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Submitted in partial requirements

for HUEC 3012

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The University of the West Indies

Title: Eating Practices and Nutrition Knowledge among University Students

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Department of Agricultural Economics & Extension
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EATING PRACTICES AND NUTRITION KNOWLEDGE AMONG UNIVERSITY STUDENTS

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ABSTRACT

Background: The unhealthy eating practices of university students contribute to increasing their susceptibility to non-communicable diseases (NCD). Nutrition knowledge is very important in that aspect and can empower students to make informed dietary choices. Hence, the purpose of this study is to compare the eating practices and nutrition knowledge among university students.

Method: A cross-sectional survey of 196 students was randomly selected from the University of the West Indies, St. Augustine Campus. Students were approached and asked to complete a questionnaire that included questions on their eating practices, nutrition knowledge and demographics. Eating practices and nutrition knowledge were analyzed using the Statistical Package for Social Sciences (SPSS) Software, version 17.0.

Results: The questionnaire was completed by 196 university students (39.8 % male and 60.2 % female). The majority of students were ranked as having excellent knowledge (>8 out of 10) which was indicative of their nutrition knowledge score for that section. There was a significant difference in the mean nutrition knowledge score between males and females whose response was either yes or no to taking a course in nutrition (p-value- 0.008; mean – 2.58 ±.577; 2.44 ±.545). Students were aware of the number of food groups and foods that must be consumed the least in the diet however, 76. 9 % (n=150) students were unaware of the food that must be consumed the most in the diet. Additionally, a total of 133 students (67.9 %) answered incorrectly to protein being the main source of energy. The majority of the students in the study (91.4 %) reported consuming fast-food while a significant difference was observed in the fast-food consumption of local and regional students (p-value- 0.006; mean-1.96 ± .207; 1.80 ±.401).

Conclusions: The current study has revealed that students of the University of the West Indies have excellent nutrition knowledge, but eating practices do not reflect such knowledge.

Keywords: Nutrition knowledge, Eating practices and University students

INTRODUCTION

1.1 Background

Nutrition education is one of the important aspects of nutrition knowledge; it plays an important role in raising awareness with the hope of improving the health of society (Harvey-Berino 1997). In recent years an increased incidence of major diseases such as type-2-diabetes, obesity, hypertension, cardiovascular diseases and cancer has called for a more stringent approach to nutrition education. Educating individuals with nutrition related knowledge empowers them to make more informed dietary choices leading to a more reformed, food-conscious society (Barzegari 2011). Eating practices of university students can improve significantly only if they utilize the acquired nutritional knowledge in making healthier food choices to combat the incidence of non-communicable diseases (NCD). University students are at that juncture in their lives, where they may move away from home to different countries to attend university. This transition takes a toll on their health and well-being; since they, themselves will be preparing their own meals. Difficulties may arise in this respect as student grapple with meal preparation, class attendance and adjusting to living on their own and to their new surroundings.

The fast-food market influences and affects the eating habits of university students because fast foods are tasty, readily available, cost –effective and convenient. In this regard, nutritional knowledge may act as a deterrent against fast – food trends (Yahia 2008). Many university students who have the nutrition based knowledge however, do not apply this knowledge to their eating behaviors. A survey conducted on eating trends of consumers in America found that one quarter of the respondents were knowledgeable as it relates to nutrition also they knew what foods to eat whereas the remainder of the study group fell into two categories; they either do not want to be bothered or they know what to do but do not have the will power to follow through (Blazer 1997). Nutrition knowledge alone should be enough to remedy eating practices of university students sufficiently leading to a much healthier lifestyle however, ingrained habits held are difficult to break and as such nutrition knowledge is not fully utilized. Hence, the main objective of this study is to compare eating practices and nutrition knowledge of university students.

1.2 Rationale and Statement of problem

Nutritional knowledge is a key factor in promoting healthier eating practices. The presence or absence of diseases increases nutrition knowledge which may cause an improvement in eating practices. The extent to which university students are knowledgeable about nutrition and therefore utilize their knowledge is unknown. This study seeks to compare eating practices and nutritional knowledge of university students.

1.3 Research Question

To what extent does nutrition related knowledge influence eating practices of university students?

1.4 Objectives

- To evaluate university students knowledge of nutrition.
- To assess eating practices of the university students.
- To identify differences in nutrition knowledge and eating practices in relation to gender.
- To identify the factors preventing regular consumption of breakfast, lunch and evening meal.
- To identify the factors that influence fast-food consumption among university students.
- To evaluate the frequency of consuming foods from the different food groups.
- To identify differences in nutrition knowledge among students in relation to taking previous course in nutrition.
- To identify differences in nutrition knowledge among students in relation to their country of residence.
- To identify the number of university students who took previous nutrition course.

1.5 Hypothesis

- There is no gender difference in relation to the consumption of breakfast, lunch or evening meals
- There is no gender difference in relation to correct and incorrect responses to each nutritional knowledge question.
- There is no gender difference in relation to overall nutrition knowledge score.
- There is no difference in eating practices based on country of residence (local, regional and international) and those students taking a previous course in nutrition.

- There is no difference in fast food consumption among university student with respect to their country of residence (local, regional and international).
- There is no difference in fast-food consumption in relation to gender (males and females).

LITERATURE REVIEW

Nutrition knowledge promotes healthy eating practices thus preventing the development of non-communicable diseases (NCD) such as type 2 diabetes, obesity, stroke and cardiovascular diseases. Studies show that insufficient nutrition knowledge and not maintaining a healthy diet results in issues such as health problems, overweight and obesity (Harvey-Berino et al 1997). Kruger et al (2002) also believes that nutrition knowledge is an important factor which should be reflected in the form of healthy eating practices. All through university life, poor eating practices are a major health concern among university students; eating practices such as over consumption of fast-foods, salt and sugar, snacking, skipping meals especially breakfast, and lack of fiber in the diet however, predispose students to non-communicable diseases (NCD). At the same time, nutritional principles learnt and practiced at home would be foregone during this period because of exposure to barriers such as lack of time, stress and lack of income which may pose a problem for students in adopting and initiating healthier eating practices.

Eating practices of university students has been a common area of study among researchers; this undertaking has been in an effort to highlight the many factors that affect eating habits of university students during this vulnerable period of their life. Numerous studies conducted on university students and their various dietary patterns; categorized their diets as unhealthy, minimal in fruits and vegetables with meal pattern irregularity and a high selection of fast food (Soriano 2000; Mammas 2004; Irazusta 2007; Nicklas 2001). Although, skipping meals especially breakfast was a major finding in several studies concerning eating practices of university students; nonetheless, numerous researchers found high rates of daily breakfast consumption among university students accounting for more than half the study population (Anuar and Ghazali 2011; Yahia et al 2008; Ganasegeran et al 2012).

Indeed, students leaving their parental homes to study abroad at various universities may be confronted with many challenges influencing their eating practices thus, deterring them from maintaining previously

held convictions about their diet. For instance, Ansari, Stock and Milkolajczyk (2012) found that habits towards nutrition among university students in four European countries differ across country and sex, thus concluding that students living home displayed healthier nutrition related habits. Also, a study conducted among university students in Greece living away from home; discovered that students decreased their consumption of fresh fruits, cooked and raw vegetables, and fish, thus increasing in their sugar and fast food content of their diet (Papadaki et al 2007). Hence, this study concluded that students residing away from their parental homes have developed undesirable eating habits compared to students living at home (Papadaki et al 2007). In addition, other studies have identified an increase in practices such as snacking, sugar, salt, wine, alcohol and fast food intake among university students living away from home (Kızıltan 2005; Turconi 2008; Mazıcıoğlu 2003). On the contrary, Jaworowska and Grezgorz (2007) found a decreased percentage of energy consumption from total fat whereas an increased consumption of energy from carbohydrate among Polish students living away from their homes as opposed to their counterparts still residing with their parents.

University students perform unhealthy eating practices including skipping breakfast, snacking between meals, low fruit and vegetable intake and excessive fast-food consumption; these and many other factors elicit a negative effect on health and well-being. According to the WHO (2011) it was indicated that increased intake of energy dense foods such as foods high in fat, salt and sugar, but low in vitamins, minerals and other macro nutrients is a growing worldwide concern with a high prevalence among students. A study of male and female college students revealed that 80% of the students snack at least once per day also, performing frequent skipping of meals (Huang et al 1994). Galore (1993), conducted a study on the typical eating habits of university students, thus concluding that students attending university do not follow healthy dietary patterns, also inferred was the tendency to select energy dense foods high in fat and low in fruits and vegetables. Additionally, in a study conducted by the Oregon State University investigating the eating habits of 582 college student; the research discovered that among male and female students, both groups did not consume an adequate amount of fruits and vegetables (Li et al 2011).

Male students reported having five serving per week slightly higher than female students, who reported eating at least four serving per week, thus concluding that male students consumed slightly higher amounts of fruit and vegetable servings per week (Li et al 2011). Moreover, Albolfotouh (2007) agree that college students practice poor eating habits such as; skipping meals, minimal consumption of fish, fruits and vegetables with a preference towards high fat, sugary and salty foods. In contrast however, a study of 660 French university students, healthy food practices were observed such as increased consumption of fruits and fiber and a high avoidance of foods with fat. Also demonstrated was a reduced amount of snacking and a regular consumption of breakfast (Monneuse, Bellisle and Koppert 1997); therefore suggesting that the eating practices of French university students were consistent with dietary recommendations established during the study (Monneuse, Bellisle and Koppert 1997).

Indeed, eating practices and nutrition knowledge must work in unison so that food selection, meal regularity and serving sizes reflect proper dietary habits in accordance with recommended dietary guidelines. For instance, Sakamaki et al (2005) conducted a study examining food habits and nutrition knowledge of Chinese university students thus concluding that nutrition knowledge has a positive effect on eating habits. A study of 16,000 European students highlighted an association between nutrition knowledge and healthy eating habits (Wardle et al 1997). Likewise, Zawila, Steib and Hoogenboom (2003) research assessing nutrition knowledge and attitudes of female collegiate cross-country runners, acknowledges that students' attitude towards nutrition was positively related to their level of nutrition related knowledge.

Nutrition information is widely available from a range of sources since the upsurge in the prevalence of non-communicable diseases (NCD) and also some personal desires to practice healthier lifestyles. Davy, Benes and Driskell (2006) inform that the most frequent medium used by university student to obtain nutrition education include television, magazines, newspapers, radio, family and friends, books, websites, doctors and school. As information is more accessible university student should be aware of nutritional

principles and the constituents of a healthy diet but no application of these principles is visible in their daily meal selection. In a research, Sakamaki (2005) implies that although (85.5%) of students were aware of nutritional concepts and what constitutes a nutritionally balanced food; only (7%) apply these concepts when selecting foods from a menu. While this is true, Park and Kim (2005) validated the effects of a nutrition lecture on eating habits of university students; specifically, highlighting that students' increased their meal regularity and reduce their level of smoking after the nutrition lecture hence, inferring that a positive relationship existed between nutrition knowledge and eating habits (Park and Kim 2005).

Nutrition knowledge and principles should definitely be utilized when making dietary choices and must be reflected in proper eating practices. Increased nutrition knowledge with the subsequent application of this said knowledge, will allow students to practice healthier eating habits thus making informed dietary choices for a better nutritional status. Numerous studies have conveyed that students fail to prioritize nutrition in food selection and are uninformed about dietary guidelines because of their various misapprehensions (Fredrick 1992; Mitchell 1990; Jacobson 2001). Hence, The American Dietetic Association indicates that no relationship is present between nutritional knowledge and eating habits and this finding is consistent with the beliefs and understanding of individuals that the role of diet in health is superficial. Conversely, Kolodinsky et al (2007) found a positive relationship existing between increased knowledge of dietary guidelines and more healthy eating practices thus concluding that college students with increased knowledge about nutrition are healthier eaters.

In a study of dietary intake and nutrition knowledge of students at the University of Chester in the United Kingdom (UK), it was determined that although students were aware of nutritional guidance from professionals, the impact of the relationship between diet and diseases was not quite understood (Fazakerley 2006). Broccia et al (2008) studied the nutrition knowledge of university students in Sardinia and Corsica and concluded that students of Sardinia were more aware of the nutrient sources and the

association between diet and disease, while students of Corsica scored higher on the section of the questionnaire related to reducing fat, salt and sugar in the diet with various foods.

Obviously, fast-foods consist mainly of saturated and trans-fats, sodium and sugar, and are a preferred choice for many university students. According to WHO (2003) consumption of fast-food frequently is a major health concern because fast-foods contain saturated and trans fats, sodium and simple carbohydrate- all of which are mediators of non-communicable diseases (NCD) such as hypertension, type 2 diabetes and cardiovascular diseases. Numerous studies were conducted regarding reasons for college students' excessive fast-food consumption; factors highlighted were menu choices, cost, availability, convenience and taste (Driskell 2005; Davy, Benes and Driskell 2006; Sneed 1991). In addition, a study conducted among college students revealed that a large percentage indicated that fast-food were consumed because of the perceived economic value derived from its procurement and consumption (Morse and Driskell 2009). Although fast-foods consumed by university students may contribute minimal nutrients however, the eating practices of students still do not deliver the recommended amount for the various food groups (Morse and Driskell 2009; Dinger 1997).

Apart from foods with increased fat, sodium and sugar, an increasing trend over the last few years observed among fast-food restaurants was the inclusion of food containing less energy and fat as part of their menu (Morse and Driskell 2009). Nevertheless, students fail to select a variety of items from fast-food menu to constitute a healthy diet. For instance, a study examining fast-food consumption and attitude towards healthier fast-food options among 344 college students; found that the students consume fast-food frequently and are willing to spend more, and as a result would not select nutrient –dense options (Haines, O'Neil and Zanovec 2010). Fast-foods being readily-available have been attributed to the prevalence of fast-food consumption more than three times per week. Likewise, in a study of the prevalence of fast-foods among college students, it was discovered that meals consumed at fast-food restaurants occurred 1-3 times per week (Morse and Driskell 2009). Essentially, high risk for overweight

or obesity, increased total energy intake, sweetened beverages and fat; but low intake of healthy foods are associated with the availability of fast-foods (Hakim, Muniandy and Danish 2012). Paeratakul et al (2003) , implied that fast-food consumption encourages soda intake and is linked to a minimal intake of milk , fruits and vegetables among adults and teenagers. Furthermore, in agreement several researchers have establish that an association exists between fast-food consumption and an insufficient intake of fruits and vegetables (Astrup 2005; Pereira et al 2005; Jeffery et al 2006; Fraser et al 2011).

In context of eating practices, numerous studies have established that among university students sub-optimal consumption of fruits and vegetables, snacking, irregular meal pattern, over consumption of fast foods and a variety-limited diet is customary among students. These poor eating practices may have a profound impact on their health and well-being predisposing students to non-communicable diseases (NCD). Hence, providing nutrition information is a good strategy to employ in improving nutritional knowledge of students thus empowering them to make informed dietary choices.

METHODOLOGY

3.1 Participants

The target population of this study consisted of students from the University of the West Indies, St. Augustine campus, Trinidad. The sample size for the study was calculated using the precision of the study equation - ($Z_2 = p\ q/\ d^2$), after which a final sample size of 196 students was determined to participate in this study.

3.2 Study Design

The study was a cross-sectional descriptive survey aimed at comparing the eating practices and nutrition knowledge among university students of the University of West Indies. Each questionnaire was codified to identify the responses of each participant based on the assigned code, to increase the confidentiality of the responses received and to improve the response rate of the participants.

The self-administered questionnaire consisted of three sections: eating practices, nutrition knowledge and demographics. The section on eating practices consisted of eight questions, requiring the students to identify how often particular food items were consumed, regularity of meal consumption, snacking, and fast food consumption and reasons for consuming fast foods.

The nutrition knowledge section was constructed with the intentions of testing the level of nutrition knowledge for each student; supplying basic nutritional statements for which a response based on agreement to the statement was required. This section contained four questions examining knowledge about the food groups, foods that should be consumed the most and least in the diet , and also general statements about nutrition. Finally, the demographic section required the students to answer questions about gender, country of residence and prior nutrition knowledge.

For the purpose of assessing the nutritional knowledge and calculating students' scores, the knowledge section in the questionnaire was given a total score of 10 and each score was ranged accordingly: Poor (1 – 4 out of 10); Good (5 – 7 out of 10) and Excellent (> 8 out of 10). The scored nutrition knowledge

was used to compare nutrition knowledge with respects to gender, country of residence and taking a course in nutrition.

3.3 Pilot Study

A draft questionnaire was distributed to ten students from the University of the West Indies; the comments were used to alter the final questionnaire. The purpose of the pilot study was to detect any error and restrictions that might have occurred during the formulation of the questionnaire. For instance, the responses from the pilot study revealed that a few questions in both the knowledge and eating practices sections were unclear and needed rephrasing. Also, questions from section one requesting a frequency of how often the various foods from the food groups were eaten; were compiled into a table to reduce the time spent answering each individual question.

3.4 Procedure

The participants were recruited using systematic random sampling, throughout the University of the West Indies, St. Augustine campus. The questionnaires were distributed in the areas of the campus where most students were situated for instance in the Students Activity Center (SAC), Learning Resources Center (LRC) on the greens, Food court, Frank Stockdale, Dudley Huggins and Engineering undercroft. The students were approached requesting their voluntary participation in the study. After giving assent to participate in the study; each student was given a questionnaire and subsequently advised to read the cover letter before proceeding to answer the questions. Also, the students were assured that the data collected would be confidential and were told the measures instituted to achieve this.

3.5 Data Analysis

The data obtained in this study was quantitative, nominal and ordinal data analyzed using the Statistical Package for the Social Sciences (SPSS) Software, version 17.0. Data analysis comprised of descriptive statistics such as frequencies and percentages and inferential statistics (chi square, and ANOVA). Additionally, independent-sample t test was used to evaluate the difference in mean nutrition knowledge score with respect to gender, country of residence and those who responded yes or no to taking a previous course in nutrition. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

4.1 Demographic characteristics of the university students

A total of 196 university students completed the questionnaire, 60.2 % females (n= 118) and 39.8% males (n=78). Based on the country of residence the majority of the participants were local 68.9 % (n= 135), and the remainder of the participants were regional 20.9% (n= 41) and international 10.2% (n=20). Majority of the participants 63.8 % (n=125) reported not taking a previous course in nutrition however, the remainder of the participants 36.2% (n=71) took a course in nutrition. **Table 1** summarizes the demographic data.

Table1: Shows demographic characteristics of the university students

Demographic characteristics	N	Percent (%)
Gender		
Male	78	39.8
Female	118	59.9
Country of residence		
Local	135	68.8
Regional	41	20.9
International	20	10.2
Course in Nutrition		
Yes	24	12.2
Males	47	24.0
Females		
Total	71	36.2
No		
Males	54	27.6
Females	71	36.2
Total	125	63.8

4.1.1 Eating Practices

4.1.2 Frequency of meal consumption

The frequency of meal consumption among university students were assessed to evaluate their eating practices as it relates to the regularity of consuming meals. **Figure 1** shows the percentage of students who consume breakfast, lunch and evening meal in the study. 41.3% (n=81) of the students reported eating breakfast daily; while 66.8% (n=131) and 65.8% (n=129) reported consuming lunch and evening meal respectively.

Independent sample t-test was used to analyze the mean difference in consumption of breakfast, lunch and evening meal among males and females in the study. **Table 2** shows the means differences in breakfast, lunch and dinner consumption based on gender and their corresponding F and p-values. Observed was a significant difference in the variances (F-test – 4.056; p-value – 0.45) between males and females however, the p-value for the equality of means t-test (p-value – .133) was not significant.

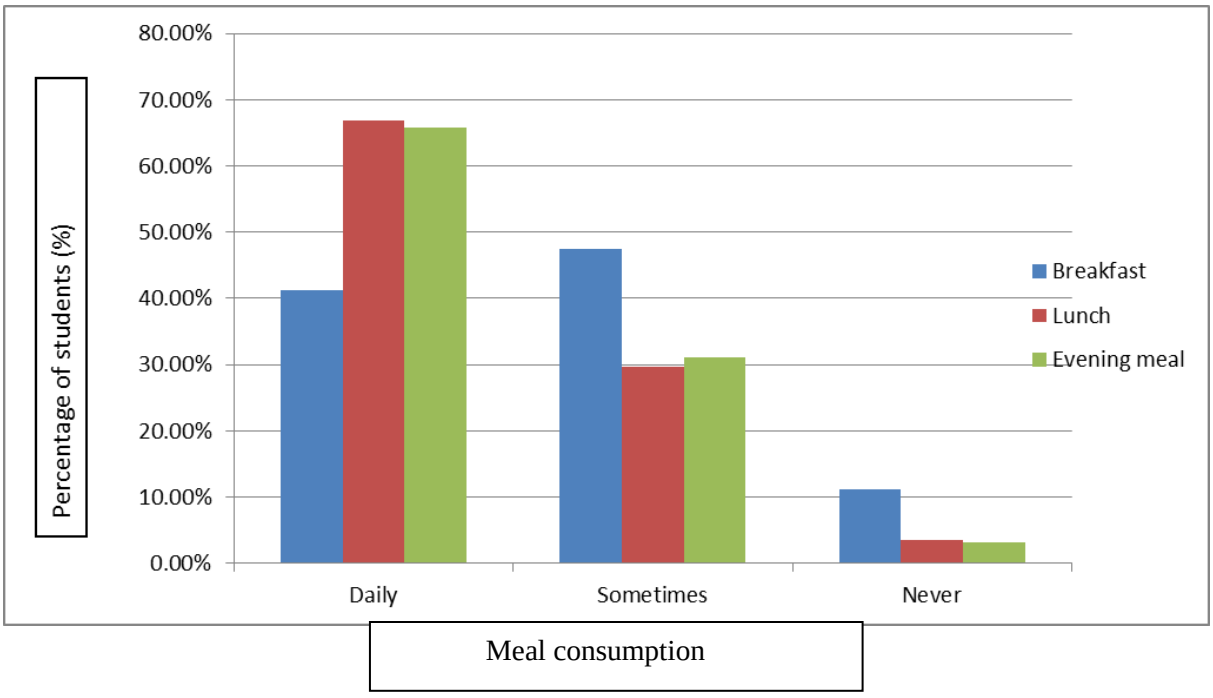

Figure 1: Graph showing percentages of students consuming meal: daily, sometimes and/or never.

Table 2: T-test of mean differences in meal consumption for males and females

Meals	Males Mean (SD)	Females Mean (SD)	p-value
Breakfast	1.73 ± .6.96	1.68 ±.639	.585
Lunch	1.29 ±.537	1.42 ± .560	.133
Evening meals	1.38 ± .586	1.36 ± .517	.800

4.1.3 Factors preventing regular meal consumption

Figure 2 shows the factors students selected which prevented them from consuming breakfast, lunch and evening meals. The majority of the students in the study reported lack of time as their reason for not consuming breakfast daily accounting for 50.5% (n=99) while, 20.4% (n= 40) and 9.2 % (n=18) stated that lack of time, prevented the consumption of lunch and evening meals respectively. The other factors such as insufficient income and dieting marginally affected the consumption of breakfast, lunch and evening meals.

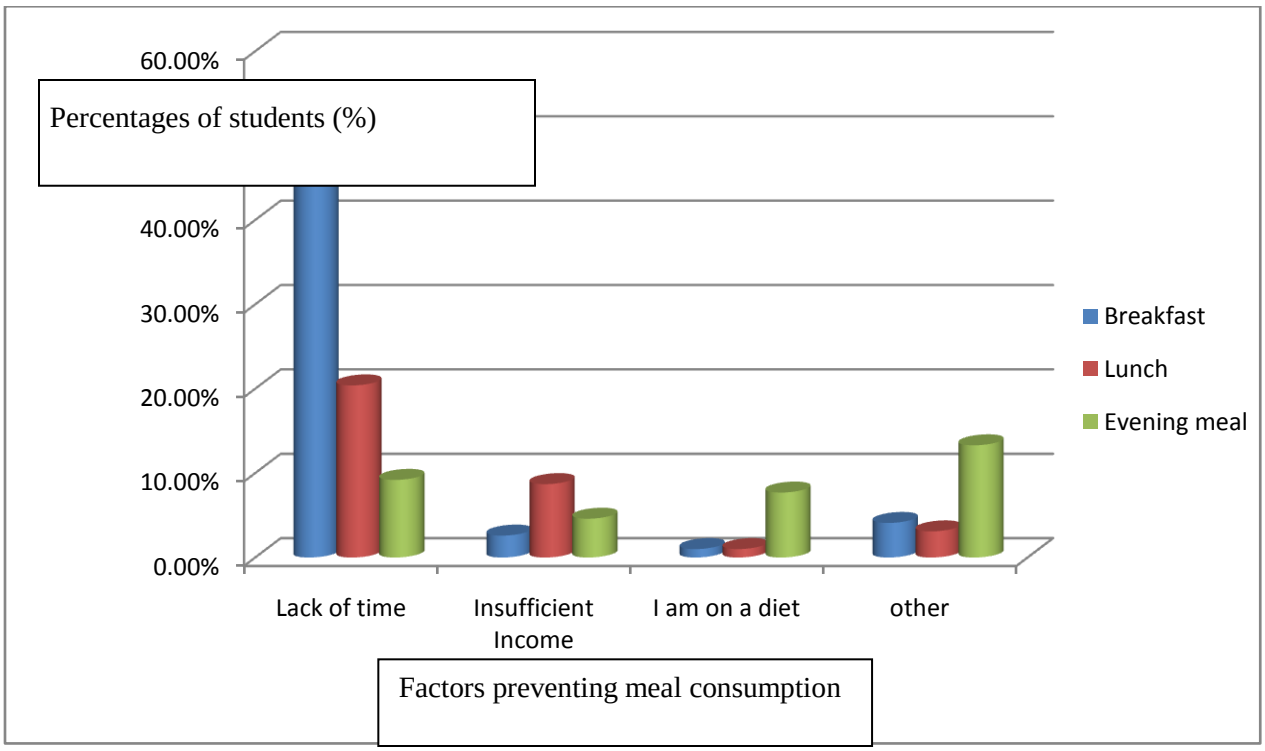

Figure 2: Graph showing factors preventing the consumption of meals

4.1.4 Frequency of snacking between meals.

Figure 3 provides the percentage of students snacking between and after meals. 42.9 % (n= 84), 45.6 % (n=89) and 30.8% (n=60) reported consuming snacks daily between breakfast and lunch; lunch and evening meals and after evening meals respectively. Students consuming snacks rarely between breakfast and lunch; lunch and evening meals and after evening meals were 41.8 % (n=82), 40.0 % (n= 78), 50.8 % (n= 99) respectively.

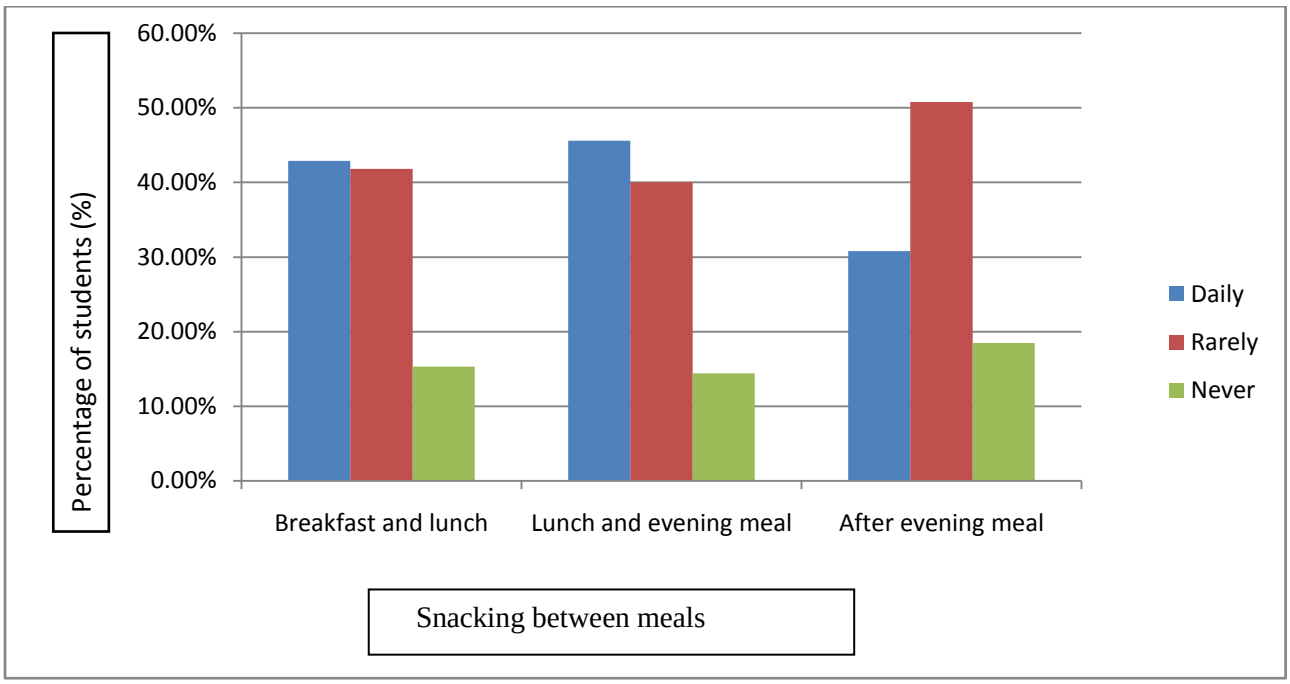

Figure 3: Graph showing the percentage of students consuming snacks between meals

4.1.5 Snacks consumed between meals

Figure 4 shows the percentage of students selecting the various snack options consumed between meals in the questionnaire. The majority of student reported consuming fruits 47.4 % (n= 93), pastries 45.9 % (n = 90), potato chips and corn curls 33.7 % (n = 66), yogurt 27.0 % (n= 53) while the remainder stated consuming other snacks 24.5 % (n= 48).

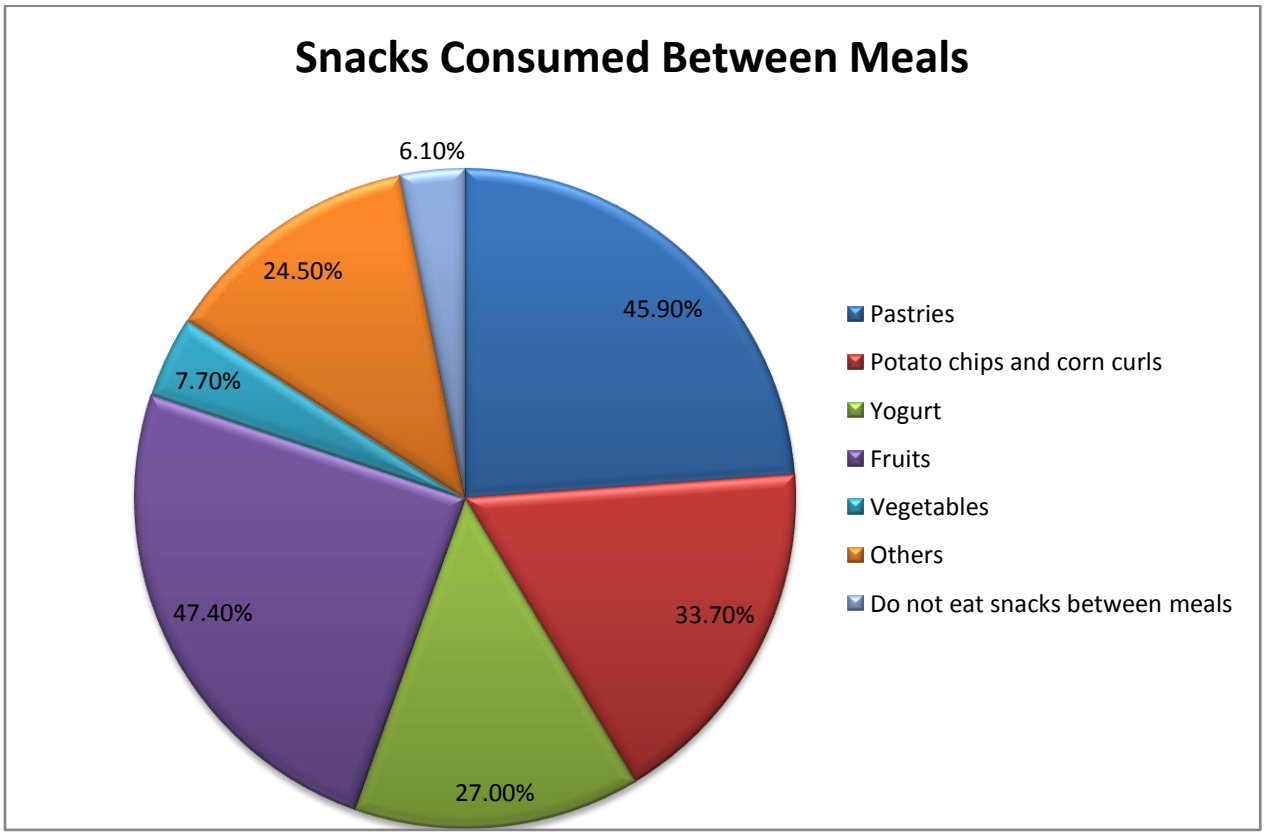

Figure 4: Chart showing snacks consumed between meals

4.1.6 Consumption of foods from the foods groups

Figure 5 displays frequency of consuming foods from the various food groups. 54.1 % (n= 106) and 32.7 % (n= 64) students indicated they consumed food from the bread, cereals, pasta, rice and ground provision group always and often respectively. In relation to the consumption of fruits students reported consuming sometimes and often accounting for 44.9% (n= 88) and 36.2% (n= 71) respectively. 43.4 % (n= 85) and 34.7% (n= 68) consumed beans, peas, seeds and nuts often and sometimes respectively. Moreover, in relation to the frequency of consuming foods from the meat, poultry, fish and dairy group students reported consumption as always 59.2% (n = 116) which accounted for the majority while, 31.1 % (n = 61) reported consuming often. Lastly, 42.9 % (n= 84) and 29.6% (n=58) consumed butter, margarine, shortening, coconut milk, cooking and salad oils sometimes and often respectively.

Eating practices of the students were compared based on taking a previous course in nutrition. Analysis results from independent sample t-test showed significant difference in eating practices for consuming fruits (p-value- 0.036) and meats, poultry, fish and dairy products (p-value- 0.012) among students who took course previously in nutrition.

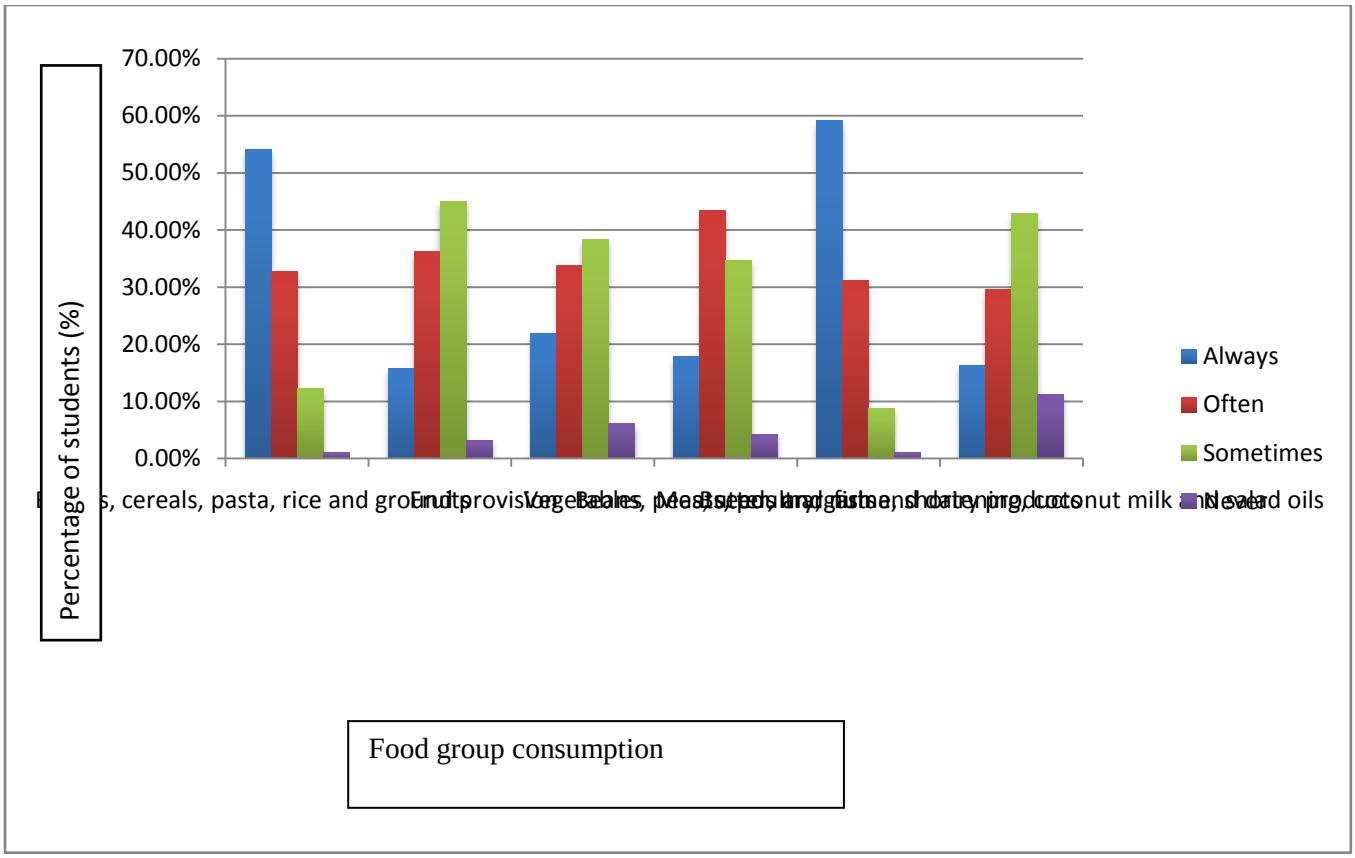

Figure 5: Frequency of consuming foods from the food groups

4.1.7Fast-food consumption

Results on the frequency of eating fast-food showed that students reported eating fast-food: daily 10.7 % (n = 21), once per week 26.0 % (n= 51), twice per week 24.0 % (n= 47) and other. Other accounting for the majority 39.3 % (n=77) (**Figures 6, 7**). A one way ANOVA was used to analyze the data on mean difference in fast-food consumption among student of the different country of residence (F-value – 4.983, p- value 0.008) was done. A significant difference in fast-food consumption was observed between local and regional students (p-value – 0.006) (**Table 3**).

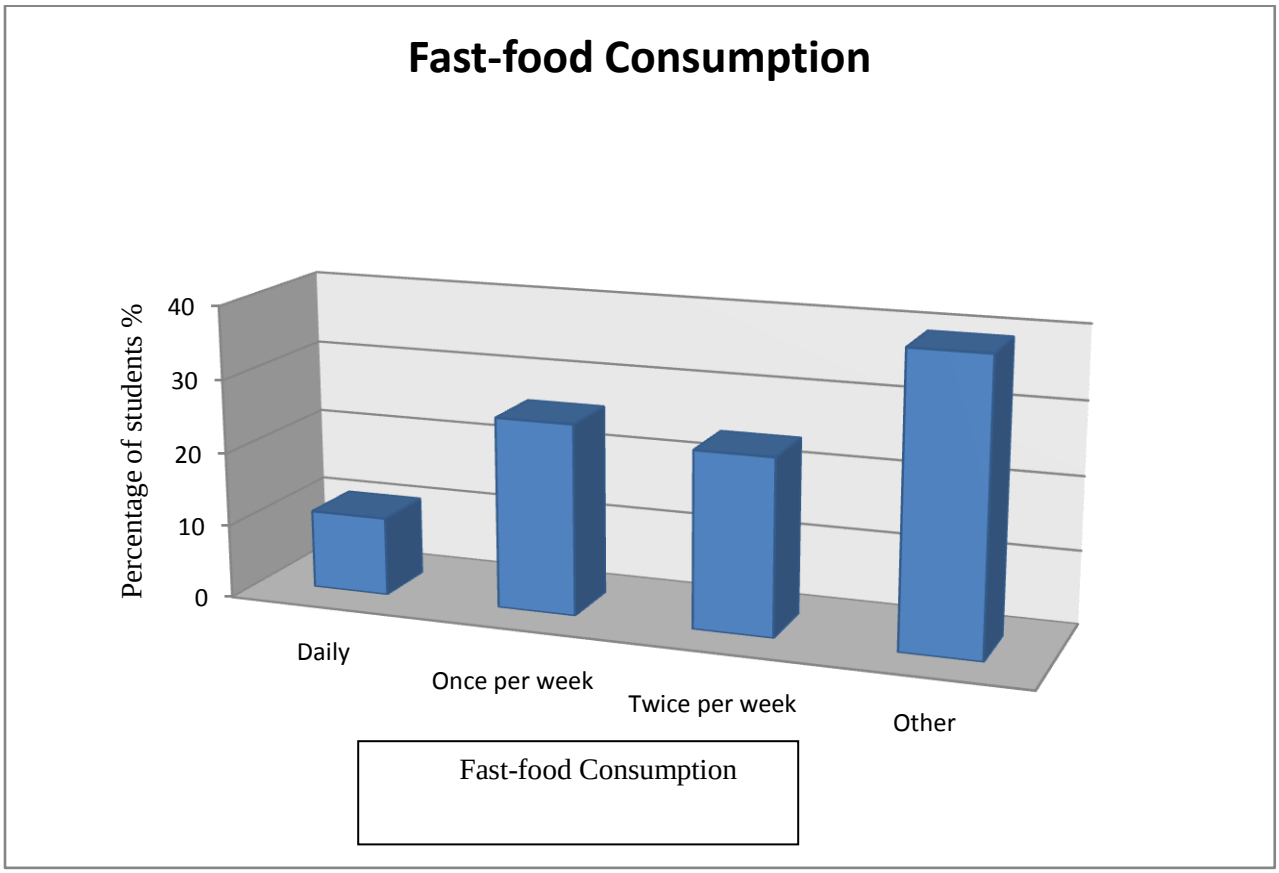

Figure 6: **Graph showing percentage of students and fast-food consumption**

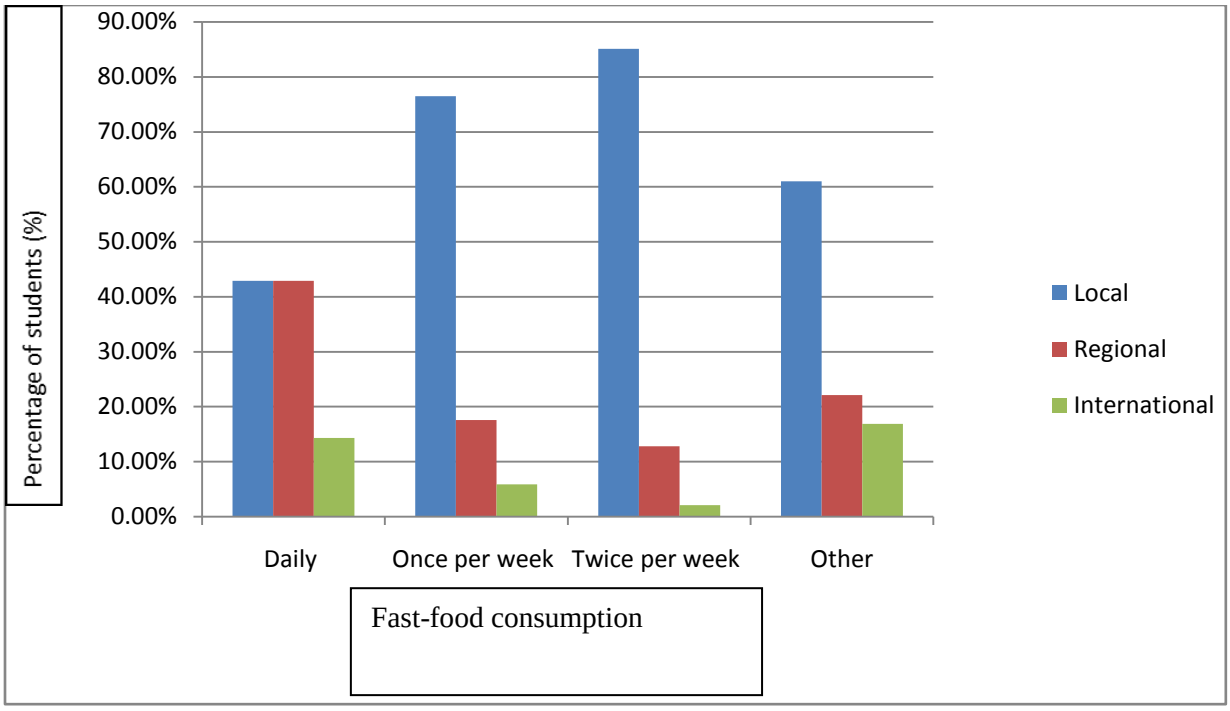

Figure 7: Graph showing students fast-food consumption vs. country of residence.

Table 3: Shows mean fast-food consumption among the country of residence

Country of Residence	Mean (SD)	Mean difference	p-value
Local and Regional	1.96 ± .207 1.80 ±.401	.151	.006
Regional and International	1.80 ±.401 1.90 ± .308	- 0.095	.399
Local and International	1.96 ± .207 1.90 ± .308	0.056	.665

4.1.8 Reason for fast-food consumption

Figure 8 presents the various reasons selected by university students for consuming fast-foods and the associated percentage of students selecting the mentioned reasons. 61.2% (n= 120), 30.6% (n= 60) and 29.1 % (n= 57) choose fast-food because of convenience, taste and availability respectively.

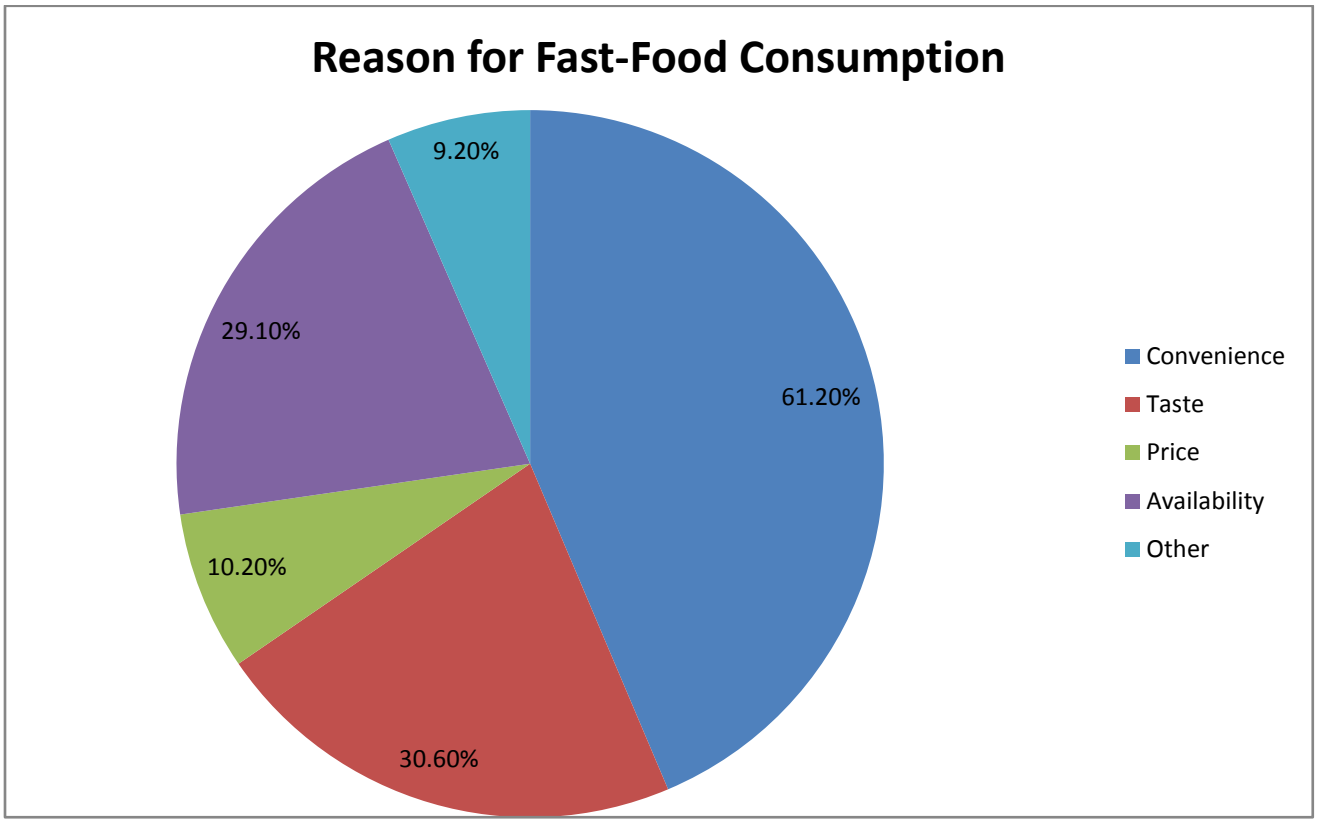

Figure 8: Graph showing reasons for fast-food consumption

4.2 Nutrition knowledge

4.2.1 Students' nutritional knowledge

From the total of 196 students, 102 scored more than 8 out of 10 which reflects excellent knowledge and only 6 students scored less than 4 - poor nutrition knowledge **(Table 4).**

The majority of students (63.3 %) knew the number of food groups and that butter, margarine, shortening, coconut milk, cooking and salad oils should be consumed the least in the diet accounting for (92.8 %). However, the majority of students (76.9 %) and (67.9 %) did not know that breads, cereals, rice, pasta and ground provision should be eaten the most and that proteins is not a major source of energy for the body respectively **(Table 5**).

Nutritional knowledge between students based on a previous course taken in nutrition was analyzed. Independent sample t- test showed no significant difference in scored nutrition knowledge between students who reported yes or no to taking a previous course in nutrition indicating a (p-value- 0.098) but, significant difference in interactions between students' gender and taking a previous course in nutrition (p-value 0.008; mean – 2.58 ±.577; 2.44 ±.545). Conversely, showed was no significant difference in mean nutrition knowledge between male and female students (p-value 0.175; mean – 2.42 ± .593; 2.53 ± .534). In relation to local, regional and international students and their nutritional knowledge; no significant difference in the mean nutritional knowledge was observed (p-value .743; mean – 2.50 ± .531; 249 ± .637; 2.40 ± .598) respectively.

Table 4: Shows the number of students in each nutrition knowledge group

Nutrition Knowledge	Number of Students
Poor (1 – 4 out of 10)	**6**
Good (5 – 7 out of 10)	**88**
Excellent (> 8 out of 10)	**102**

Table 5: T-test of mean differences for students' correct and incorrect responses to nutrition knowledge questions.

Questions	Correct %	Incorrect %	Males M±(SD)	Females M ± (SD)	P-value
How many food groups are there?	63.3 % (n= 124)	36.7 % (n= 72)	.50± .503	.72 ±.503	0.002
Which of the following group of foods should be consumed the most in the diet?	23.1 % (n= 45)	76.9 % (n= 150)	.15 ± .363	.28 ± .451	0.033
Which of the following group of foods should be consumed the least in the diet?	92.8 % (n= 180)	7.2 % (n= 14)	.90 ±.305	.93 ±.252	.387
Fat free foods are foods free from energy	77.0 % (n=151)	23 % (n=45)	.74 ±.439	.79 ±.410	.471
A high fiber diet is essential for good bowel functions.	96.9% (n=190)	3.1% (n=6)	.95 ± .222	.98 ±.130	.220
Excessive consumption of empty calorie foods (baked products, jams, jellies, sweetened fruit juices and ice cream) can have a positive effect on health.	86.2% (n=169)	13.8% (n= 27)	.86 ±.350	.86 ±.344	.915
Fruits and vegetables in the diet provide vitamins, minerals, water and fiber.	99.0 % (n= 194)	1.0 % (n= 2)	.99 ±.113	.99 ± .092	.768

Skipping meals is acceptable for quick weight loss.	83.7 % (n=164)	16.3 % (n= 32)	.78 ±.416	.87 ±.335	.108
Proteins (meats, poultry, dairy products, peas, beans and nuts) are a main source of energy for the body.	32.1 % (n=63)	67.9 % (n=133)	.41 ±.495	.26 ±.442	.035
Milk and milk products are the best sources of calcium	89.8 % (n= 176)	10.2 % (n=20)	.88 ±.322	.91 ± .292	.618

DISCUSSION

The purpose of the study was to evaluate the eating practices and nutrition knowledge of university students. As a result eating practices were analyzed based on the regularity of eating meals, frequency of snacking, consumption of fast-foods and the various foods from the food groups. In the study, less than half of the students (41.3 %) reported having breakfast daily but, (66. 8 %) and (65.8 %), had lunch and evening meals daily. This finding was relatively lower in another study evaluating the eating habits of Lebanese university students; 32 % reported consuming breakfast daily (Yahia 2008). However, Sakamaki.R. et al (2005) found high consumption of breakfast daily among Chinese medical university students. Also, daily breakfast consumption (75.6 %) and (43.9 %) was found among Malay students in Selangor and students in a Malaysian medical school (Ganasegeran et al 2012; Anuar and Ghazali 2011).

The regular consumption of snacks in between meals is an unhealthy eating practices. Findings from numerous studies have identified increased snacking trends among university students (Kızıltan 2005; Turconi 2008; Mazıcıoğlu 2003). In the current study the amount of students consuming snacks in between breakfast, lunch and dinner were extremely high, (93.9 %) stated that they ate snacks. Among the snacks eaten were pastries (45.9 %), fruits (47.4 %), potato chips and corn curls (33.7 %), yogurt (27.0 %), vegetables (7.7 %) and other snacks (24.5 %) such as doubles, peanuts,cookies, granola and chocolate. In comparison, regular snack consumption was observed among Lebanese university students (53.2 %) and another study of 1912 (80 %) college students who selected snacking at least once per week (Yahia et al 2008; Huang et al 1994).

The majority of students in the study (91.8%) consumed fast-foods daily, once per week, twice per week and other stated times such as once and twice per month; with only a minimal number of students (8.2 %) not consuming fast-foods at all. Consistent with the current research, several conducted studies have highlighted increased fast-food consumption among university students (Soriano 2000; Mammas 2004;

Irazusta 2007; Nicklas 2001). Conversely, a study found that students consuming fast-foods often accounted for (21.2 %) while the majority of the students (78.8 %) hardly consumed fast-foods (Ganasegeran et al 2012). Moreover, Morse and Driskell (2009) found that fast-food consumption among males (74 %) and females (60 %) were significantly different with regards to consumptions of 1 -3 times per week. However, in this study no significant difference in the mean fast-food consumption was found between males and females with regard to the times consumed per week.

University students select fast-foods for various reasons which range from taste, availability and convenience (Yahia et al 2008). In the current study, students' chose fast-foods because of convenience, taste, availabilty, and price. Apart from the chosen responses, students also mentioned other reasons such as feeling for fast-foods, lack of time and cooking skills, not being home and emotions (sad) as additional reasons for consuming fast –foods. A study on male and female college students, indicated that fast-foods were consumed because its perceived as low-cost and economical; while other students stated reasons such as lack of time, taste and dining with family and friends (Morse and Driskell 2009). Additionally, college students in a survey specified that not only fast-food choices but, food choices in general, were influenced by convenience, price, preference, health and weight concerns (Driskell, Kim and Goebel 2005).

Similarities in numerous studies on eating practices of university students were minimal consumption of fruits and vegetables (Soriano 2000; Mammas 2004; Irazusta 2007; Nicklas 2001). However, findings from the current study revealed that students consumed fruits and vegetables always (15.8 %, 21.9 %), often (36.2 %, 33.7 %) and sometimes (44.9 %, 38.3 %) with only a minimal amount (3.1 % and 6.1 %) reporting never as a response. In comparison, a study of Chinese medical students, found that (32.5%) of subjects reported eating fruit daily and overall (47.9%) of the students reported consuming vegetables such as spinach and carrots (Sakamaki et al 2005). Likewise, Yahia and colleagues (2008) found that

among Lebanese university students there were (30.5 %) and (27.3 %) reported daily consumptions of vegetables and fruits respectively.

In relation to intake of foods from the various food groups, similar finding was reported by Vand den Berg et al (2012) who studied the eating practices of nursing students, in South Africa; findings were adequate intake by most students (83.2 %) for bread, cereal, rice and pasta group. Likewise, in the current study, students (54.1 %) stated consuming bread, cereals, rice, pasta and ground provision always. Surprisingly, less than quarter of the students (16.3 %) consumed butter, margarine, shortening, coconut milk, cooking and salad oils always. However, in South Africa nursing students study, more than half (68.3 %) reported consuming margarine, oil or fat daily (Vand den et al Berg 2012). Nutrition knowledge score and the individual questions were used to evaluate the nutrition knowledge of the 196 University of the West Indies students (118 females and 78 males) based on gender, previous course in nutrition and country of residence. The results revealed that nutrition knowledge of the students is exceptional since the majority 52% (n=102), got > 8 out of 10 being ranked as excellent knowledge.

There was no significance difference in the mean score of nutritional knowledge based on gender (p-value, 0.175), however significant differences were observed based on the responses given for each individual nutrition knowledge question. Also significant were differences in mean nutrition knowledge score in relation to students' gender and responses of yes or no to taking a course in nutrition. Findings similar to the current study, Broccia et al (2008) in an investigations of nutritional knowledge of Sardinian and Corsican university students, and Kim (2003), in a study of 618 university students in Gwangju Area; discovered that female students scored higher than male students in nutrition knowledge.

CONCLUSION

The study evaluated the eating practices and nutrition knowledge of university students. Apart from skipping meals and occasionally consuming breakfast, students engaged in other unhealthy eating practices such as late night consumption of meals, snacking in between meals and fast-food consumption. These and many other unhealthy eating practices can impact the health and well-being of university students. The finding from the study indicated that university students regularly consume fast-food because of convenience, taste, availability and price. Also observed were differences in the mean fast-food consumption of local students as compared to the mean fast-food consumption of regional students (p-value, .006); with local students consuming more fast-food than regional students.

Although, students' eating practices included some unhealthy eating patterns; a positive findings was that they consumed a variety of food from the different food groups. The university setting is the perfect arena to foster these healthy eating practices, and as such food courts and cafeterias should offer an array of healthier food choices for university students to choose from. In the current study it is evident that the majority of students were knowledgeable as it relates to nutrition but fail to select foods that are consistent with this acquired knowledge; thus, nutrition knowledge alone cannot warrant healthy eating patterns among university students. Nutrition education and interventions ought to be strategies implemented to elicit positive response to aid alterations in students' diet consistent with dietary recommendations.

LIMITATIONS AND RECOMMENDATIONS

Limitations of the study were the uneven amount of males to females; students from local, regional and international countries of residence and students who answered either yes or no to taking a course in nutrition. Another limitation was that the honesty of the students can be questionable with respect to questions in the eating practices section of the questionnaire. Finally, the students may have under or over reported their eating practices because that section required the students to remember particular eating patterns.

The finding from this research can be used by university officials. They can implement policies on campus to prevent the offering of snacks and foods that do not provide adequate nutrients for the body. Additionally, strategies can be used to design nutrition education interventions in order to increase the nutrition knowledge of students; promote improved eating practices; and encourage students to make more informed food choice decisions. Strategies that can be used include:

- Providing nutrition facts brochure and weekly nutritional newsletter via email.
- Make basic nutrition courses mandatory for all students from all faculties to equip them with the skills to choose foods wisely.
- Nutritional articles could be published in the university newspapers and on the university web site accessible to all students.
- Mandatory attendance to monthly or fortnightly seminars and workshop highlighting the importance of nutrition.
- The use of posters about the university campus with facts on nutrition.

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APPENDIX

Participant no: _____

Questionnaire

Dear UWI Student,

This survey is being conducted to compare "Eating practices and nutrition knowledge among university students." Providing information for this survey is voluntary however, your cooperation is kindly appreciated. It is required that you answer all questions honestly and truthfully.

Your identity and responses will be kept confidential.

PLEASE TICK [√] THE ANSWER OF YOUR CHOICE.

SECTION I: EATING PRACTICES QUESTIONS

1) How often do you eat each of the following meals?

	Daily	Sometimes	Never
Breakfast	☐	☐	☐
Lunch	☐	☐	☐
Evening meal	☐	☐	☐

2) Which of the following prevents you from eating breakfast, lunch and evening meal?

	Lack of time	Insufficient income	I am on a diet	I eat	Other
Breakfast	☐	☐	☐	☐	☐
Lunch	☐	☐	☐	☐	☐
Evening meal	☐	☐	☐	☐	☐

3) What is the latest time you eat during the night?

- ☐ Before 6 pm
- ☐ Between 6 – 8 pm
- ☐ As late as _____

4) How often do you eat snacks between each of the following meals?

	Daily	Rarely	Never
Between breakfast and lunch	☐	☐	☐
Between lunch and dinner	☐	☐	☐
After evening meal	☐	☐	☐

5) What type of snacks do you eat between breakfast, lunch and evening meal?

- ☐ Pastries
- ☐ Potato chip and corn curls
- ☐ Yogurt
- ☐ Fruits
- ☐ Vegetables
- ☐ I do not eat between meals
- ☐ Other(please specify)_____

6) How often do you eat each of the following foods?

	Always (6-11 servings)	Often (3-5 servings)	Sometimes (2-3 servings)	Never (1-2 servings)
Breads, cereals, pasta, rice and ground provision	☐	☐	☐	☐
Fruits	☐	☐	☐	☐
Vegetables	☐	☐	☐	☐
Beans, peas seeds and nuts	☐	☐	☐	☐
Meats, poultry, fish and dairy products	☐	☐	☐	☐
Butter, margarine, shortening, coconut milk, cooking and salad oils	☐	☐	☐	☐

7) How often do you eat fast foods (fried chicken, french fries, pizza or hamburger)?

- ☐ Daily
- ☐ Once per week
- ☐ Twice per week
- ☐ Never
- ☐ Other (please specify)_____

8) What is your reason for buying fast food?

- ☐ I do not use fast foods
- ☐ Convenience
- ☐ Taste
- ☐ Price
- ☐ Availability
- ☐ Others(please specify)_____

SECTION II: NUTRITION KNOWLEDGE QUESTIONS

1) How many food groups are there?

- ☐ Three
- ☐ Six
- ☐ Five
- ☐ I don't know

2) Which of the following group of foods should be consumed the most in the diet?

- ☐ Butter, margarine, shortening, coconut milk, cooking and salad oils
- ☐ Meats, poultry, fish and dairy products
- ☐ Breads, cereals, pasta, rice and ground provision
- ☐ Vegetables and fruits
- ☐ Beans, peas, seeds and nuts

3) Which of the following should be consumed the least in the diet?

- ☐ Butter, margarine, shortening, coconut milk, cooking and salad oils
- ☐ Meats, poultry, fish and dairy products
- ☐ Breads, cereals, pasta, rice and ground provision
- ☐ Vegetables and fruits

☐ Beans, peas, seeds and nuts

4) Please indicate your level of agreement to the following statements.

Statements	**Yes**	**No**	**I don't know**
Fat free foods are foods free from energy			
A high fiber diet is essential for good bowel functions.			
Excessive consumption of empty calorie foods (baked products, jams, jellies, sweetened fruit juices and ice cream) can have a positive effect on health.			
Fruits and vegetables in the diet provide vitamins, minerals, water and fiber.			
Skipping meals is acceptable for quick weight loss.			
Proteins (meats, poultry, dairy products, peas, beans and nuts) are a main source of energy for the body.			
Milk and milk products are the best sources of calcium			

SECTION III: DEMOGRAPHICS

1) Gender

- ☐ Male
- ☐ Female

2) Country of residence

- ☐ Local
- ☐ Regional
- ☐ International

3) Have you taken a course in nutrition?

- ☐ Yes
- ☐ No

Thank you for your time! Have a blessed day!