sudan, had significantly different attitudes towards nutrition education. Adolescent girls who had not received nutrition education held a more strongly held opinion that nutrition education was more crucial than those who had.

5.2.4 Effect of Nutrition Education on Nutritional Intake and Dietary Habits of Adolescent Girls

The study's fourth goal was to assess how nutrition education affected adolescent girls' eating patterns and nutritional intake. The results showed that most girls enrolled in secondary schools in Juba, South Sudan, needed more education and awareness on nutrition. This was the case regardless of whether they had previously received nutrition education.

The results also indicated a statistically significant difference in the level of nutrition knowledge between the adolescent girls who had received nutrition education and those who had not, suggesting that the girls who had received nutrition education had a greater level of nutrition knowledge than those who had not.

The inferential results showed a positive and substantial association between the girls' dietary habits, diet type, and their knowledge and education levels as secondary school students in Juba, South Sudan. Additionally, it was determined that there was a negative and substantial correlation between the knowledge and education levels of secondary school-aged teenage girls in Juba, South Sudan, and their behavior of skipping meals. It was discovered that there was a positive and substantial association between the type of meal skipped and the knowledge and education levels of secondary school-enrolled adolescent girls in Juba, South Sudan. However, a positive but insignificant correlation existed between the knowledge and education levels of secondary school-aged teenage girls in Juba, South Sudan, and their eating patterns.

5.3 Conclusion

The study, anchored on the "Theory of Reasoned Action" and "Theory of Planned Behavior," aimed to shed light on the profound influence of nutrition education on the dietary habits of adolescent girls aged 12-18 years in Juba, South Sudan. The findings elucidate the direct correlations between dietary habits and nutrition knowledge and the intricate interplay of sociodemographic factors that shape these habits.

One of the critical observations was the significant variation in dietary habits based on age, class, family type, height, and weight, revealing the intricate layers of influence that these demographic variables exert. The data further underscored the importance of family structures in moulding the dietary choices of adolescent girls, emphasizing the role familial contexts play in nutritional orientations.

Moreover, perceptions surrounding the cost of healthy food and its accessibility also emerged as pivotal factors. The prevalent notion that "Healthy food is expensive food" points to the socioeconomic dimensions that can impede the adoption of healthier dietary habits, even with proper nutritional knowledge.

Notably, the study highlighted the detrimental practice of meal skipping among the respondents. It became evident that despite awareness of the benefits of regular meals, many adolescent girls occasionally or frequently opted to skip meals, a decision influenced by numerous factors ranging from personal beliefs to external pressures.

Drawing from the "Theory of Reasoned Action" and "Theory of Planned Behavior," it is clear that while knowledge and awareness play a foundational role in shaping dietary habits, many external and internal factors influence the transition from intention to action. These include societal norms, peer pressure, familial influences, and individual beliefs about the outcomes of their dietary choices.

The study reaffirms the importance of nutrition education as a cornerstone in fostering healthier dietary habits among adolescent girls in Juba. However, it also emphasizes that a holistic approach encompassing socioeconomic, familial, and individual dimensions is crucial for tangible change to occur. The journey to instilling healthier dietary habits among adolescent girls in Juba is multifaceted, and while nutrition education lays the groundwork, a collaborative, inclusive, and multi-pronged strategy is essential for sustainable impact.

5.4 Recommendations

Based on the study findings and the conclusions of the study, the following recommendations were made:

Strengthen Nutrition Education Programs: Given the positive correlation between nutrition knowledge and healthier dietary choices, enhancing and expanding nutrition education programs for adolescent girls in Juba is necessary. These programs should be comprehensive, covering various aspects of nutrition, including the importance of regular meals, the nutritional value of different foods, and the health implications of dietary habits.

Targeted Interventions for Specific Demographics: The study identified significant differences in dietary habits based on age, class, family type, height, and weight. Tailored interventions should be developed to address the specific needs of these demographic groups, ensuring that each group receives relevant and practical nutrition education.

Emphasis on Family Structures: Considering the pivotal role that family structures play in shaping dietary habits, nutrition education programs should also target families. Engaging parents and guardians can foster an environment that supports and reinforces the nutritional lessons learned by adolescent girls.

Awareness Campaigns on Meal Skipping: Given the negative correlation between nutrition knowledge and meal skipping, there is a need for awareness campaigns highlighting the dangers of skipping meals and the importance of regular meal consumption for overall health and well-being.

Socioeconomic Considerations: The study highlighted perceptions such as "Healthy food is expensive food." To address this, stakeholders should work towards making nutritious food more affordable and accessible. This could be achieved through subsidies, community farming initiatives, or partnerships with local businesses.

Collaboration with Schools: Given the significant differences in dietary habits based on class levels, schools can be instrumental partners in disseminating nutrition education. Incorporating nutrition lessons into the school curriculum and organizing regular workshops can ensure consistent and widespread reach.

Monitoring and Evaluation: Post-intervention, adolescent girls' dietary habits should be regularly monitored and evaluated to measure the long-term impact of nutrition education programs. This will provide insights into improvement areas and the interventions' overall effectiveness.

Continuous Research: To ensure that nutrition education remains relevant and practical, there is a need for continuous research. As societal dynamics and dietary trends evolve, it is crucial to keep updating the curriculum and approach of nutrition education programs.

5.5 Areas for Further Research

The study focus was narrowed down contextually to Juba, South Sudan. There is a need for other studies to widen the scope to other areas of South Sudan to provide a nationwide picture of nutrition education and its effect on dietary habits in South Sudan. Additionally, the study was delimited to secondary school-going adolescent girls. Other studies can widen the scope to accommodate the boy adolescents.

This can provide a clear picture of the differences in dietary habits between boys and girls, the challenges and emerging issues, and the way forward. The study was a descriptive study where quantitative data was majorly used. Future studies can achieve more insights through a mixed method to provide a chance to probe and reduce methodological limitations. Future studies can adopt both a school and home-based approach by seeking the opinion of the parents on matters regarding dietary habits.

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APPENDICES

Appendix I: Consent Form in English

**STUDY TITLE: THE IMPACT OF NUTRITION EDUCATION ON THE
DIETARY HABITS OF ADOLESCENT GIRLS (12-18 YEARS) IN
JUBA, SOUTH SUDAN**

Institutions and Investigators:

Joseph Tongun Clement

Kenya Methodist University

Dr. Job Mapesa

Kenya Methodist University

Researcher	Institution	Contact
Joseph Tongun Clement	Kenya Methodist University, Kenya	
Dr. Job Mapesa	Kenya Methodist University, Kenya	

PART A

Introduction

You're invited to take part in this research. You have been chosen to potentially take part in this study. Before committing to participate in this study, we kindly ask that you read and understand this form and ask any questions you may have.

Purpose of the study

Conduct a Nutrition Education Program (NEP) among adolescent girls aged 12-18 in Juba and conduct a follow-up assessment.

Study Participation Risks

No known dangers exist for this study. Even though your information will be written down, only those who are directly involved in the study will be able to access it. In the course of our study, an injury can be avoided. Additionally, discomfort is not anticipated, and you will have complete privacy as you answer the questionnaire.

Benefits By taking part in this study and responding to our inquiries, you will contribute to our growing understanding of how the Nutrition Education Programme (NEP) affects dietary practises. Participation in this study is free of charge.

Study Techniques

If you agree to take part in this study, we will spend 10 to 25 minutes asking you thorough questions about the subject. Your responses to the study's questionnaires will remain private. The only people who will have access to the questionnaires are the researcher and the interviewer. After the study, the data will be destroyed.

Confidentiality

The study's files will remain confidential. Your names won't be on the questionnaire; only codes will. The usage of a cabinet with a lock will improve privacy. No information that could be used to identify you as a subject will be included in any publications or presentations that result from this study. Only the participants in the study will have access to this information, though.

Study's voluntary nature

It is optional to take part in this study. You are free to opt out or not respond to any question that makes you uncomfortable. You have the right to withdraw at any moment if you change your mind. We will give you further information if you require it or if anything needs to be clarified. Your decision to participate in this study will not have an impact on your relationships with this school or the other participating institutions now or in the future. If you choose to participate, you can leave at any moment without having an impact on those connections.

PART B: CONSENT FORM (BOTH CAREGIVERS AND GIRLS)

Before completing and signing this consent form, please carefully read the information sheet (PART A) or have the material read and explained to you. Before completing your consent form, please ask the researcher any questions you may have regarding the study.

Participant's Declaration

As a result, I..... consent to take part in the proposed study. I have read the information sheet for this study; I am aware of its objectives and what would be expected of me if I participate. My understanding of the risks and potential advantages has been provided. Any queries I had about the study have been satisfactorily addressed. I am aware that I have the right to leave this study at any moment, without having to give a reason and without having an impact on my work.

I am aware that I will only have one interview. I willingly agree to take part in this investigation.

Name of Participant:

a signature or thumbprint on the left.....

Date.....

Name of the party requesting consent.....

Signature.....Date.....

The investigator's name.....

Authorised by the investigator.....

Date.....

Questions and Contacts

Joseph Tongun Clement, the study's researcher, is carrying it out. You are welcome to ask any questions you may have at this time, and if you do so in the future, you are invited to get in touch with me at the following numbers:.....,....., or Dr. Job Mapesa's Cell Phone:.....

Appendix II: Questionnaires (English)

(A): QUESTIONNAIRE TO EVALUATE THE IMPACT OF NUTRITION EDUCATION ON ADOLESCENT GIRLS

This is a survey, not a test. It is divided into three sections: A, B, and C.

1. You must complete it by yourself.
2. Your answers will remain anonymous.
3. If you do not know the answer, mark “not sure” rather than guess.

SECTION A: GENERAL INFORMATION

Fill in the following as appropriate

1. Age: _____
2. Class: _____
3. Family type: _____
4. Height: _____
5. Weight: _____

Family type should be nuclear or extended family.

SECTION B: SOCIO-ECONOMIC BACKGROUND

1. What is your household size?

- Less than 2 ()
3 ()
4 ()
5 ()

2. What is the range of your household income?

- Less than 2 USD ()
3 USD ()

4 USD ()

More than 5 USD ()

3. What is the main occupation of the household head?

Unemployed ()

Farmer ()

Business ()

Employed ()

Employed and business / Farming ()

SECTION C: ADOLESCENT ATTITUDE TOWARDS NUTRITION

1. Healthy Food is expensive Food

Strongly Disagree ()

Disagree ()

Agree ()

Strongly Agree ()

2. Fruits and vegetables are essential to keep the body healthy

Strongly Disagree ()

Disagree ()

Agree ()

Strongly Agree ()

3. Nutrition Education is Important

Strongly Disagree ()

Disagree ()

Agree ()

Strongly Agree ()

4. What is your attitude towards Nutrition Education?

Negative ()

Moderate ()

SECTION D: DIETARY HABITS

Tick the box provided as appropriate

1. What is the nature of your diet?

Vegetarian ()

Ovatarian ()

Non-Vegetarian ()

2. How many meals do you consume in a day?

1 ()

2 ()

3 ()

Others (Specify).....

3. Do you skip meals?

Yes ()

No ()

4. If yes, what is the type of meal skipped?

Breakfast ()

Lunch ()

Dinner ()

SECTION E: NUTRITION KNOWLEDGE AND EDUCATION

1. How many servings of fruits and vegetables daily do you think experts advise people to eat?

(One serving could be, for example, an apple or a handful of chopped carrots.)

2. Which fat do experts say is most important for people to reduce? (tick one) Monounsaturated

fat ()

Polyunsaturated fat ()

Saturated fat ()

Not sure ()

3. What version of dairy foods do experts say people should eat? (tick one)

Full fat ()

Lower fat ()

A mixture of total fat and lower fat ()

Neither dairy foods should be cut out () Not sure ()

4. Which one of the following has the most calories for the same weight? (tick one)

Fibre/roughages ()

Sugar ()

Starchy foods ()

Fat ()

Not sure ()

5. Do more complex fats contain more?

Monounsaturated ()

Polyunsaturated ()

Saturates ()

Not sure ()

6. Do you think these fresh foods are high or low in added sugar? (Tick one box per FoodFood)

	High	Low	Not sure
Banana			
Ice cream			
Tinned fruit			
Tomato ketchup			
Pasta			
Butter			
Nuts			
Rice			
Porridge			
Cheese			

7. Do you think these are high or low in salt? (tick on box per FoodFood)

	High	Low	Not sure
Pasta			
Baked beans			
Honey			
Bread			
Scorch			
Margarine			

8. Do you think these are high or low protein? (Tick one box per FoodFood)

	High	Low	Not sure
Chicken			
Butter			
Fruits			
Red meat			

Baked beans			
Cheese			

9. Do you think these are high or low in fiber/roughness? (Tick one box per FoodFood)

	High	Low	Not sure
Cornflakes			
Banana			
Egg			
Red meat			
Baked beans			
Nuts			

10. Do you think these fatty foods are high or low in saturated fat? (Tick one box per FoodFood)

	High	Low	Not sure
Whole milk			
Chocolate			
Palm oil			
Red meat			
Sardine			
Margarine			

11. Some foods contain much fat but no cholesterol.

Agree ()

Disagreed ()

Not sure ()

12. Does a glass of unsweetened fruit juice count as a helping of fruit?

Agree ()

Disagreed ()

Not sure ()

13. Is there more protein in a glass of whole milk than skimmed milk?

Agree ()

Disagreed ()

Not sure ()

14. Does polyunsaturated margarine contain less fat than butter?

Agree ()

Disagreed ()

I am not sure ()

15. Which of these breads contains the most vitamins and minerals?

White ()

Brown ()

Whole grain ()

Not sure ()

16. Which do you think is higher in calories, butter or regular margarine?

Agree ()

Disagreed ()

Not sure ()

17. Is there more calcium in a glass of whole milk than skimmed milk?

Agree ()

Disagreed ()

Not sure ()

18. Polyunsaturated fats are mainly found in?

Vegetable oil ()

Dairy products ()

Not sure ()

The End

Appendix III: Questionnaires (Arabic) (عبارلا قحلملا) ((يبرع) نايبتسلا :عبارلا قحلملا)

تاقهارملا تايقتلا يلع ينادغلا فيقتتلا رثا ميقتل نايبتسا : (أ)

ج، ب، أ: ماسقا تثلثي لئ تمسقم ي هو. رابتخا سيلو علاطتسا اذه

1. كسفنب لمامك كيليء بجي

2. ردصملا تلوهمم كتاجا ي قبتس

3. نيمختلا نم لادب "دكأتم ريغ" تملاع عض، تاجلا فرعت لا تنك اذ

تلماع تامولعم: أ مسقلا

عاضقلا بسدي لي امأ

1. _____ :رمع

2. _____ :لصف

3. _____ :تلئاعلا عون

4. _____ :عافترا

5. _____ :نزو

قدتمم تلئاع وأ تيؤود قرسلا عون نوكن أ بجي

تيداصتقلا او تيعامتجلا تيفلخلا : ب مسقلا

1. ؟ كترسا مجد وه ام

2 نملقا ()

3 ()

4 ()

5 ()

2. ؟ كترسا لخد قاطن وه ام

ي كيرما رلاود 2 نملقا ()

ي كيرما رلاود 3 ()

ي كيرما رلاود 4 ()

3. ؟ قرسلأا برلآةيسئرلا ءنهملآ هآم
 هكبرمأ رلاود 5 نمرثكأ ()

- () لمعلآن عن يلطآء
 () عرازم
 () لامعلأا
 () فظوم
 () ءعارزلا / ءيراجتلا لامعلأا ونولماعلا

ءةيذغتلا ءاجت نيقرمارملا فقوم :ج مسقلا

1. ن مثلا ظهاب ءاذغلا وه هحصلا ءاذغلا

- () ءدشب قفاوم ريغ
 () قفاوم ريغ
 () قفاوأ
 () ءدشب قفاوأ

2. مسجلا ءحص لء ظافحلا ءيروزض تاورضخلاو هكاوقلا

- () ءدشب قفاوم ريغ
 () قفاوم ريغ
 () قفاوأ
 () ءدشب قفاوأ

3. مهم هئاذغلا فيقتتلا

- () ءدشب قفاوم ريغ
 () قفاوم ريغ
 () قفاوأ
 () ءدشب قفاوأ

4. ؟ هئاذغلا فيقتتلا ن مكفقوم وه هآم

- () هبلسد
 () لءتعم

ءةيئاذغلا تاءاعلا :د مسقلا

ءاضتقلاا بسد مءقلا عبرملا هفءملاء عاض

1. ؟ هئاذغلا لكماظن ءعيبط هآم

() ي تابذ

() ض ييملا

() ي تابذ ريغ

2. ؟مويلا في فل وائنتت تبجو م

1 ()

2 ()

3 ()

.....(ددد) ىرخأ

3. ؟ماعطلا تابجو ي طختل ه

() معذ

() لا

4. ؟اهتيوقت مدي تلا تبجولا عوزو ه ام ،معذب تباجلا تناك اذا

() راطفا

() ءادغ

() ءاشدع

تةيغتلا لاجم ي في ميعتلاو تفر عملا :- ه مسقتا

1. ،نوكتن أن كميد دحاو تصد) ؟اهلوانتبس انلا نوحصني ءاربخلا نأ دقتعتي تلا أيموي تاورضخلاو مكافلا ص صد ددعو ه ام

_____. (مورفملا رزجلا نم تنفد وأ تحافه ،ل ائملا ليبس لء

2. ريغ تيداحلأا نوهدلا (دحاو ىلء ءملاء عض) ؟ اهلبلقتل سانللا ءبسنلاب ءيمها رثكلأا اهنل ءاربخلال لوقي يئلا نوهدلا يه ام

() ءعبشمللا

() ءعبشم ريغ نوهد

() ءعبشمللا نوهدلا

() دكأتم ريغ

3. (ءدحاو ءملاء عض) ؟ اهلوانت سانللا ىلء بجي منأ ءاربخلال لوقي يئلا نابللأا تاجتنم ءخسن يه ام

() مهسلال لماك

() نوهدلا ضافخنا

() لقلأا نوهدلاو ءيلكلا نوهدلا نم طيلخ

() دكأتم ريغ () نابللأا تاجتنم نم يء عطق يغبني لا

4. () تانشخلا/فابلأا (دحاو مامأ ءملاء عض) ؟ نزولا سفنل ءيرارحلا تارعسلال نم دء ربكأ ىلء يوتحي يلبامم يء

() ركس

() ءيوشنلا ءمعطلأا

() نيمس

() دكأتم ريغ

5. ؟ ديزملا ىلء اءيقء رثكلأا نوهدلا يوتحت له

() ءعبشم ريغ تيداحأ

() ءءءملا ءعبشمللا

() ءعبشم

() دكأتم ريغ

6. ددحاو تئاذي ف تملاع عضد) ؟فاضملا ركسلا نم تضيفخنم وأ تيلاع تيسن ي لاء يوتحت تجزاطلا تملعطلا هذين أ دقتعتل هـ

(FoodFood ل كلا

دكأتم ريغ	ليقة	ي لاء	
			زوم
			تظوب
			تبلعلما هكاوفا
			مطامطا تصلص
			تنوركعم
			تنمس
			تارسكما
			زراً
			تديصء
			هنيج

7. (FoodFood لك عبرملا ي لاء تملاع عضد) ؟حملما ي ف تضيفخنم وأ تملعترم هذين أ دقتعتل هـ

دكأتم ريغ	ليقة	ي لاء	
			تنوركعم
			تخوبطملا ايلوصافلا
			لسء
			زبخ
			قرح
			نمس

8. (FoodFood لك ددحاو تئاذي ف تملاع عضد) ؟نيتوربلا نم تضيفخنم وأ تيلاع تيسن هذين أ دقتعتل هـ

دكأتم ريغ	ليقة	ي لاء	
			تخرف
			تنمس
			تهكافلا
			رمحاً مح
			تخوبطملا ايلوصافلا
			هنيج

9. (FoodFood لك ددحاو تئاذي ف تملاع عضد) ؟تنوشخلا/ف ايلأاً نم تضيفخنم وأ تيلاع تيسن هذين أ دقتعتل هـ

دكأتم ريغ	ليقة	ي لاء	
-----------	------	-------	--

قرذلا قئافر			
زوم			
تضيي			
رمحاً محط			
تخوبطملا ايلوصافلا			
تارسكملا			

10. لكلا ءدحاو تئناخي في تملاع عضد؟ تءبشملا نوهدلا نم تءففخنم وأ تءللاع تءبسنى لء يوتحت تئنهءلا تءمعطلأا مءه نأ ءقتعتل هـ

FoodFood)

ءكأتم ريغ	ل يلق	ي لاء	
			ي فاصء بيلء
			تءءلا وكوشء
			ل يخنلا تيز
			رمحاً محط
			ن يءر سلا كمسء
			ن مسء

11. لور تسيلوكلا لء يوتحت لا نكلو نوهدلا نم ريئكلا لء تءمعطلأا ضعب يوتحت

() قفاوي

() قفاوم ريغ

() ءكأتم ريغ

12. ؟ تءهكافلا نم ءءعاسم تءبائمب لءملا ريغ تءهكافلا ريصء نم بوك ربئعيل هـ

() قفاوي

() قفاوم ريغ

() ءكأتم ريغ

13. ؟ مسءلا يلاء بيلحلا نم رئكأ مسءلا ل مأك بيلحلا بوك ي في نيتورب ءجويل هـ

() قفاوي

() قفاوم ريغ

() دكأتم ريغ

14. ؟دبزلانم لقا نوهدى لع عبشما ريغ ددعتما ن مسلا يوتحيل هـ

() قفاوي

() قفاوم ريغ

() ادكأتم تسلا

15. ؟نداعملوا تانيماتيفلا نم ددع ربكأ لى لع يوتحيل زبخلا هـ نم ي أ

() ضيبأ

() يند

() بويحلا لك

() دكأتم ريغ

16. ؟ي داعلما ن مسلا وأ دبزلانم ،تيرارحلا تارعلسا ي فى لى لعأ هنا دقتعت ي ذللا ام

() قفاوي

() قفاوم ريغ

() دكأتم ريغ

17. ؟مسدلا عوزنم بيلحلا نم رثكأ مسدلا لماك بيلحلا نم بوك ي ف مويسلاك دجويل هـ

() قفاوي

() قفاوم ريغ

() دكأتم ريغ

18. ؟ي فى سينر لكشب تعبشما ريغ ددعتما نوهدلا دجوت

() ي تابذ تيز

() نابلاأ تاجتتم

() دكأئررغ

Appendix IV: Introduction Letter



KENYA METHODIST UNIVERSITY

P. O. Box 267 Meru - 60200, Kenya
Tel: 254-064-30301/31229/30367/31171

Fax: 254-64-30162
Email: deanrd@kemu.ac.ke

DIRECTORATE OF POSTGRADUATE STUDIES

January 21, 2021

Commission Secretary,
National Commission for Science, Technology and Innovations,
P.O. Box 30623-00100,
NAIROBI.

Dear sir/ Madam,

RE: JOSEPH TONGUN CLEMENT (HND-3-0471-1/2017)

This is to confirm that the above named is a bona fide student of Kenya Methodist University, Department of Public Health, Human Nutrition and Dietetics undertaking a Degree of Master of Human Nutrition and dietetics. He is conducting research on 'Evaluation of the effect of nutritional education on dietary habits on adolescent girls (12-18 years) in Juba, South Sudan'.

We confirm that his Research proposal has been defended and approved by the University.

In this regard, we are requesting your office to issue a permit to enable him collect data for his research.

Any assistance accorded to him will be appreciated.

Thank you.



Dr. John Muchiri, PHD.
Director Postgraduate Studies

Appendix V: SERC Ethical Clearance



KENYA METHODIST UNIVERSITY

P. O. BOX 267 MERU - 60200, KENYA
TEL: 254-064-30301/31229/30367/31171

FAX: 254-64-30162
EMAIL: serc@kemu.ac.ke

December 14, 2020

KeMU/SERC/HND/42/2020

Joseph Tongun Clement
Kenya Methodist University

Dear Joseph,

SUBJECT: EVALUATION OF THE EFFECT OF NUTRITIONAL EDUCATION ON DIETARY HABITS ON ADOLESCENT GIRLS (12-18 YEARS) IN JUBA, SOUTH SUDAN

This is to inform you that Kenya Methodist University Scientific Ethics and Review Committee has reviewed and approved your above research proposal. Your application approval number is KeMU/SERC/HND/42/2020. The approval period is 14th December 2020 – 14th December 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 Kenya Methodist University Scientific Ethics and 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 KeMU SERC 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 KeMU SERC within 72 hours.
- V. Clearance for export of biological specimens must be obtained from relevant institutions.

VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal

VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU SERC.

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.



Appendix VI: Research Permit from the South Sudan Government

27/General Education
Plsc process & facilitate.
27/11/2020

GUDELE BLOCK (9) EXT
JUBA- SOUTH SUDAN
22nd NOV, 2020

DIRECTOR GENERAL,
DIRECTORATE OF RESEARCH
STATE MINISTRY OF GENERAL EDUCATION, SCIENCE AND
TECHNOLOGY.
CENTRAL EQUATORIA STATE, JUBA

Sir/Madam,

SUBJECT: Authorization letter for data collection in two Secondary Schools in Juba City, Central Equatoria State.

Research Title: **EVALUATION OF THE EFFECT OF NUTRITION EDUCATION ON DIETARY HABITS OF ADOLESCENT GIRLS (12-18 YEARS) IN JUBA, SOUTH SUDAN.**

Dear Sir/Madam,

I am hereby submitting the above cited subject in question under your kind office for consideration. I am a M.Sc. Student at Kenya Methodist University in Nairobi since 2017 in the school of Medicine and Health Sciences department of Public Health Human Nutrition and dietetics. I have done with the course work of the program and I am left with the research part. I carried out my internship with the Ministry of Health at Al Saba children Hospital in 2018 - 2019 and it is time now for me to carry out the data collection in the Secondary Schools in Juba in which I won't do so without your authorization. With your approval letter, permission will be sought from the headmasters of the schools to approve data collection. A written informed consent will be sought from the students and caregivers before any information is sought from them. The data will be treated with confidentiality and used solely for academic purposes and not any other purpose.


I will appreciate your understanding and support. Waiting to hear from you soon.

Attached: SMoH and KeMU Recommendation letters for your cross- through

Regards

Joseph Tongun Clement
MSc Public Health Human Nutrition and Dietetics
Kenya Methodist University, Nairobi -Kenya
School of Medicine and Health Sciences
E-mail: jtongun83@gmail.com
Tel: +211927100003/+211915763559

II- H/Teacher/ Chinese
Friendship Sec. School
For your attention and
cordial facilitation, please
27/11/2020



Appendix XIII: Grammar Score

A: The first 60 pages

General metrics

82,893	12,027	915	48 min 6 sec	1 hr 32 min
characters	words	sentences	reading time	speaking time

Writing Issues

 No issues found

Plagiarism



B: The rest of Pages

General metrics

67,016	10,045	975	40 min 10 sec	1 hr 17 min
characters	words	sentences	reading time	speaking time

Score



99

This text scores better than 99% of all texts checked by Grammarly

Writing Issues

3 Issues left	 Critical	3 Advanced
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Appendix IX: External Grammar Editorial Certificate

PRIME EDUCATIONAL CONSULT	
<i>For editing, proofreading, grammar checking, linguistic analysis, and translations.</i>	
NO PEC029	<div>CERTIFICATE OF THESIS EDITING</div>
It is certified that professional editors edited the manuscript listed below at Prime Educational Consult for accuracy of the English language, format, and grammar use	
THESIS TITLE	
THE IMPACT OF NUTRITION EDUCATION ON THE DIETARY HABITS OF ADOLESCENT GIRLS (12-18 YEARS) IN JUBA, SOUTH SUDAN	
AUTHOR	
JOSEPH TONGUN CLEMENT	
	<div>23 Date 2023</div> <div><div>Signature</div><div>Dr. Oscar Ayofemi Obi, Ph.D Email: oscaraobi@yahoo.com Tel: +256753049708</div></div>
This Certificate is generated and verified by Prime Educational Consult and attested by Dr. Oscar Ayofemi Obi, Ph.D. in English Language, that the editor kept the ideas and aim of the researcher the same. The University can refer to the Certificate to ensure the quality check of the thesis is ready for publication.	

Appendix X: Study Site

