THE UNIVERSITY OF THE WEST INDIES
AT ST. AUGUSTINE, TRINIDAD AND TOBAGO

A Research Paper

Submitted in partial requirements

for HUEC 3012

of

The University of the West Indies

Title: Useful predictors of University Students' choices of dietary protein sources

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Year Submitted: 2014

Department of Agricultural Economics & Extension
Faulty of Food and Agricultural

USEFUL PREDICTORS OF UNIVERSITY STUDENTS' CHOICES OF DIETARY PROTEIN SOURCES.

A Research Paper

The University of the West Indies

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2014

ACKNOWLEDGEMENTS

This research was conducted under the supervision of Dr. Patricia Dyett, DrPH, MS, RD, as well as under the support of the University of the West Indies' Department of Agricultural Economics and Extension (DAEE). Research approval was granted by the Head of Department of the Department of Agricultural Economics and Extension, Dr. Selby Nicholls. Statistical Analysis was performed with the assistance of Dr. George Legall and Dr. Frank Cowie.

Permissions for conducting research on the University of Trinidad and Tobago (UTT) San Fernando Technical Institute campus was granted by the campus manager, Mr. Rennie Coolman and the UTT Registrar, Mr Phillip Robinson.

Permissions for conducting research on the University of the Southern Caribbean St. Joseph Campus were granted by Dr. Noel Brathwaite, Director of Research at the University of the Southern Caribbean. Additional acknowledgement must be given to Lois Baynes M.A. Ed. Assistant Lecturer at USC, for allowing the distribution of surveys in her classroom.

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ABSTRACT

Dietary protein is important for growth, tissue repair, and human metabolism; and therefore plays a critical role in optimal health, especially during the adolescent and young adult period of life. However, protein food choices and diet patterns can vary in their impact on health, from beneficial to detrimental. University students are exposed to many factors affecting food choice. The purpose of this study was to understand the factors affecting university students' choices of dietary protein. 245 students registered at three universities in Trinidad were surveyed on their consumption dietary protein from various sources and factors that potentially affect these choices, using a modified Food Choice Questionnaire. Chicken is consumed most frequently by 77.1% of students. The main factors affecting protein source choices were demographic; particularly, gender, race and religion. Place of Residence affects protein consumption significantly, where those students that live on campus during the school year, consume different sources of protein than those who live at home. Across the three universities, USC has the most varied consumption, particularly due to the high concentration of Seventh Day Adventist students who are restricted in meat choices, which are high protein food sources. In promoting dietary behaviour change in students' dietary choices of protein, availability is a potential avenue.

INTRODUCTION

Food choice is a study that is governed by many disciplines such as food science, nutrition, psychology, sociology and more. Many factors influence human dietary patterns, including taste, cost/income, availability, convenience, traditions/culture, environmental factors, etc. Sensory properties of food have also been shown to play an important role in food selection (Griffioen-Roose et al, 2011).

Protein is a major macronutrient which comes from many sources of food, ranging from animal products to legumes and whole grain cereals; and is critical to healthy growth and maintenance of body tissues. As seen in a study by Griffioen-Roose et al, (2011), most persons prefer high protein foods when hungry and protein is described as the most satiating macronutrient. This proves the importance of protein in the human diet. Many individuals choose different protein sources on a daily basis for varying reasons.

However, the source of protein in the diet was found to be significantly related to certain metabolic diseases such as stroke and Coronary Heart Disease in a study by Bernstein et al, 2011. It is therefore important to analyse protein choice in the consumer environment to understand the habits of individuals and also the risk for disease from a dietetics perspective.

Food choice is important to study in Trinidad and Tobago as health concerns for the nation are growing. An article by Hope, (2010), attempts to portray the health status of the nation by use of the Nutrition Country Profile. The statistics explain that obesity is growing in Trinidad and Tobago. Obesity rates were 16.8% and overweight population is at 31.4%. In a publication by Edwards (2012), the obesity epidemic is partly due to the influence of fast food restaurants in the country. 12 fast food restaurant chains have had an impact on the Trinidad and Tobago market in recent years and they have been associated with obesity and other non-communicable diseases. Understanding the food purchasing habits of the population will enable a better conceptualisation of consumer behaviour.

University students, however, vary in the means by which they obtain their food. While many students live at home, many others rent on campus or near campus, away from home. Therefore, dietary patterns and habits vary greatly across different individuals attending tertiary level institutions. A recent study by Turnbull-Fortune in 2012, at the University of the West Indies, St. Augustine campus, states that out of 91 resident hall students, 84.6 % purchase foods at on campus cafeterias, whereas 80.2% purchase at off campus cafeterias. 13.2% purchase food on campus always. Therefore, it is understood that students' food choices at universities vary greatly and can be affected by their living arrangements. Therefore, it is appropriate to study the university student population of Trinidad and Tobago.

In a diverse population such as the Caribbean, many factors seem to be at play in the food environment, which is little studied. Many cultural variations exist in food choice, particularly in protein choice, preparation and traditions. This is the first study to address the protein food source choices of University students in Trinidad and Tobago.

LITERATURE REVIEW

Food Choice

Food choice, according to Marshall (1995), is the "daily routine of domestic provisioning." Considerations for food include more than just hunger, but incorporate food availability, restrictions and range of choice. Food is said to no longer satisfy just nutrition alone, but to satisfy other needs such as appearance, lifestyle, image and healthiness (Dordevic et al., 2013). Understanding food choice is more than just a nutritional concern, but incorporates psychology, sociology, anthropology and physiology.

Humans are now more focused on where they get their food, nutritional value, availability, preparation, flavour, environmental factors and especially cost, more than simply satisfying hunger. A study in "Modelling Food Choice" by Shepherd and Sparks (1994) describe the importance of food choice in nutrition as crucial in influencing persons' choices and changing diets in the effort of promoting health on a large scale. This is particularly important in the increase of incidental metabolic disorders worldwide. According to the International Diabetes Foundations (2013), about a quarter of the world's adult population has metabolic syndrome.

Factors affecting food choice

Individual factors affecting food choice are interrelated and combine extrinsic and intrinsic factors. Extrinsic factors, as stated by Shepherd and Sparks (1994) include environment, social factors, regional factors and availability. Intrinsic factors encompass a wide range of motives for food choice such as personal factors, psychological factors, physiological and biological factors, as well as education and culture.

Many different studies attempt to determine the main factor/s affecting food choice in adult populations. However, these factors that affect individuals, are themselves affected by other factors. For Instance, in a research study conducted by Steenhuis et al (2011), questionnaires were used to understand the role of price and pricing strategies in food choices of consumers. However, despite determining the effectiveness of pricing on influencing food choice, pricing affects those with lower income more so than

those with higher income and education levels. In the study, the feedback was important in understanding how to control food choice, where improvements of taxes for healthy food were suggested.

The previously mentioned study by Dordevic et al (2013) stated that despite some studies proving that taste is most important as a feature of food in some populations, this study used the same questionnaire method and determined that Sensory appeal and Purchase Convenience were the most important factors influencing their food choice. Another study by Pollard, Steptoe and Warde (1998) concluded that in fact, price, convenience, health and sensory appeal also prove important to consumers in determining their food choice.

In contrast, another study by Steptoe and Wardle (1999) about the motivational factors in Dietary intake patterns distributed the Food Choice questionnaire to persons and evaluated educational status versus price, familiarity, mood control and sensory appeal. An analysis of variance was performed and found that Non – motivational factors can be important in determining food choice.

Women are said to have a higher score in seven factors; mood, health, natural content, weight control, convenience, familiarity and price than men, where men tend to focus on price (Jauregi et al., 2011). This study also employed the use of a Food Choice Questionnaire, to 255 women and 50 men. It concluded that Sensory aspects, Price and Weight control were the main factors affecting food choice in that respective order.

In adolescent and young adult food choice, parents have a critical role as described in the 1996 review by Shepherd and Dennison (1996). However, teens have increasing independence, such as university students do, and they are influenced by other factors as well. However, in Trinidad, many university students are still dependent on their parents for finances, shelter and other provisions. Therefore it is important to understand the extent to which this factor influences dietary protein intake.

Protein Intake and healthy

A publication by the Food and Agriculture Organization of the United Nations (FAO, 2011) focused on "Dietary protein quality evaluation in Human Nutrition," where the main conclusion was that the type of protein and quality of a dietary protein source were the main determinants of the most optimum protein source intakes. The amino acid profile or Amino Acid Score which can be calculated by different methods, are the most crucial factor in determining optimum protein for health. Protein has different implications on human health, there are many Physiologic and Metabolic Responses associated with protein intake. These include tissue turnover, repair, lean body mass profile and impaired blood profile among other factors. Short term implications include body wasting due to lack of protein in diet, impaired immunologic function, mental impairment and even factors such as mood and psychological effects. Long term effects are studied extensively with respect to dietary protein intake, where bone health and kidney health are extremely affected by protein intake. Cardiovascular risk, cancer and other organ function are also affected by dietary protein.

Factors affecting Protein Intake

Very few studies have been made available about the factors and motivators of protein source choice. Protein source choice is important in understanding how to intervene and attempt to make changes in the population's dietary protein intake. A study by Lin et al (2010) performed a randomized clinical trial. 24 Hour Recalls assessed the protein intake of persons on a Clinical trial called PREMIER for Blood pressure and weight control. This study found that the majority of the protein in the American Diet is obtained from poultry, dairy, refined grains and beef. However, in general, animal protein comprised 69% of total protein intake. The study found that when comparing race and other demographic factors with food choice, Race was a most prominent factor which affected seafood, beef, dairy and poultry intake. Particularly, African Americans were less likely to consume large amounts of these foods than Caucasians in the study. Other smaller influences on dietary protein intake included culture, economics and taste.

Another older study by Smit et al (1999) also utilised a 24 hour recall however, in the limitations, it was noted that more in depth analysis may have proved more useful than a 24 hour recall. In general, the study found that Beef was consumed most, followed by milk and yogurt, especially in younger populations. There was also a definite race and ethnic influence on protein consumption.

Protein intake choices are particularly important to attempt to control and change dietary habits in the field of nutrition to encourage improved health and overall wellbeing on both an individual level and to address public health concerns. This therefore provides the rationale for the aim and objectives of the current study in examining useful predictors of university students' dietary protein sources.

OBJECTIVES:

- To advance the understanding of specific factors affecting food choices among the student populations at three tertiary level educational institutes in Trinidad.

- To identify the most frequently consumed protein foods in the diets of tertiary students at 3 different universities in Trinidad.

- To examine possible relationships between protein food choice and demographic characteristics of the students.

- To compare dietary habits with respect to protein choices across the three main universities in Trinidad.

HYPOTHESES:

1. NULL: There is no difference in frequency of consumption of various protein foods among university students in Trinidad.

   ALTERNATE: University students in Trinidad consume some dietary protein foods more than others.

2. NULL: There is no association between protein food choice and demographic characteristics of university students in Trinidad.

   ALTERNATE: University students in Trinidad make different protein food choices based on their different demographic characteristics.

3. NULL: There are no differences in student dietary protein choices and factors across the three main universities in Trinidad.

   ALTERNATE: Protein choices and factors in students vary among the three main universities in Trinidad.

METHOD

Subjects/Participants

Undergraduate students were among the target population at three university campuses: University of the West Indies (St. Augustine Campus), University of the Southern Caribbean and The University of Trinidad and Tobago (San Fernando Technical Institute). Inclusion criteria involved students above the age of 18 currently enrolled at any of the three mentioned universities, pursuing any Undergraduate programme (diplomas, certificates, degrees, etc.). Exclusion criteria involved persons not registered at the time of study, for an undergraduate programme at any of the three universities mentioned. Also, persons under the age of 18 were excluded.

Sample size calculations were based on the precision of the study. A confidence level of 95% was determined. The population of interest used was 20% of the total university population, on the principle that approximately 20% of students rent or live away from home, allowing them to make their own food choices. Therefore, the sample size was calculated as 245 students in total. Furthermore, the sample size from U.W.I. was found as 121 students, U.T.T.'s sample size was 90 students and U.S.C.'s sample size was 34 students.

Study design

This study employed an Observational Cross-sectional design. The habits and patterns of dietary intakes of a group of students were examined with respect to dietary protein intake using a survey. No intervention or experimental method was used and the study aimed at collection of self-reported data from anonymous volunteers. Independent variables included all demographic characteristics (age, gender, etc.) as well as university registered and living arrangements. All of the independent variables were discrete. Dependent variables focused on the dietary habits and perceptions of students with respect to various protein sources. All dependent variables were discrete. A continuous variable for each habit was developed by calculating a score for dietary habits and factors affecting dietary choices of protein.

Procedure

Data Collection was conducted in the form of short, anonymous, non-sensitive questionnaires. Students were selected by convenience sampling, which means that participants were selected based on their availability at the survey times and location. Short questionnaires that incorporated modified food frequency questions as well as demographic information were utilised (see Appendix). The surveys covered 12 common food items which contribute large amounts of dietary protein; Chicken, Turkey, Duck, Beef, Pork, Goat, Fish, Other Seafood, Eggs, Cheese, Peas/Beans and Soy Products. These surveys were distributed to the students chosen at random. At the beginning of the survey instrument (questionnaire), is a short paragraph about the researcher's intent and purpose for collecting data and conducting the survey.

Statistical analysis

Statistical analysis of data was performed using the IBM Statistical Program for Social Sciences (IBM SPSS) version 12.0. Descriptive frequencies were used to understand trends across demographic categories in the three Universities. Bar graphs of these frequencies were developed. Cross Tabulations were used to map the demographic trends as well as residence and meal source trends across the three universities. These cross tabulations were used to evaluate and compare means using Chi Squared tests to identify relationships between certain demographic factors and frequency of protein sources consumption.

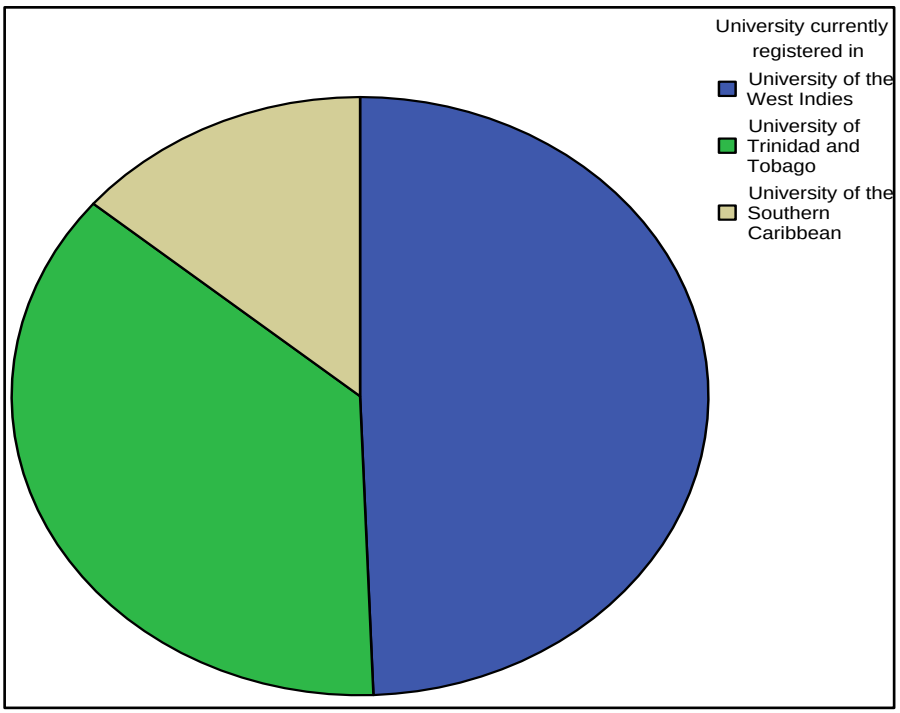
One way ANOVA tests, using Post Hoc Tukey analysis were employed to further evaluate the protein sources and reasons for protein source consumption across universities, races, daily meal source and residence.

RESULTS

Demographics

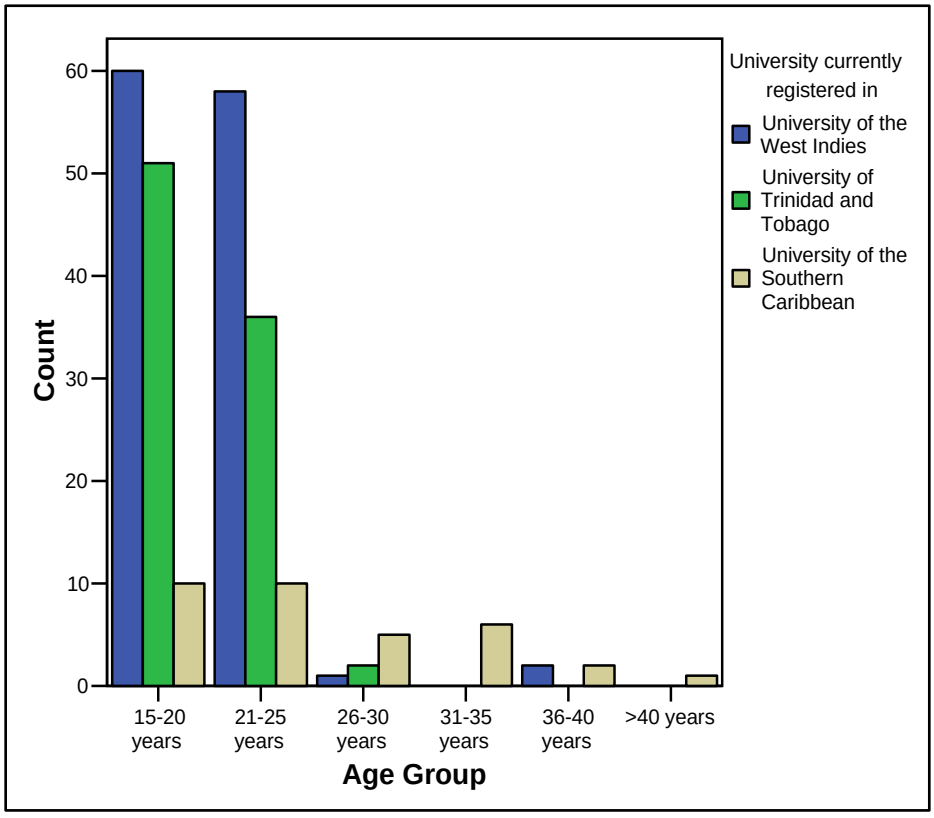
Most participants (49.4%) were from the University of the West Indies (UWI), 36.7% from the University of Trinidad and Tobago (UTT) and 13.9 % from the University of the Southern Caribbean (USC). See graph 1.

Graph 1. The distribution of participants across the three universities studied



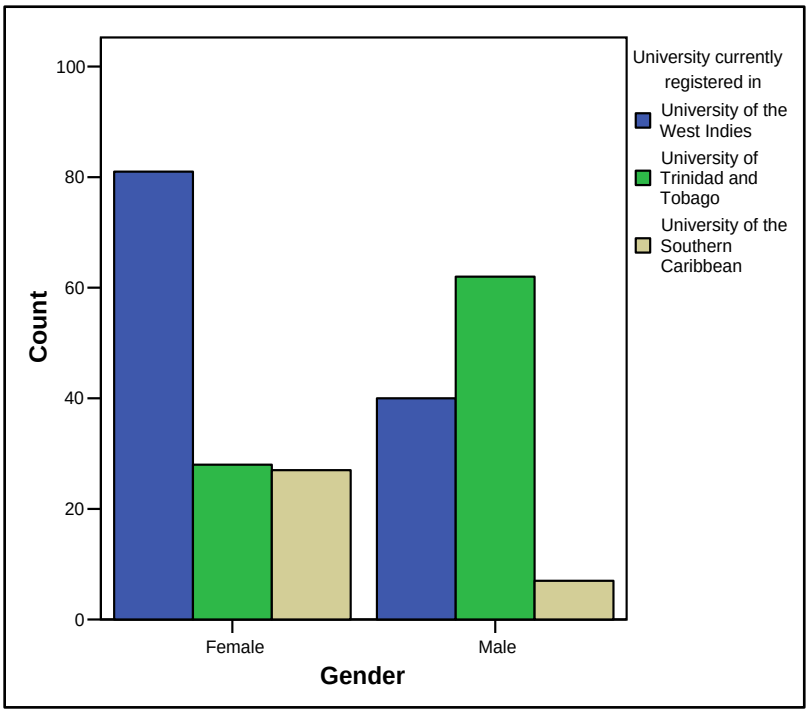
Most participants were below the age of 25 years. Only in USC did the age groups seem to be more widely distributed (Graph 2).

Graph 2. Bar Chart showing the age distribution across the three universities studied.



Graph 3 shows that more females participated in the study, however, more males responded from UTT.

Graph 3. Bar chart showing the gender distribution across the three universities studied.



Most students in UWI live at home with some renting apartments and a small amount living on hall. UTT has most students living at home with small amounts living on hall or in an apartment near campus. USC has very few students living in an apartment, most living at home and almost a third living on campus. Overall, 79.6% of the participants live at home, 9.4% live on hall or on campus and 11.0% rent in a room or apartment near campus (Table 1).

Table 1. Cross tabulation displaying the distribution of cases in the three universities and the participants' residential status during the academic year.

			University currently registered in			
			University of the West Indies	University of Trinidad and Tobago	University of the Southern Caribbean	Total
Residence	At Home	Count	88	87	20	195
		% within University currently registered in	72.7%	96.7%	58.8%	79.6%
	On hall or Campus	Count	9	1	13	23
		% within University currently registered in	7.4%	1.1%	38.2%	9.4%
	Rental Apartment or Room near campus	Count	24	2	1	27
		% within University currently registered in	19.8%	2.2%	2.9%	11.0%
Total		Count	121	90	34	245
		% within University currently registered in	100.0%	100.0%	100.0%	100.0%

UWI seems to be the most racially diverse university, where UTT is predominantly students of Indian descent and USC predominantly consists of persons of African Descent and Mixed Descent. See table 2.

Table 2. Cross Tabulation displaying the number of cases in the three universities and their corresponding race/ethnicity.

			University currently registered in			
			University of the West Indies	University of Trinidad and Tobago	University of the Southern Caribbean	Total
Race/Ethnicity	African descent	Count	24	14	17	55
		% within University currently registered in	19.8%	15.6%	50.0%	22.4%
	Indian Descent	Count	65	56	1	122
		% within University currently registered in	53.7%	62.2%	2.9%	49.8%
	Mixed descent	Count	29	11	12	52
		% within University currently registered in	24.0%	12.2%	35.3%	21.2%
	Other	Count	3	9	4	16
		% within University currently registered in	2.5%	10.0%	11.8%	6.5%
Total		Count	121	90	34	245
		% within University currently registered in	100.0%	100.0%	100.0%	100.0%

In UWI and UTT, most persons get their Daily meal source from family members, whereas less than 20% obtain food from cafeterias and approximately 20 percent purchase foods at fast food outlets and prepare their own food. In USC, most persons prepare their own food and obtain food from campus cafeterias, less than 20% purchase foods at fast food restaurants and obtain foods prepared by parents/family members (Table 3).

Table 3. Cross Tabulation displaying the summary of cases in the three universities and their corresponding Daily Meal Source

			University currently registered in			
			University of the West Indies	University of Trinidad and Tobago	University of the Southern Caribbean	Total
Daily Meal Source	Purchase food at restaurants or fast food outlet	Count	26	14	4	44
		% within University currently registered in	21.5%	15.6%	11.8%	18.0%
	Obtain food from campus cafeterias with structured meal plan	Count	5	16	9	30
		% within University currently registered in	4.1%	17.8%	26.5%	12.2%
	Obtain food prepared by parents/family members	Count	65	50	6	121
		% within University currently registered in	53.7%	55.6%	17.6%	49.4%
	Prepare your own food	Count	25	10	15	50
		% within University currently registered in	20.7%	11.1%	44.1%	20.4%
Total		Count	121	90	34	245
		% within University currently registered in	100.0%	100.0%	100.0%	100.0%

Protein Food Diet Pattern

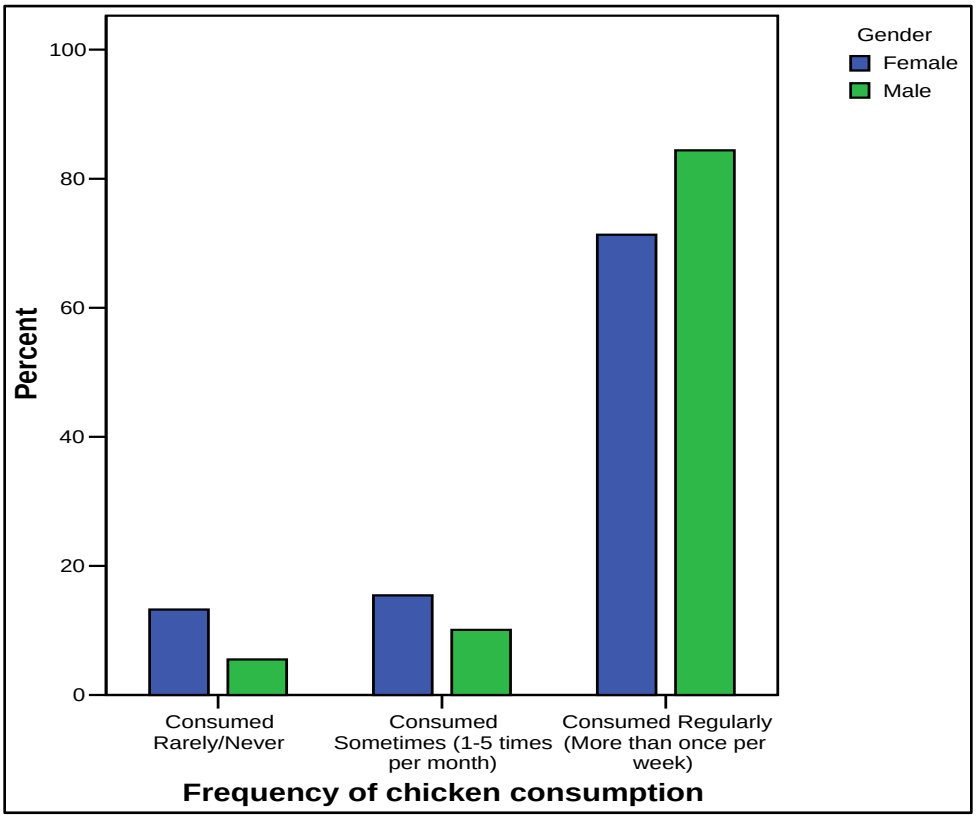
Chicken is consumed regularly or more than once per week by 77.1% of the population. Cheese, Peas/Beans and Eggs are also consumed most regularly. Fish followed by Soy and Seafood are eaten less regularly. Turkey, Duck, Beef, Pork and Goat are eaten least frequently by the entire population (Table 4).

Table 4. Frequency (%) of Consumption of Different Protein Sources

	Rarely/Never	**Sometimes**	**Regularly**
Chicken	9.8	13.1	77.1
Turkey	74.3	22.0	3.7
Duck	69.8	27.8	2.4
Beef	59.2	35.1	5.7
Pork	64.9	29.8	5.3
Goat	56.7	40.0	3.3
Fish	32.2	49.4	18.4
Seafood	55.5	36.7	7.8
Eggs	13.1	40.4	46.5
Cheese	4.9	30.2	64.9
Peas/Beans	7.3	34.3	58.4
Soy	60.8	25.7	13.5

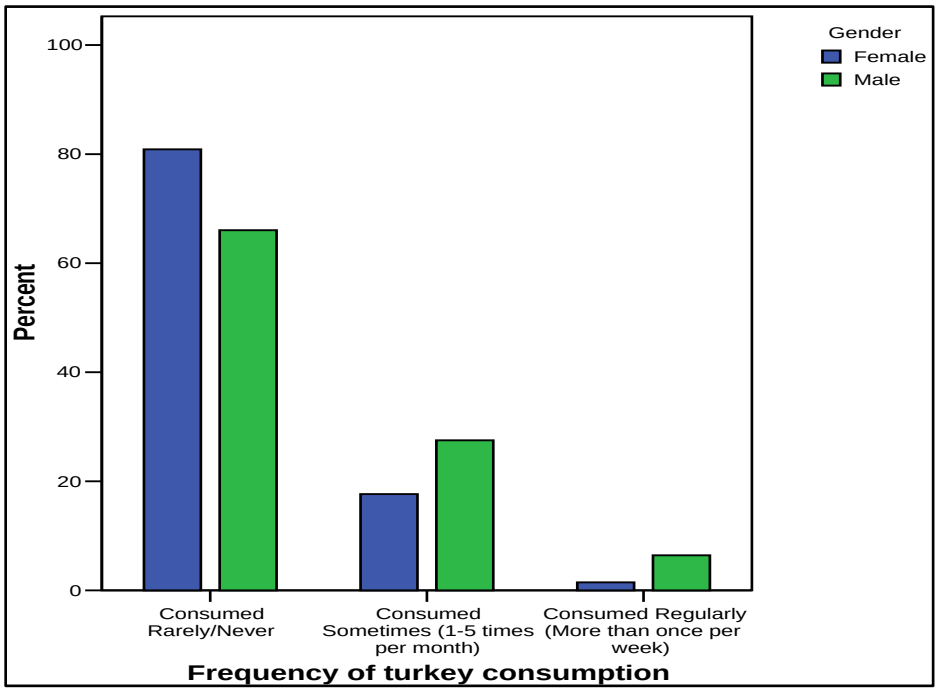
Chicken consumption compared with gender, has a p value of 0.042 which is statistically significant at the 0.05 level. By looking at the frequencies in the bar graph, it can be deduced that males consume chicken far more often than females. See Graph 4.

Graph 4. Bar chart showing Frequency of chicken consumption across genders. Chi squared test gave p value of 0.042.



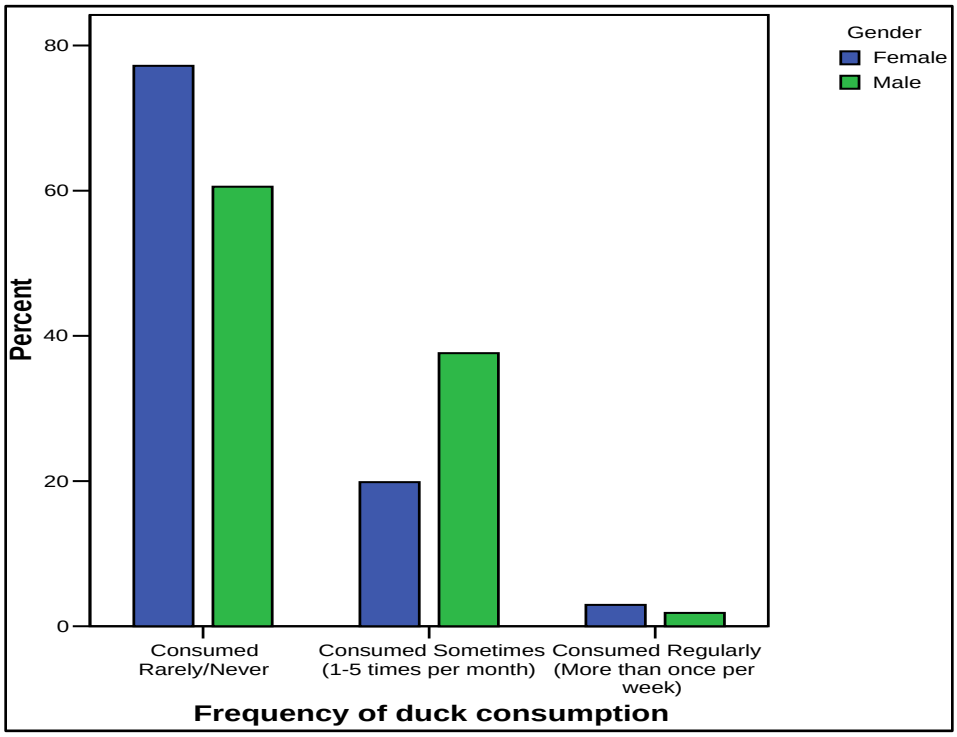
Turkey consumption compared with Gender has a p value of 0.014 which is very statistically significant as shown by the bar chart where females consume turkey far less often than males. See Graph 5.

Graph 5. Bar chart displaying Turkey consumption distribution across genders. Chi squared value is 0.014.



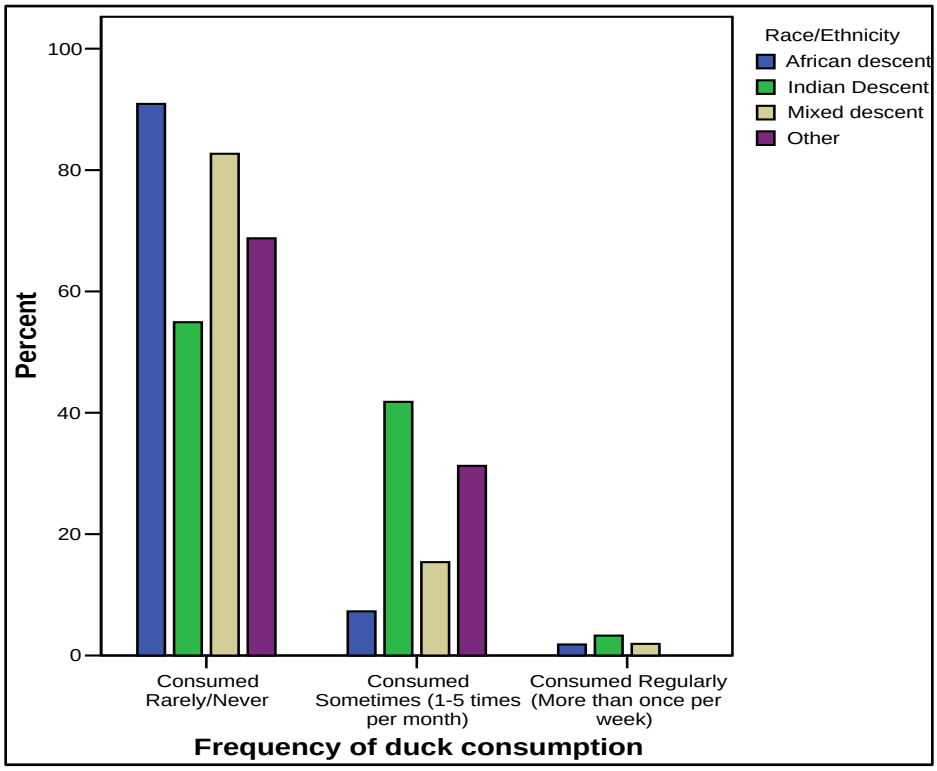
The Chi squared value of 0.008 shows that there is a statistical significance in the association of Duck consumption with gender. See. Graph 6.

Graph 6. Bar chart displaying Frequency of Duck consumption grouped by Gender. Chi Squared test produced p value of 0.008.



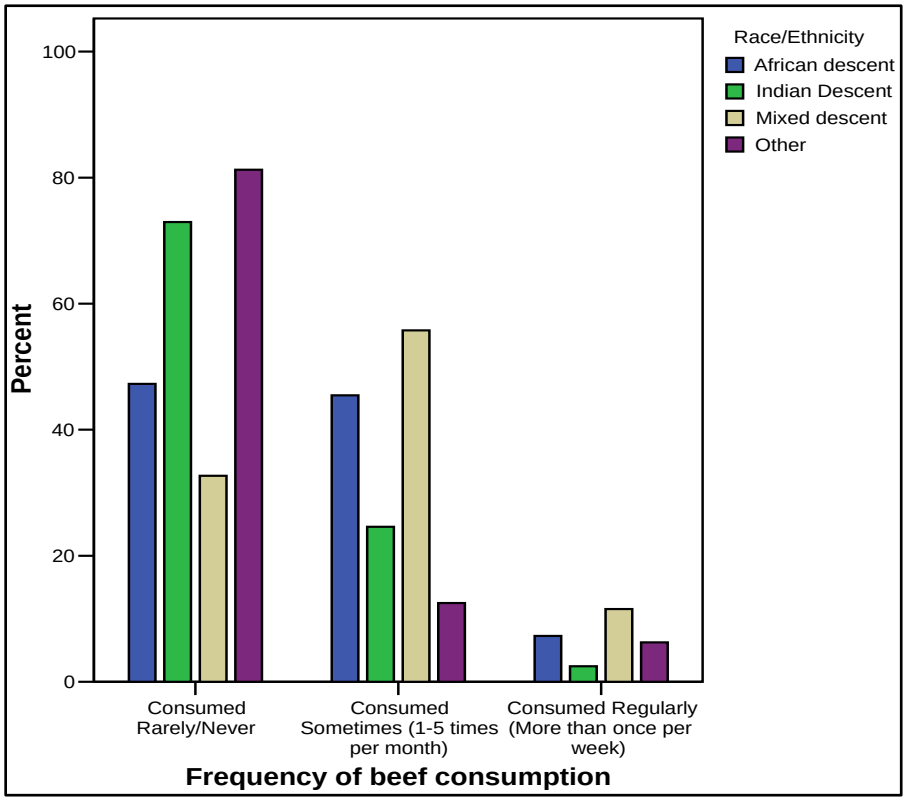
It seems that with a p value of <0.001, duck consumption is not equal across all races. Persons of African descent consume duck meat least often as compared to other groups (Graph 7), whereas persons of Indian descent consume duck meat most often as compared to other groups.

Graph 7. Bar Chart Showing the Frequency of Duck Consumption as grouped by Race. P Value for Chi Squared test is <0.001.



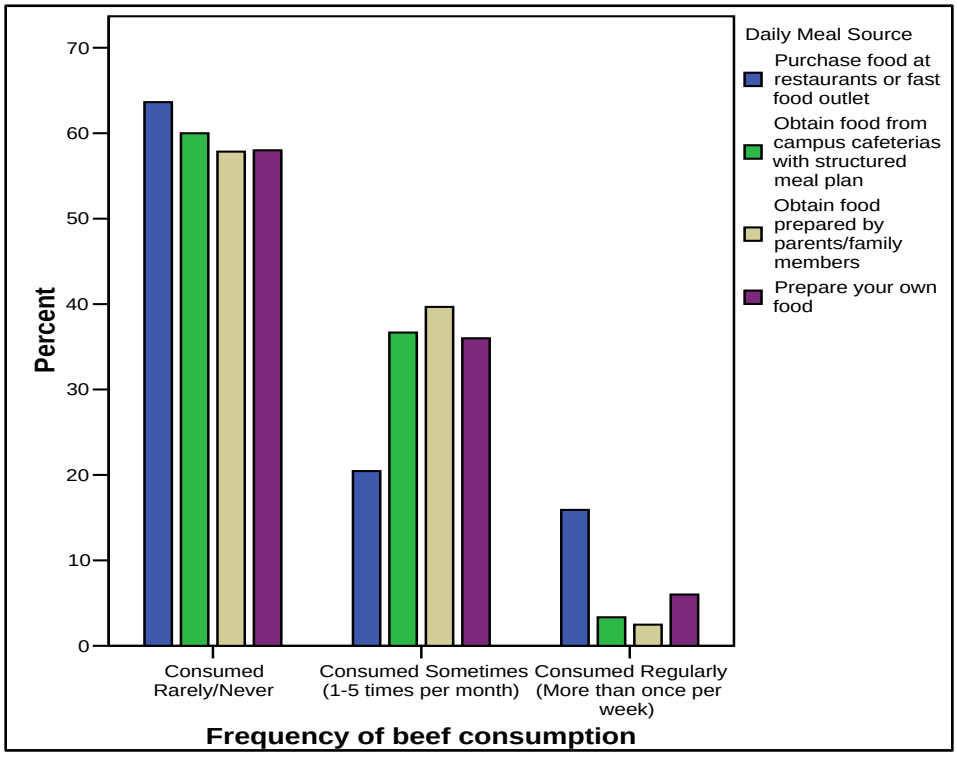
Beef consumption is associated with race, where there is a p value of <0.001. Persons of Indian Descent consume beef least frequently. See Graph 8.

Graph 8. Bar Chart displaying the Frequency of Beef Consumption grouped by Race. P value is <0.001 in Chi Squared Test.



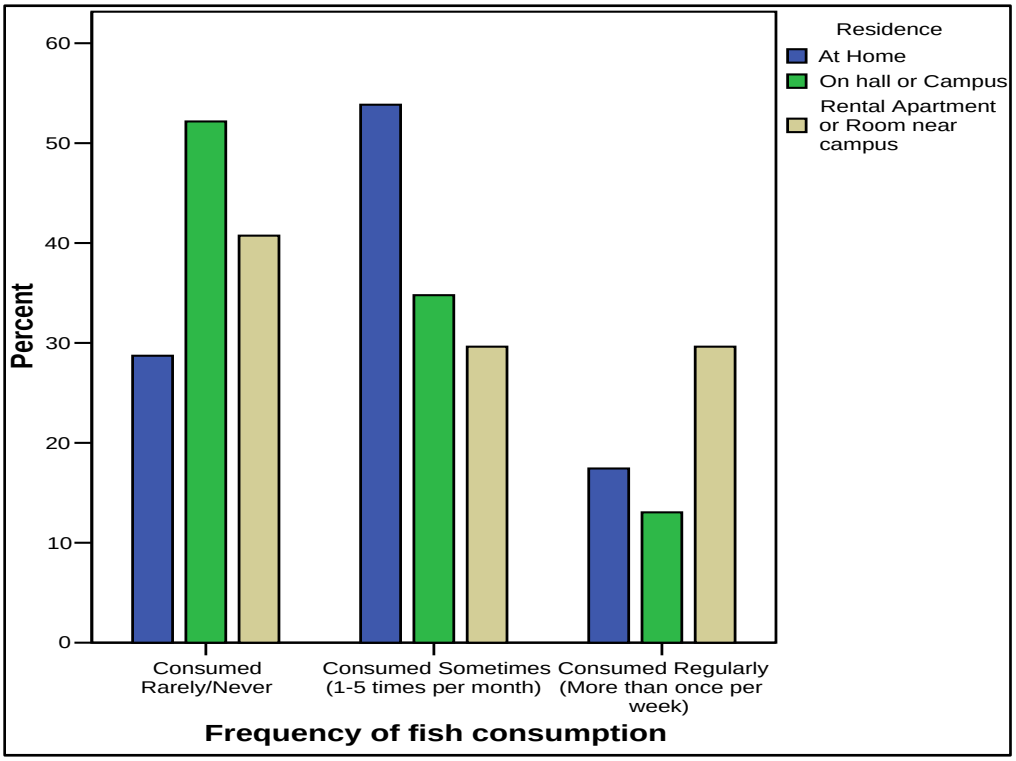
Daily meal source is associated with Beef consumption as seen by the p value of 0.028. Persons that purchase foods at fast food restaurants or outlets, consume beef most regularly. See Graph 9.

Graph 9. Bar Chart showing Frequency of Beef Consumption grouped by Daily Meal Source. P value is 0.028



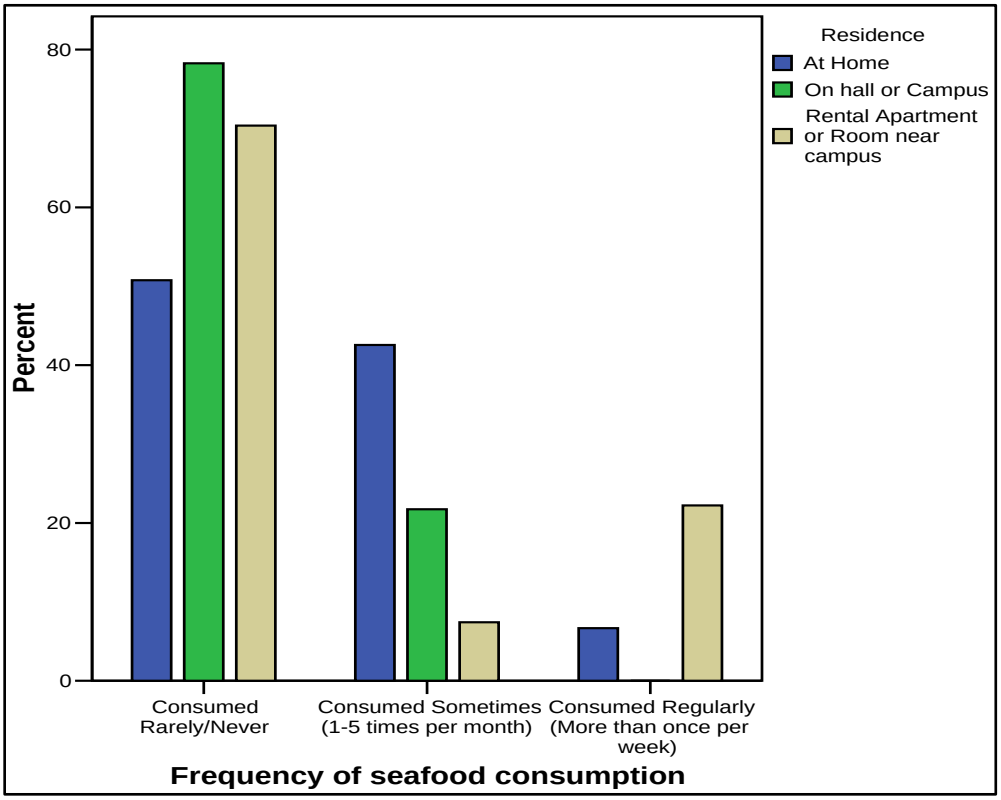
Fish consumption is associated with residence, having a p value of 0.034. It seems that persons that rent near campus consume fish most regularly and those that live on hall or campus consume fish least regularly (Graph 10).

Graph 10. Bar Chart showing the distribution of Frequency of Fish Consumption grouped by Residence. P value is 0.034 in Chi Squared test.



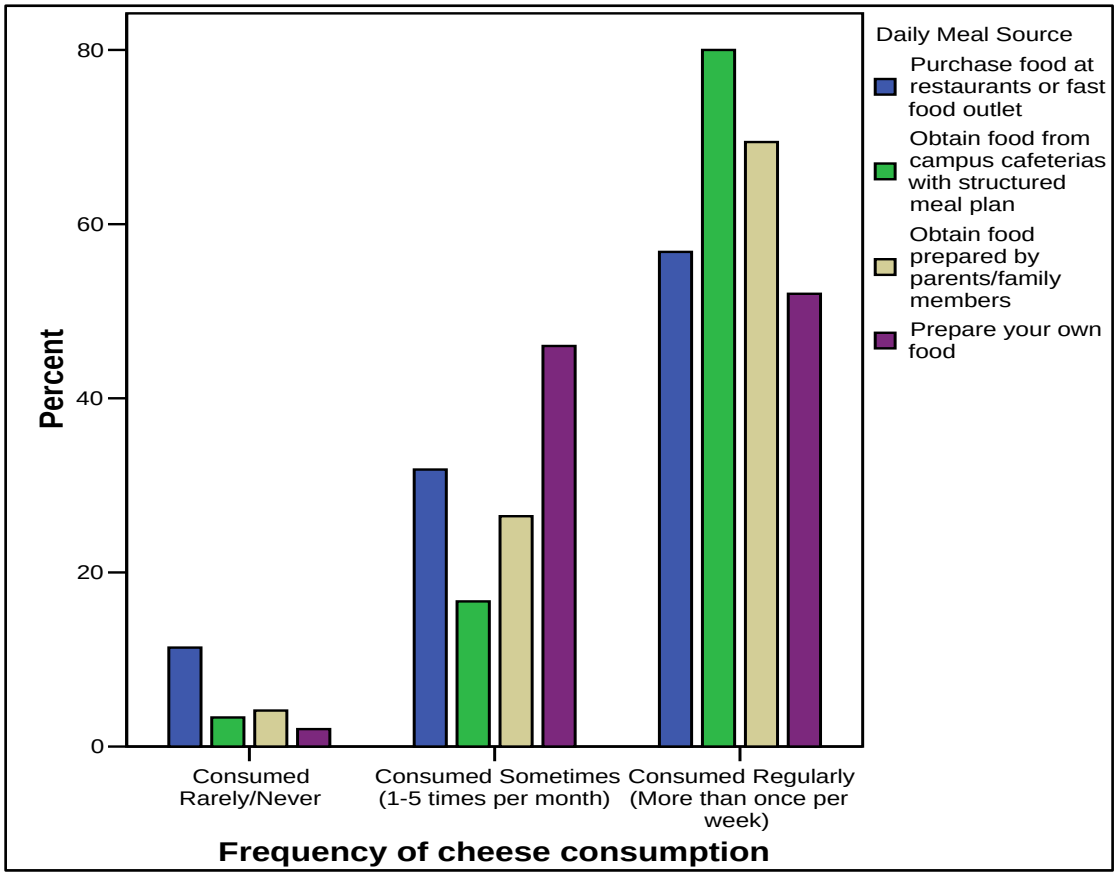
Seafood is associated with Residence, with a p value of <0.001. Participants that rent near campus consume seafood most regularly and those at home consume least regularly. See Graph 11.

Graph 11. Bar Chart showing the Frequency of Seafood Consumption grouped by Residence. P value for Chi Squared Test is <0.001.



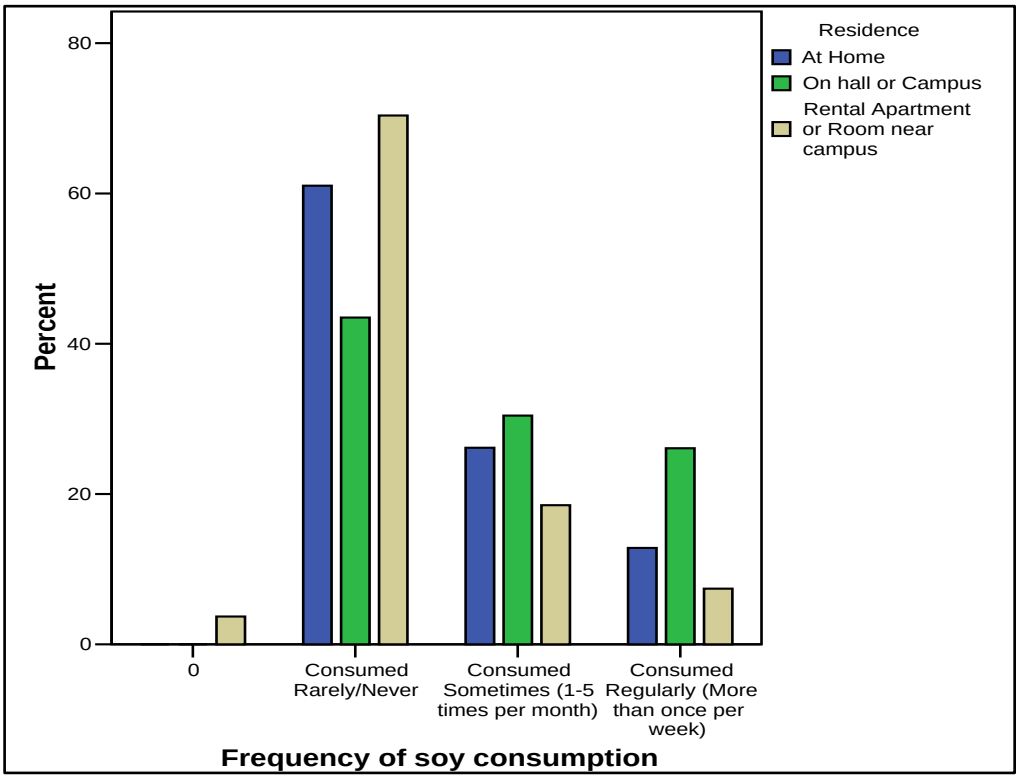
Cheese consumption is associated with meal source with a p value of 0.023. This shows that there is a statistical significance. Persons that obtain food from campus cafeterias consume cheese most regularly and those purchasing food at fast food restaurants consume cheese least regularly. See Graph 12.

Graph 12. Bar Chart showing the Frequency of Cheese Consumption grouped by Daily Meal Source. Chi Squared p value is 0.023



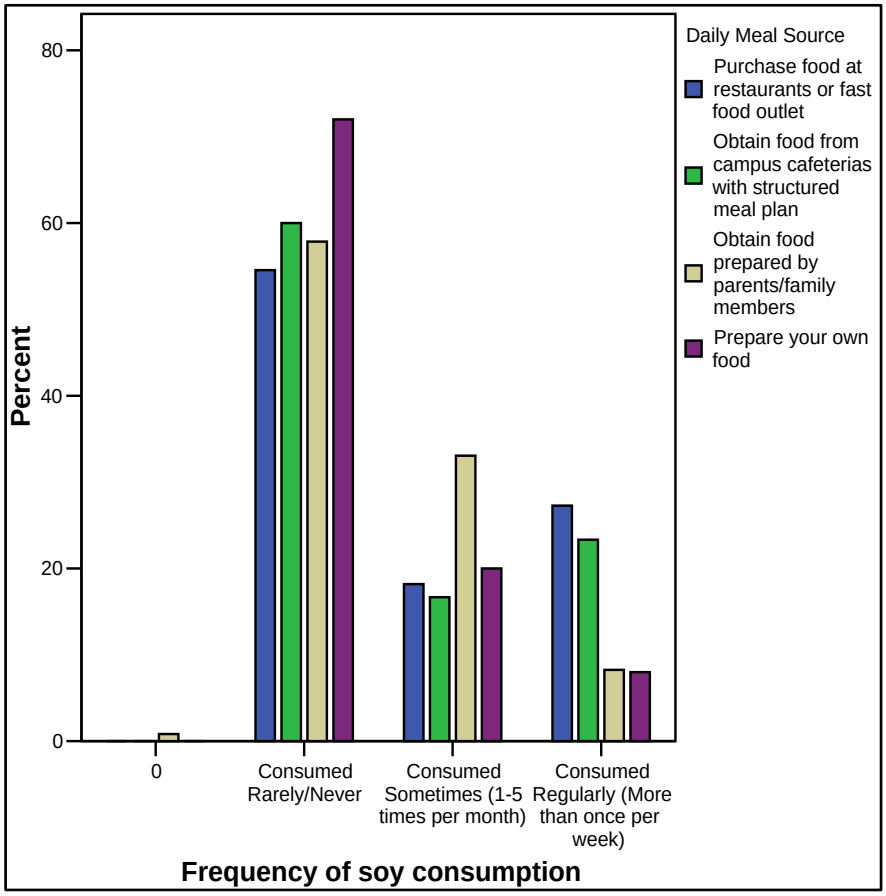
Residence is significantly associated with soy consumption, as there is a p value of 0.031. See Graph 13.

Graph 13. Bar chart showing the Frequency of Soy Consumption grouped by Residence. P value for Chi Squared test is 0.031



Persons that purchase food at restaurants or fast food outlets consume soy most often, whereas persons that prepare their own food consume soy least often. See Graph 14.

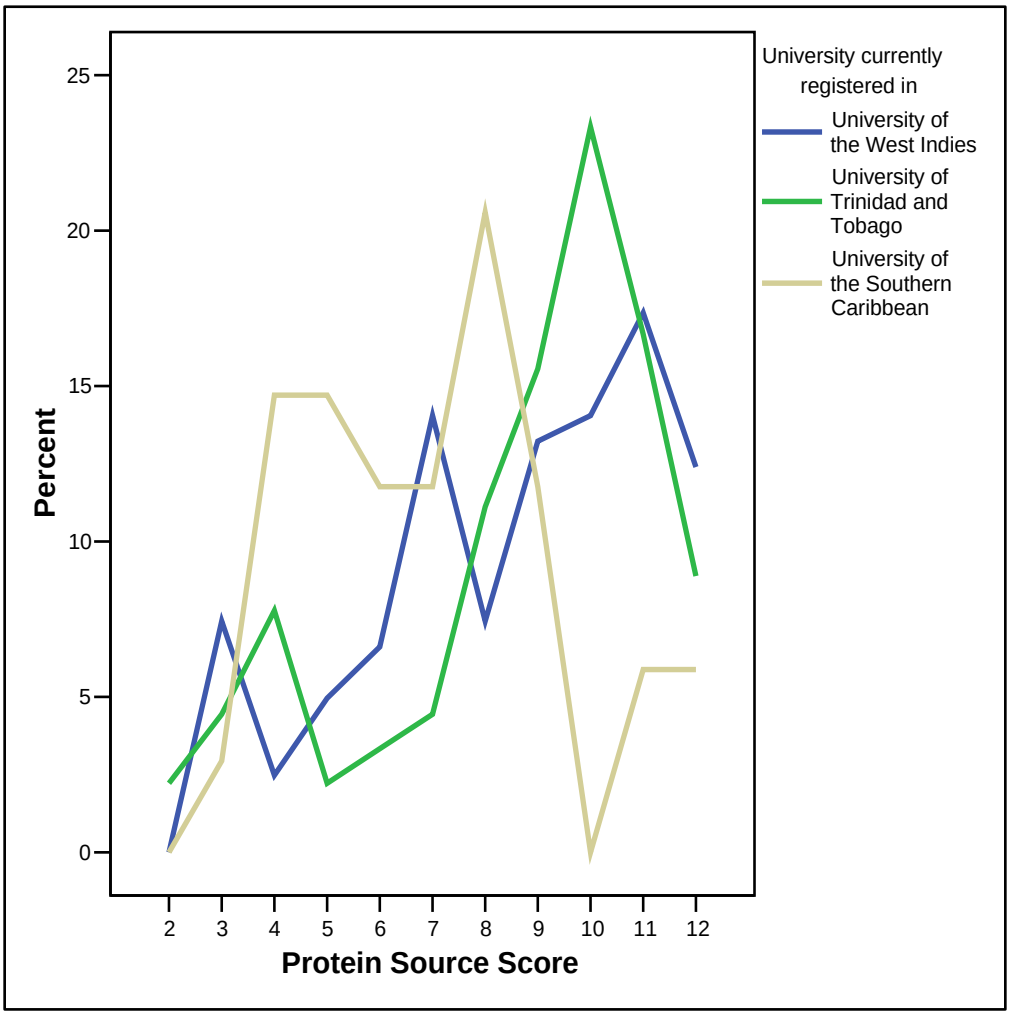
Graph 14. Bar chart displaying Frequency of Soy consumption grouped by Daily Meal Source. P value for Chi square test is 0.021.



Comparison of protein choices among Trinidad universities

Students registered at the University of the West Indies consume the most sources on average as compared to the University of the Southern Caribbean and the University of the West Indies. USC has the least diversity among the three universities with respect to dietary protein sources as seen in Graph 15.

Graph 15. Line Graph of a three-way university comparison of students' protein food choices scores.



DISCUSSION

According to Lin et al. (2010), the most frequently consumed protein source is chicken which is consumed regularly or more than once per week by 77.1% of the population. However, beef is not one of the most consumed sources as suggested by Smit et al. (1999). In the current study, similar diet trends were also observed. This was generally due to the fact that many respondents recorded not eating beef due to their religion, either Hindu, Seventh Day Adventist or being vegetarian. This allows the rejection of the relevant null hypothesis, in stating that University students do not consume some protein sources more frequently than others.

In comparing Post hoc Analysis for reasons for the factors encouraging protein consumption, Daily Meal Source influences persons' sensitivity to Availability of a Protein Source. Persons that obtain foods from cafeterias are more influenced by what is available to them than those that purchase foods at restaurants and those that obtain food prepared by family members. The p values are 0.016 and 0.002 respectively for this factor. This is because most cafeterias have strict menu plans which have no variety. Restaurants tend to have options with respect to protein food sources. There is a p value of 0.016 for this factor. Also, in the study by Scheibenne et al (2014) it is stated that when another person purchases and prepares the food in the household, there is more variety and diversity in the diet. Therefore persons that obtain food from cafeterias with meal plans are more affected by availability than others. This may be due to the lack of variety of protein sources in such cases.

Females make different choices than males in this study population, which is in keeping with the literature (Pollard et al, 1998) that states that women have generally healthier diets and attribute a greater importance to weight control than men. Women therefore make different food choices than men. It is shown particularly in the frequency of Duck, Chicken and Turkey consumption.

Race also has a correlation with duck and beef consumption. It seems that with a p value of <0.001, duck consumption is not equal across all races. Persons of African descent consume duck meat least often as compared to other groups (Graph 7), whereas persons of Indian descent consume duck meat most often as compared to other groups. This may be due to the cultural factors that underlie race in Trinidad and Tobago. Food preparation varies across cultures in Trinidad and Tobago. Beef is also correlated with race, where there is a p value of <0.001 seen in Graph 8. Persons of Indian Descent consume Beef least often of all groups, also due to culture, where Hinduism is prominent in Trinidad.

In the 1999 study by Smit et al, this proof is well documented that race and ethnic influences affect protein source consumption on a large scale, more so than other intrinsic factors. Overall, it seems that Gender and Residence have the greatest effect on protein source consumption. Meal source and race also have significant effects of protein food source consumption.

Dietary Protein Scores were used, where out of 12 sources of dietary protein; the scores were computed by adding the total number of sources each person consumes in the study population, using SPSS. In conducting Post Hoc analysis of the three Universities, there is statistical significance in the Protein Excluded from diet score, out of 12 sources of protein (Graph 15). It seems that USC consumes significantly less sources of protein overall, than UWI AND UTT with p values of 0.001 and <0.001 respectively. The mean Protein Excluded from diet Score for USC is 4.59 sources of protein, whereas UWI and USC have scores of 2.86 and 2.52 respectively. This may be due to the fact that USC has a higher population of religious or Seventh Day Adventist students that are restricted from protein sources such as Pork, Seafood, Duck and Beef. UWI and UTT have a high population of Hindu students that must not consume Beef and in some cases, Pork. Also, they contain many Muslim students that must not consume Pork.

In analysing the Score for Protein Sources Included in the Diet, the same is found, where UWI and UTT consume a mean of 8.54 and 8.63 sources of protein respectively, whereas, USC consumes a

mean of 7 sources on average. The statistical significance provided a value of 0.008 with USC compared to UWI and 0.007 for USC compared to UTT.

The factor discouraging protein consumption; 'availability of protein sources' is also determined by a score of 12 sources. This seems to be significant when comparing USC to UTT, where there is a p value of 0.033 when Post Hoc Analysis is conducted. More persons at USC are affected or influenced by availability than those at UTT, where there is a mean difference of 0.527 for availability which is statistically significant. This may be due to the limited food availability near the St. Joseph campus of USC, which is far from any main town, as compared to UTT which is situated in a main city in San Fernando. Also, many persons in USC rent on campus as opposed to UTT students that mainly live at home. Health is also seen as a factor of discouragement as there is a p value of 0.041 for the comparison of USC to UTT students. USC students are also more discouraged by health concerns than UTT students. This may be due to the areas of study, where in the literature, knowledge of nutrition encourages an interest in dietary sources, and many students of UTT are only studying engineering, whereas USC students are from a variety of disciplines.

Therefore, it is concluded that dietary protein choices are different across the three universities and the relevant null hypothesis is rejected. This is supplemented by the fact that availability affects the USC students most, possibly due to the location of the University, away from main cities, as opposed to the situation of UWI and UTT's campuses near populous districts and towns. Also, protein sources are varied more often when comparing USC to the other Universities, as USC is a religious institution, consisting of many Seventh Day Adventist students, who are restricted in their protein source consumption.

CONCLUSION

Overall, chicken is consumed most frequently by most students in the three universities, which is consistent with previous research in this field.

Demographic Characteristics affect food choices more than most other factors, where Gender, Race and Religion play an important part of students' dietary choices. Additionally, various living arrangements pose a great association with dietary protein choices. This adheres to many scientists' postulation that food choice is affected by many intrinsic and extrinsic factors, and comprises the study of many different social and biological disciplines.

Across the three universities, USC contains the population with the least variety of dietary protein sources, due to its Seventh Day Adventist status, which restricts consumption of certain foods like pork, duck and seafood.

Generally, the protein food choices of students across all three university campuses in Trinidad, are affected by many different factors.

RECOMMENDATIONS & LIMITATIONS

More females participated in the study, however, more males responded from UTT. This can be attributed to the fact that the field of study of this university is engineering, which more males tend to pursue. A more even distribution of gender in participants may have produced more accurate results.

A comparison of students' knowledge of nutritional value may have proved useful in comparing other important reasons for consumption of certain protein food choices.

In performing interventions in students' dietary intakes, it is useful to consider culture, religion and availability.

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APPENDIX

QUESTIONNAIRE

Dear University Student, my name is Leandra Ramoo. I am a final year undergraduate student at the University of the West Indies conducting a survey to aid in my research in the field of Human Nutrition and Dietetics. This survey is designed to understand consumer choices of dietary protein sources in university students. This questionnaire is completely anonymous. Please fill out the appropriate response for each question. Thank you for your consent and participation.

Section A

Please tick the appropriate response.

1. **Age Group:** □15- 20 □21-25 □26-30 □31-35 □36-40 □>40
2. **Gender:** □Female □Male
3. **What University do you currently attend?:**
   □University of the West Indies(U.W.I.) □University of Trinidad and Tobago(U.T.T.)
   □University of the Southern Caribbean(U.S.C.)
4. **Where do you stay during the school year? :**
   □At Home □On hall or on campus □ Rental apartment or room near campus
5. **Race:** □Afro-Trinidadian □Indo-Trinidadian □Caucasian
   □Mixed □Other_____*(specify?)*
6. **Please select which ONE of the following options that you obtain most of your food from on a daily basis:**
   □Purchase food at a restaurants or fast food outlet
   □Obtain food from campus cafeterias with structured meal plans
   □Obtain food prepared by parents/family members
   □Prepare your own food

Section B

1. **How often do you consume the following foods/food products?**
   Please tick the appropriate boxes.

	Rarely/Never (< than once per month)	Sometimes (1-5 times a month)	Regularly (More than once a week)
Chicken			
Turkey			
Duck			
Beef			
Pork			
Goat			
Fish			
Other seafood (e.g. shrimp, lobster, etc)			
Eggs			
Dairy Cheese/ Dairy Cheese items			
Peas or Beans			
Soy/TVP Products (e.g. tofu, soya chunks, veggie burger, gluten, etc.)			

2. **Please indicate if any of the foods listed below are not included your diet by checking 'NOT INCLUDED IN DIET' and also checking under the main reason/s for your not eating the food item.** (*You may select more than one reason.)*
3.

Food Name/s	**NOT INCLUDED IN DIET**	**REASON/S FOR EXCLUSION FROM DIET**						
		Religious reasons *(Please name religion below)*	**Too costly**	**Dislike Taste/ Flavour**	**Not widely available to you**	**Allergy to the food**	**It is unhealthy / unclean**	**Other** *(please specify?)*
Chicken								
Turkey								
Duck								
Beef								
Pork								
Goat								
Fish								
Other seafood (e.g. shrimp, lobster, clam, etc)								
Eggs								
Dairy Cheese/ Dairy Cheese items								
Peas or Beans								
Soy/TVP Products (e.g. tofu, soya chunks, veggie burger, gluten, etc.)								

4. **Please indicate which of the following foods you consume and select the reason/s why you do consume such foods by checking under the appropriate response.** *You may select more than one reason.*

Food Name/s	**INCLUDED IN DIET**	**REASON/S FOR CONSUMING FOOD**					
		Affordable	**Tasty**	**Widely available**	**It is prepared at home / in cafeterias**	**It is healthy**	**Other *(please specify?)***
Chicken							
Turkey							
Duck							
Beef							
Pork							
Goat							
Fish							
Other seafood (e.g. shrimp, lobster, clam, etc)							
Eggs							
Dairy Cheese/ Dairy Cheese items							
Peas or Beans							
Soy/TVP Products (e.g. tofu, soya chunks, veggie burger, gluten, etc.)							