



**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:** Knowledge, Perception and Acceptance of Coconut Water as a functional food among consumers in Trinidad

**Student Name:** Ronella Rajkumar

**Project Supervisor:** Dr. Neela Badrie

**Year Submitted:**

Department of Agricultural Economics & Extension  
Faculty of Food and Agricultural

**KNOWLEDGE, PERCEPTION AND ACCEPTANCE OF COCONUT WATER AS A  
FUNCTIONAL FOOD AMONG CONSUMERS IN TRINIDAD.**

**A Research Paper**

**Submitted in Partial requirements for HUEC 3012**

**Of**

**The University of the West Indies**

**RONELLA RAJKUMAR**

**ID: 810002111**

**PROGRAM: HUMAN NUTRITION AND DIETETICS**

**SUPERVISOR: PROF. NEELA BADRIE**

## TABLE OF CONTENTS

<u>ACKNOWLEDGEMENTS</u> .....	i
<u>LIST OF TABLES AND ILLUSTRATIONS</u> .....	ii
<u>ABSTRACT</u> .....	1-2
<u>INTRODUCTION</u> .....	3-6
1.0 <u>Background</u> .....	3-4
1.1 <u>Purpose of the Study</u> .....	5
1.2 <u>Rationale of the study</u> .....	5
1.3 <u>Research Question</u> .....	5
1.4 <u>Hypotheses</u> .....	6
1.5 <u>Aim</u> .....	6
1.6 <u>Specific Objectives</u> .....	6
<u>LITERATURE REVIEW</u> .....	7-9
2.0 <u>Theoretical Framework</u> .....	8-9
<u>METHODOLOGY</u> .....	10-13
3.0 <u>Subjects/ Participants</u> .....	10
3.1 <u>Study Design and Procedure</u> .....	11-12
3.2 <u>Statistical Analyses</u> .....	13

<u>RESULTS</u> .....	14-24
4.0 <u>Demographic Characteristics</u> .....	14-15
4.1 <u>Knowledge on Functional Foods</u> .....	16-17
4.2 Consumption Patterns of Coconut Water.....	18-23
4.3 Perception of Coconut Water.....	24
<u>DISCUSSION</u> .....	25-27
<u>LIMITATIONS</u> .....	28
<u>RECOMMENDATIONS</u> .....	29
<u>CONCLUSION</u> .....	30
REFERENCE.....	31-34
APPENDIX.....	35-39

## **ACKNOWLEDGEMENTS**

The successful completion of this project was due to the many people who played a crucial role in guiding and motivating me during my study. Firstly, my deepest gratitude goes to the Almighty God for giving me the strength, knowledge and understanding to fulfill the goals and objectives of my study. My sincere appreciation is extended to my supervisor Professor Neela Badrie for her guidance and support during the course of my project. Also, my greatest gratitude goes to Dr. George Legall who assisted me with interpreting and analyzing data on SPSS system. Thank you to my family and friends for your endless support throughout the project and finally thanks to all the consumers who cooperated and participated in the study, without you all the research would not have been possible.

## LIST OF TABLES AND ILLUSTRATIONS

Table 1: Showing Demographic Profile of the Study Population (n=384).....	15
Table 2: Showing Percentage of Respondents Awareness of Functional Food .....	16
Table 3: Showing Knowledge of Respondents on the Functional Properties of Coconut Water..	17
Figure 1: Column Graph Showing the Consumption of Coconut Water by Consumer.....	18
Table 4: Showing Reasons for Consuming Coconut Water.....	19
Table 5: Showing Type, Times and Ways Coconut Water Consumed and the purchase of coconut water.....	21
Table 6: Shows Consumption of Other Functional Foods.....	22
Figure 2: Bar Graph Showing the Reasons for Consuming Fresh Coconut Water Over Bottled Coconut Water.....	23
Table 7: Showing the Perception of Coconut Water by Respondents .....	24

## ABSTRACT

**Objective:** Chronic diseases are the leading cause of death in Trinidad. Consumer awareness on functional foods and the health benefits of drinking coconut water can encourage healthier food selections and improve the health status of individuals. Thus, the purpose of this study was to investigate consumer knowledge, perception and acceptance of coconut water as a functional food among consumers in Trinidad.

**Method:** A self-administered questionnaire was used to collect data on demographics, knowledge and consumption of coconut water from the target population which consisted of 384 consumers, males (n=209) and females (n=174) who visited local supermarkets in Trinidad. Pearson chi square, descriptive statistics and one way ANOVA was used to analyze data.

**Results:** More than half of the respondents (61.5%) were aware of functional foods and majority, (90.6%) consumed coconut water. There was a significant association between perception of the importance of drinking coconut water and whether or not respondents drank. Consumers (63.8%) stated that the key reasons for drinking coconut water was due to its taste, health benefits of flushing the kidneys and bladder (77.3%), preventing dehydration (64.9%) and boosting the immune system (32.5%). Consumers (63.0%) preferred fresh coconut water over bottled coconut water because of flavor changes (37.6%) and the price of bottled coconut (41.3%).

**Conclusion:** There is a high consumption of coconut water in Trinidad. However, an increase in consumer awareness on the functional properties of coconut water and other functional foods is needed.

**Keywords:** functional foods, coconut water, acceptance, knowledge, consumer, perception, health benefits, lifestyle diseases, beverage.

## **INTRODUCTION**

## **1.0 Background:**

Many foods possess a variety of health benefits and this may lead one to think that all foods are functional foods. Functional foods are defined by Health Canada as foods that are generally consumed in the diet which provides additional health benefits and may lessen the risk of ailments beyond the normal nutritional outcome. Food that are natural or products that are modified or had substances added, removed or combined are considered functional foods (Poulsen 1999).

Coconut water is a natural nutritious beverage that is widely used by athletes, elderly and normal persons. It is considered a functional food or nutraceutical as it contains several biologically active components and possesses heart and liver protective properties as well as hypo- lipidemic and anti- hypertensive properties (Preetha et al, 2013). The popularity of functional foods has increased worldwide today due to its countless health claims. In addition, the demand for functional foods has grown over the years due to an upsurge in non-communicable diseases throughout the world (Saat et al, 2002). The Health Belief Model explains that consumers are more willing to select healthier choices or opt for functional foods if they think it may lessen their exposure to diseases.

Additionally, despite the demand for functional foods it was observed that before consuming a product individual consider factors such as the added benefit to be received, the nutritional value as well as the cost, convenience and taste of the product (Verbeke 2008).

Coconut water the clear liquid found inside of a coconut (*Cocos nucifer*) has recently emerged as a functional food and commonly known as one of creation's greatest multipurpose substances (Adkins et al. 2006). Some constituents of coconut water are sugars, vitamins, minerals, amino

acids and phyto-hormones. This invigorating drink is extensively consumed by many individuals due to these distinctive components (Yong et al. 2009). However, due to limited studies that have been done in relation to the level of awareness on coconut water and functional foods by consumers in Trinidad , there is the need to investigate the level of knowledge, perception and acceptance of coconut water as a functional food among consumers in Trinidad.

### **1.1 Purpose of the Study:**

The purpose of this study was to investigate consumer knowledge, perception and acceptance of coconut water as a functional food among consumers in Trinidad.

## **1.2 Rationale of the Study:**

Healthier food choices are associated with a higher life expectancy. Thus, participating and adapting to healthy eating habits by consumers such as balanced diet, reduced fatty intake, moderate alcohol consumption and reduced sugars can help improve their well – being.

In Trinidad and Tobago, according to the Ministry of Health (MOH's) Health Report Card 2011 these healthy eating practices can reduce the amount of deaths associated to chronic non-communicable ailments since, consuming healthier foods and food products will lessen the development of risk factors associated with cardiovascular diseases, cancer, diabetes and strokes that may end in death.

Additionally, it is known that coconut water can be used in a variety of ways however consumer knowledge of its countless benefits is uncertain and there are limited studies in relation to the perception and acceptance of functional foods in Trinidad and Tobago. Thus, there is the need to assess consumer knowledge, perception and acceptance of coconut water as a functional food among consumers in Trinidad.

## **1.3 Research Question:**

What is the association between the knowledge and perception of coconut water among consumers and actual acceptance and use of it as a functional food?

## **1.4 Hypothesis:**

1. Consumption of coconut water as a functional food is higher among consumers who perceive it as having health benefits.

2. There is a positive relationship between knowledge, attitude and perception of coconut water.
3. Consumption of coconut water is higher than other functional foods.

### **1.5 Aim:**

To evaluate consumer knowledge, perception and acceptance of coconut water as a functional food among consumers in Trinidad.

### **1.6 Specific Objectives were to:**

1. Assess consumer knowledge on the functional properties of coconut water.
2. Evaluate the reasons for drinking coconut water.
3. Determine the consumption frequency of coconut water throughout Trinidad.
4. Evaluate the correlation between the importance of drinking coconut water and maintaining a healthy lifestyle.
5. Determine the association between consumer perception and acceptance of coconut water.
6. Evaluate consumer preferences between fresh coconut water and bottled coconut water.

## **LITERATURE REVIEW**

For most people the concept of functional food is new and their attitude towards it depends on how they perceive functional foods and what they link it with. A study conducted on Danish

consumers revealed that those who did not have a clear understanding of the term functional foods linked it to unnatural foods. However, when functional foods were compared to genetically modified foods, it was seen as healthier (Jonas and Beckmann 1998).

In different parts of the world different factors are used to evaluate the characteristics of food and similarly various reasons may determine the consumption of food products. A study done by Raats and Shepherd (1992), show that Finnish, Dutch and British considered low fat milk as “healthy”. On the other hand, the French referred to it as being “digestible”. This simply states that culture influences nutrition and the type of foods consumed. In addition to culture, there may be an association with age and gender towards the consumption of functional foods. Studies revealed that women are usually more concerned about functional foods due to their elevated interest in fitness and wellbeing (Urala & Lähteenmäki 2007). Additionally Poulsen (1999) stated that older age consumers were more eager to consume functional foods as oppose to younger consumers due to the perception of themselves being greater expose to conditions.

With regards to the acceptance of a product studies showed that before consuming a product, individuals consider factors such as the added benefit to be received, the nutritional value as well as the cost and taste of the product (Verbeke 2008). Specifically, taste has been an important feature in consumer’s willingness to accept functional foods. The likelihood of consumers giving up taste for foods that are nutritious is small (Verbeke, 2006; Urala & Lähteenmäki, 2004).

Coconut water is a very familiar product however; the health benefits or disease preventing characteristics known as its functional properties is not familiar to many consumers (Hall 2009). Coconut water has a high content of antioxidants and nutrients including potassium, sodium, chloride and many others. Some of its known benefits are its effectiveness in controlling

glaucoma, cholesterol, increasing metabolism, removing kidney stones and flushing the bladder (Santoso 1996). According to the International Food Information Council a lack of knowledge and consumer awareness on a product as well can result in low consumption of that product. Therefore, a lack of knowledge can affect the consumption of coconut water. Studies show however that coconut water is regarded as the optimum hydrating drink in various tropical countries worldwide (Kuberski 1979).

In another study, Bech-Larsen stated that in order to change consumer perception and inform consumers on the true benefits of foods, health claims will have to be included on nutrition fact label.

## **2.0 Theoretical framework**

The health outcome of an individual is linked to eating and diet practices. In support of published literature it is evident that the health behavior of individuals is influenced by many emotions and intellectual factors. The Health Belief Model (HBM) which describes and forecast health behaviors can be applied to the study of consumer knowledge, perception and acceptance of coconut water in Trinidad. It is a psychological model which was developed in response to a tuberculosis screening program which revealed that participation is based on perceived susceptibility, severity, benefit, barriers, specific cues and self-efficacy (Rosenstock 1988).

Perceived susceptibility is based on the perception of an individual that they are exposed to a health risk. Higher an individual think they are at risk, the more likely they will participate in actions to decrease the risk of contracting a disease (de Wit et al 2005). Therefore, from this study consumers may increase their consumption of coconut water as a functional food as a means of decreasing their risk. Perceived severity refers to what impact a person thinks the

disease will have on their lifestyle and the consequences of the condition (Mc Cormick – Brown 1999). Persons who perceive a higher severity will take a direct action to prevent the disease. In the study conducted consumers who were aware of the functional properties of coconut water and its ability to lessen the risk of diseases were more willing to consume it.

Perceived benefit refers to the view of an individual that selecting healthier choices may lessen their exposure to diseases. From the study results showed that most respondents consumed coconut water due to its ability to flush the kidneys and bladder. Perceived barrier is the negative factors such as convenience and price of a product seen by a person. It has a great impact on behavior changes of a person. The only way new behaviors are practiced is if a person perceives that the barriers are less than the benefit (Janz and Becker 1984). Similarly, respondents consumed coconut water because the health benefits outweighed the risk of diseases.

According to Rosenstock et al, the health behavior of an individual is also based on cues to action and the belief in oneself that they are ready to take action. If someone perceives that there are benefits but think that they do not have the ability to act, there is a high probability that they will not make an attempt.

## **METHODOLOGY**

### **3.0 Subjects/ Participants**

In this cross-sectional study, consumers visiting local supermarkets in five regions namely North, South, Central, East and West Trinidad, was selected to represent the sample size. A five percent level (95% Confidence Interval) and the equation  $n = Z^2_{1-\alpha/2} P (1-P)/d^2$  was used to

determine the number of consumers; where  $n$  = sample size,  $Z^2_{1-\alpha/2}$  = confidence interval,  $P$  = estimated proportion,  $d^2$  = desired precision.

The sample population comprised of three hundred and eighty four (384) consumer with males ( $n= 209$ ) and females ( $n= 174$ ). Eligibility criteria included consumers from the five (5) regions who visited local supermarkets. Exclusion criteria were consumers who visited local supermarkets that were not in North, South, Central, East and West Trinidad.

### **3.1 Study Design and Procedure**

The study was conducted as a survey using a questionnaire (which can be found in Appendix A) as the method of data collection. The questionnaires were randomly self-administered; that is consumers were not prejudged according to some standard or inherent characteristics and no personal interview was conducted in the study. It took approximately ten minutes between start

and completion of the questionnaire. A primary field test was conducted with five (5) consumers to pretest the questionnaires before it was distributed. The five (5) consumers were interviewed after completing the questionnaires to gain feedback on whether the questions were clear and understandable. The necessary adjustments were made so participants would better understand the questions and to ensure that the questionnaire was broad enough to gather the required data to address the aims and objectives of the study and measure what it was intended to measure.

A total of twenty six (26) questions were asked. The questionnaire was separated into three sections which include:–

- Knowledge question - six (6) questions which addressed what is a functional food, the functional properties of coconut water and familiarity of coconut water as a functional food.
- Consumption of coconut water – one (1) ranking scale question on the importance of drinking coconut water, nine (9) multiple choice questions based on reasons for consuming coconut water; the ways, type and frequency coconut water was consumed, factors that influenced the consumption of fresh coconut water as opposed to bottled coconut water, the health properties of coconut water as a functional food and the consumption other functional foods.

There were four (4) ‘yes’ and ‘no’ or ‘do not know’ questions, which addressed the consumption of coconut water if it will improve health status, the consumption of coconut water over modern day medicine and knowledge on the health benefits of coconut water.

- Demographic – questions were based on the sex, age, ethnicity, region of residency, occupation and level of education.

The questionnaires were distributed to individual consumers visiting local supermarkets in Trinidad during the 7<sup>th</sup> October, 2013 to the 28<sup>th</sup> October, 2013.

### **3.2 Statistical Analysis**

The Statistical Package for the Social Sciences (SPSS) Software, version 17.0 for Windows and Microsoft Office Excel 2010 were analyzed used to analyze and interpret data.

The results acquired were evaluated using frequency tests and percentages for the demographic data to describe the different characteristics of the study sample population, the consumption of

coconut water, awareness of functional foods and the type, times and ways coconut water was consumed by respondents.

The knowledge of respondents on the functional properties of coconut water, the consumption of coconut water if it will improve health status, the consumption of coconut water over modern day medicine and the importance of drinking coconut water to maintain a healthy body were analyzed using cross tabulations and Pearson's Chi – Square test, p – values that were  $\leq 0.05$  were considered statistically significant.

## **RESULTS**

### **4.0 DEMOGRAPHIC CHARACTERISTICS**

Out of a total of 400 questionnaires distributed, 384 (96%) were returned. Results of data analysis on the frequency distributions of selected demographic variables are reported in this

chapter. As seen the sample were predominantly males 54.4%; (n=209) and between the ages of 19-29 years 46.4% (n=178). The ethnic composition of the respondents were equally distributed between respondents of Afro Trinidadian 39.6%; (n=140) and Indo-Trinidadians 38.8%; (n=149). The majority of the respondents were from Central Trinidad 23.4%; (n=90) and has completed tertiary education 57.0%; (n=219).

**Table 1: Showing Demographic Profile of the Study Population (n=384)**

<b>Characteristics</b>	<b>Categories</b>	<b>Frequency</b>	<b>Percent %</b>
Sex	Male	209	54.4
	Female	174	45.3
Age	≤18	54	14.0
	19- 29	178	46.4

	30-49	102	26.6
	>50	50	13.0
Ethnicity	Indo - Trinidadian	149	38.8
	Afro - Trinidadian	140	36.5
	Chinese	10	2.6
	Hispanic	20	5.2
	Caucasian	11	2.9
	Others	54	14.1
Area of Residence	North	68	17.7
	South	80	20.8
	East	87	22.7
	West	59	15.4
	Central	90	23.4
Education	Primary	39	10.2
	Secondary	126	32.8
	Tertiary	219	57.0

#### **4.1 KNOWLEDGE ON FUNCTIONAL FOODS**

With regards to how alert consumers were on functional foods table 2 indicated that majority of respondents 61.5%; (n=236) were aware of functional foods, coconut water as a functional food and its health benefits.

**Table 2: Showing Percentage of Respondents Awareness and Knowledge of Coconut Water as a Functional Food**

<b>Variable</b>	<b>Response n (%)</b>	
	<b>Aware</b>	<b>Unaware</b>
Awareness of functional foods	236 (61.5%)	148 (38.5%)
Awareness of coconut water as a functional food	278 (72.4%)	106(27.6%)
Knowledge on the health benefits of coconut water	236 (61.5%)	148 (38.5%)

Table 3 display the knowledge of respondents on the functional properties of coconut water which was analyzed using cross tabulations and Pearson’s Chi – Square test at a 0.05 level. Results showed that there were major differences between respondent’s response for flushes kidneys and bladder, prevent dehydration and boost immune system among those that drank coconut water and who did not. Respondents who were more knowledgeable of the health benefits of coconut water were more interested in drinking it.

**Table 3: Showing Knowledge of Respondents on the Functional Properties of Coconut**

**Water**

Variable	Coconut water consumer type n (%)		
	Drink	Do not drink	p-value
Prevents diseases	80(23.0)	116(77.7)	0.592
Flush kidneys and bladder	269(77.3)	15(48.4)	0.000
Assist in weight loss	59(17.0)	6(19.4)	0.563
Increases blood glucose	26(83.9)	279(80.2)	0.482
Anti - aging properties	51(14.7)	4(12.9)	0.632
Strengthen muscles	24(6.9)	1(3.2)	0.612
Lowers cholesterol and pressure	71(20.4)	6(19.4)	0.998
Rich source of nutrients	172(49.4)	11(35.5)	0.214
Improves blood circulation	68(19.6)	6(19.4)	0.545
Prevents dehydration	226(64.9)	9(29.0)	0.000
Boost immune system	13(32.5)	9(29.0)	0.008

**4.2 CONSUMPTION PATTERNS OF COCONUT WATER**

Figure 1 is a column graph which shows the consumption of coconut water by consumers (n=384). Majority of the consumers 90.6% (n=348) drank coconut water; while 8.1% (n=31) did not drink coconut water and 1.3% (n=5) never drank coconut water.

**Figure 1: Column Graph Showing the Consumption of Coconut Water by Consumers**

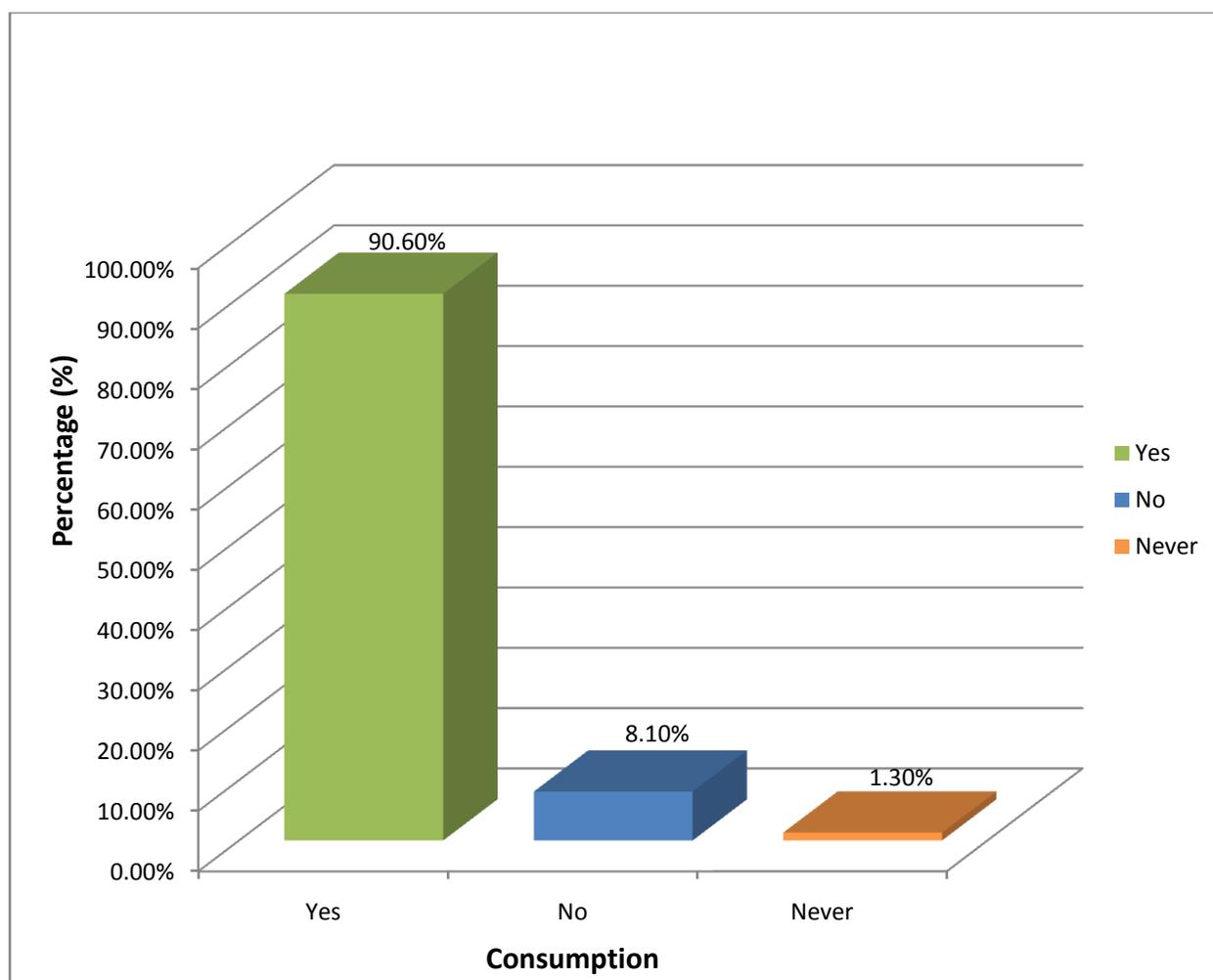


Table 4 states that taste (63.8%) is the major factor that contributed to the consumption of coconut water in Trinidad and price (6%) barely affects the consumption of coconut water.

**Table 4: Showing Reasons for Consuming Coconut Water**

Variable	Frequency	Percent %
Health benefits	202	52.6
Price	23	6
Taste	245	63.8

Directed by a doctor	50	13
Convenience	107	27.9
Other	19	4.9

Table 5 provides results on the type, times and ways coconut water consumed and the purchase of coconut water. From results obtained, the majority of the respondents 63% (n= 218) consumed fresh coconut water, followed by 31.2% (n=108) consumed both fresh and bottled coconut water and the minority of the respondents 5.8% (n=20) consumed bottled only.

Moreover, the majority of the respondents reported that they consumed coconut water once per week 39.0% (n=85), while 16.5% (n=36) consumed coconut water 2 times per week. The

minority of the respondents 7.8% (n=17) consumed coconut water 3 times per week. Additionally, it was reported that 36.7% (n=80) consumed coconut water at other times such as monthly or whenever it is available from their trees at home.

From the study, results showed that a significantly high percentage of respondents 65.6% (n=143) consumed coconut water as a thirst quenching beverage, followed by 28.4% (n=62) who consume coconut water as an energy drink, while 23.9% (n=52) consume coconut water as a chaser, 13.8% (n=30) consume coconut water with foods and the minority of the respondents 5.0% consumed coconut water in other ways.

**Table 5: Showing Type, Times Ways Coconut Water is Consumed and the Purchase of Coconut Water.**

	Frequency	%
<b>Type of coconut water consumed:</b>		
<b>Bottled</b>	20	5.8
<b>Fresh</b>	218	63.0

<b>Both</b>	108	31.2
-------------	-----	------

<b>Times consumed:</b>		
<b>Once per week</b>	85	39.0
<b>2 times per week</b>	17	7.8
<b>Other</b>	80	36.7

<b>Ways coconut water most often consumed</b>		
<b>Thirst quenching beverage</b>	143	65.6
<b>Energy drink</b>	62	28.4
<b>Chaser</b>	52	23.9
<b>With food</b>	30	13.8
<b>Other</b>	11	5

<b>Purchase:</b>		
<b>Yes</b>	248	64.6
<b>No</b>	136	35.5

Table 6 shows that there is a high consumption of other functional foods such as yogurt (56.0%), however, the consumption of coconut water is higher (90.0%).

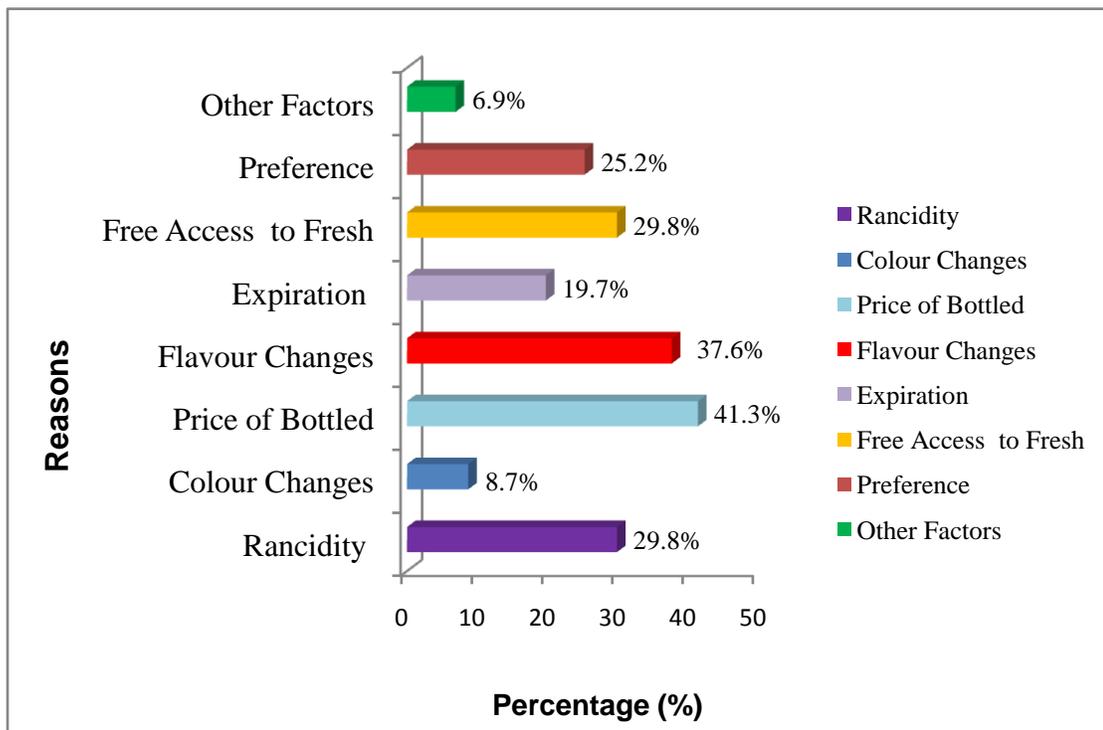
**Table 6: Showing the Consumption of Other Functional Foods**

Variable	Frequency	Percent %
Yogurt	215	56.0
Fortified cereals	141	36.7
Fortified drinks	110	28.6
Other functional foods	28	7.3

Figure 2 shows respondent's reasons for consuming fresh coconut water opposed to bottled coconut water. Majority of the respondents 41.3% (n=90) consumed fresh coconut water due to the price of bottled coconut water, whereas 37.6% (n=82) consumed fresh coconut water because of flavor changes associated with bottled coconut water. An equal distribution of respondents

29.8% (n=65) consumed fresh coconut water due to its free access and the rancidity of bottled coconut water. However, 25.2% (n=55) generally prefer fresh coconut water over bottled coconut water and 19.7% (n=43) consume fresh coconut water due to the expiration of bottled coconut water. Additionally, a minority of 8.7% (n=19) and 6.9% (n=15) of the respondents consumed fresh coconut water because of color changes in bottled coconut water and other factors respectively.

**Figure 2: Bar Graph Showing the Reasons for Consuming Fresh Coconut Water Over Bottled Coconut Water**



**4.3 PERCEPTION OF COCONUT WATER**

Table 7 show that there was a significant association between perception of the importance of drinking coconut water and whether or not respondents drank. Persons who drank coconut water were more likely to claim that coconut water is better than typical sport drinks (66.1%) and that

drinking coconut water is important to maintain a healthy body (73.3%) and improve health status (93.4%).

**Table 7: Showing the Perception of Coconut Water by Respondents**

Variable	Coconut water consumer type n (%)		
	Drink	Do not drink	p-value
Would you consume coconut water if it improves health status?	325 (93.4)	23 (74.2)	0.001
Chose coconut water over modern day medicine	192 (55.2)	11 (35.5)	0.106
Do you think it is important to drink coconut water to maintain a healthy body?	255(73.3)	31(2.03)	0.001
Thought that coconut water was better than typical sport drinks	230 (66.1)	12 (38.7)	0.001

## DISCUSSION

The demographic results showed that respondents were predominantly males 54.4%; (n=209) and mostly between the ages of 19-29 years, 46.4%; (n=178). Results did not display any link

between gender and age of the respondents on the awareness and consumption of coconut water as a functional food. Other studies however, revealed that women are usually more concerned about functional foods due to their elevated interest in fitness and wellbeing (Urala & Lähteenmäki 2007). Additionally, studies completed by Poulsen (1999), stated that older age groups were more eager to consume functional foods as oppose to younger consumers.

Although functional foods are new on the market, its popularity and awareness are continuously increasing. It was observed from this study that a great number of consumers 61.5%; (n=236) were aware of functional foods. Similarly, in Italy there has been a growing emphasis on functional foods and its impact on diet and general well-being (Poulsen 1999). Research has shown that many Italian people are selecting nutritious foods ahead of price (Nielsen 2007).

Coconut water possesses countless health benefits. From this study respondent who drank coconut water showed average knowledge on the functional properties of coconut water. Majority of consumers 77.3%; (n=269) selected the main health benefit of coconut water to be flushes kidneys and bladder, followed by 64.9%; (n=226) prevents dehydration and 49.4%; (n=172) rich source of nutrients. In support of the health benefits of coconut water Dr. Eugenio Macalalag stated “coconut water is known for its efficacy in preventing bladder infections and melting kidney stones.” In studies done by Campbell-Falck et al, showed that coconut water has been used since World War II to replenish the body stores and keep hydrated.

Majority of respondents 63.8%; (n=245) stated that the key reason for consuming coconut water was due to its taste. Before consuming a product individuals consider factors such as the added benefit to be received, the nutritional value as well as the cost and taste of the product (Verbeke 2008). Specifically, taste has been as important feature in consumer’s willingness to accept

functional foods. The likelihood of consumers giving up taste for foods that are nutritious is small (Verbeke, 2006; Urala & Lähteenmäki, 2004).

From the study it was noted that the consumption of coconut water 90.6%; (n=349) was higher than other functional foods. Studies show that the high consumption of coconut water is linked to its multi-purpose use and health benefits (Lopes 1993). Additionally, results showed that most consumers preferred fresh coconut water over bottled coconut water because of flavor changes and the price of bottled coconut. According to Santoso (1996), procedures used to preserve and package coconut water may require heat and this can cause alterations in taste and nutrients.

Coconut water has a high content of nutrients including potassium, sodium, chloride and many others. It is regarded as the optimum hydrating drink in various places worldwide (Kuberski 1979). Similarly, the findings of this study showed respondents recorded they consumed coconut water mostly as a thirst quenching beverage 65.6%; (n=143). It was also observed that the acceptance of coconut water as a functional food was based on the perception of its health benefits. Respondents (n=348) who thought that coconut water was important to maintain a healthy body consumed it more frequently. This is supported by the perceived benefit concept of the Health Belief Model, Rosenstock (1988) which stated that an individual may select healthier choices or opt for functional foods if they think it may lessen their exposure to diseases.

Furthermore, majority of respondents 55.2%; (n=192) chose coconut water over modern day medicine and many 66.1% (n=230) also agreed that coconut water is better than typical sport drinks. Conversely, research show when sport drinks were compared to coconut water the impact towards maintaining hydration were very close and differences on the rehydrating effects are

rare. In addition, studies show that some reasons for the selection of coconut water over modern day medicine may be due to coconut water being pure, and easily received into the body (Douglas et al 2012).

## **LIMITATIONS**

Some limitations encountered while conducting this study included:

1. Due to limited time to plan and prepare the study, an in-depth investigation was not permitted.
2. This study consisted of more males (54.4%) than females (45.6%).With the female's population being smaller this can be a bias in the study.
3. Respondents may have interpreted the questions asked in the study differently.
4. A full evaluation of the knowledge, acceptance and perception of the respondents may not have been allowed due to the structure and type of questions asked.
5. Respondents may not have answered truthfully on the questionnaires.
6. The studied population was not a full representation of Trinidad given that respondents (23.4%) were mainly from Central, Trinidad.

## **RECOMMENDATIONS**

1. To increase awareness of the functional properties of coconut water, health claims should be included on the nutrition fact panel of coconut water packages.
2. Promotional activities should be held by merchandisers at local supermarkets throughout Trinidad that will provide samples of coconut water and recipes including coconut water. This will improve consumer awareness as well as the possibility of increased sales.
3. Brochures, magazines and newsletters on the benefits of consuming coconut water should be made available in supermarkets, administrative buildings, hospitals and waiting rooms by distributors and health care providers as a means of promoting the health benefits of coconut water.
4. Given the rise of the death rate in the Caribbean, due to the prevalence of chronic diseases which was reported by the World Bank. The media should be used to educate consumers on the consequences of drinking coconut water and other functional foods.
5. To improve the health status of citizens in Trinidad, the Ministry of Health can implement programs and activities using coconut water and other functional foods to encourage a healthier lifestyle.

## CONCLUSION

World-wide many consumers have become interested in value added products and more importantly in food products that offer additional health benefits. Findings of this study revealed that majority of consumers were knowledgeable of the functional properties of coconut water and consumed coconut water regularly as a thirst quenching beverage. Consumers stated that it is important to drink coconut water to maintain a healthy body and that their main reason for consuming coconut water was due to its taste. Additionally, consumers reported that they would choose coconut water over modern day medicine and thinks that coconut water is better than typical sport drinks. From the study it was also observed that the consumption of coconut water was higher than other functional foods and a great number of consumers preferred fresh coconut water over bottled coconut water because of flavor changes and the price of bottled coconut water.

Even though the knowledge and acceptance of coconut water as a functional food is high among consumers in Trinidad, more can be done to increase consumer awareness of functional foods which may in turn improve the health status of many individuals.

## REFERENCE

1. Adkins, S.W., Foale, M. and Samosir, Y.M.S. 2006. "Coconut revival new possibilities for the 'tree of life'." Proceedings of the International Coconut Forum held in Cairns, Australia, 22–24 November, 2005. ACIAR Proceeding.
2. Becker, M. H and Rosenstock, I. M. 1984. "Compliance with medical advice." Health care and Human Behavior Conference, 1984, edited by A. Mathew, 135-152. London: Academic Press.
3. Campbell-Falck, D., Thomas, T., Falck, T.M., Tutuo, N. and Clem, K. 2000. "The intravenous use of coconut water." *Am. J. Emerg. Med.*, 18: 108–111.
4. Chavalittamrong, B., Pidatcha, P., Thavisri, U. 1982. "Electrolytes, sugar, calories, osmolarity and pH of beverages and coconut water." *Southeast Asian Journal Trop Med Public Health*, 13(3): 427-31.
5. De Wit, J. B. F., Das, E., & De Hoog, N. 2007. "Self-regulation of health communications: A motivated processing approach to risk perception and persuasion." *The scope of social psychology: Theory and Applications*. Hove, 2007, edited by In K. van den Bosch, M. Hewstone, M. Stroebe, H. Schut, & J. De Wit, 209–226. UK: Psychology Press.
6. Douglas, S., Kalman, F., Krieger, R, Diane., Richard J, Bloomer J. 2012. "Comparison of coconut water and a carbohydrate-electrolyte sport drink on measures of hydration and physical performance in exercise-trained men." *Int Soc Sports Nutr*; 9:1. Accessed October 6, 2013. doi: 10.1186/1550-2783-9-1.
7. IFIC (International Food Information Council). 1999. "Functional foods: Attitudinal research." *International Food Information Council Founda, IFIC*.

8. Janz, N. and Becker, M. H. 1984. "The health belief model: decade later." *Health Education Quarterly*, 11: 1-47.
9. Jonas, M. J and Beckmann, S.C. 1998. "Functional foods: consumer perceptions in Denmark and England" *MAPP*: 55, 10.
10. Kuberski, T., Roberts, A., Linehan, B., Bryden, R. Teburae, M. 1979. "Coconut water as a rehydration fluid." *N Z Med J*, 90(641): 98-100.
11. Lopes, M., A., Larkins B, A. 1993. "Endosperm origin, development and function." *Plant cell* (5): 1383–1399.
12. Macalalag, Eugenio. (Director of the Urology Department at the Chinese General Hospital). 2013. Interview by Ronella Rajkumar, Mt. Hope, St. Joseph, Trinidad and Tobago.
13. McCormick – Brown, K. 1999. "Health Belief Model." Accessed November 12, 2013. [http://hsc.usf.edu/~kmbrown/Health\\_Belief\\_Model\\_Overview.htm](http://hsc.usf.edu/~kmbrown/Health_Belief_Model_Overview.htm).
14. Ministry of Health. 2012. Accessed October 20, 2013. <http://www.health.gov.tt/>
15. Poulsen, J. B. 1999. "Danish consumers' attitudes towards functional foods." *Nr. Aarhus:MAPP*, 62: 1-49.
16. Poulsen, J.B. 1999. "Danish consumers' attitudes towards functional foods". Aarhus University, The Aarhus School of Business and Social Sciences, Centre for Research on Customer Relations in the Food Sector, MAPP: 62.
17. Preetha, P.; Girija, V., and Rajamohan, T. 2013. "Comparative effects of mature coconut water (*cocos nucifera*) and glibenclamide on some biochemical parameters in alloxan induced diabetic rats." *Rev. Bras. Farmacogn*, vol. 23(3): 481-487.

18. Raats, M, M and Shepherd, R. 1992. "Free-choice profiling of milks and other products prepared with milks at different fat contents." *J. Sens. Stud*, 7: 179–203.
19. Rosen stock, I.M., V.J. Strecher, and M.H. Becker. 1988. "Social learning theory and the Health Belief Model." *Health Education Quarterly*, 15:175-183.
20. Saat, M., Singh, R., Sirisinghe, R., M. Nawawi. 2002. "Rehydration After Exercise With Fresh Coconut Water, Carbohydrate-Electrolyte Beverage and Plain Water" *Journal of Physiological Anthropology and Applied Human Science*, 21(2): 80-83.
21. Santoso, U., Kubo, K., Ota, T., Tadokoro, T.; Maekawa, A. 1996. "Nutrient composition of kopyor coconuts (*Cocos nucifera* L.)." *Food Chem*, 57: 299–304.
22. Urala, N., & Lähteenmäki, L. 2004. "Attitudes behind consumer's willingness to use functional foods." *Food Quality and Preference*, 15: 793-803.
23. Urala, N., & Lähteenmäki, L. 2007. "Consumers' changing attitudes towards functional foods." *Food Quality and Preference*, (18): 1-12.
24. Urala, n., Arvola, A., and Lahteenmaki, L. 2003. "Strenght of health related claims and their perceived advantages." *International journal of Food Science and Technology*,: 81 - 82.
25. Verbeke, W. 2005. "Consumer acceptance of functional foods: socio-demographic, cognitive and attitudinal determinants." *Food Quality and Preference*, 45 - 57.
26. Verbeke, W. 2006. "Functional foods: Consumer willingness to compromise on taste for health?" *Food Quality and Preference*, 17:126-131.
27. Verbeke, W. 2006. "Functional foods: Consumer willingness to compromise on taste for health?" *Food Quality and Preference*, 17:126-131.

28. Yong, W. H., Liya, G., Yan, N and Swee, N. T. 2009. *The Chemical Composition and Biological Properties of Coconut (Cocos nucifera L.) Water*. Natural Sciences and Science Education Academic Group, Nanyang Technological University. Accessed 19 October, 2013. doi :10.3390/molecules14125144.

## APPENDICES

### Appendix A- Sample Questionnaire

Participant Code #: \_\_\_\_\_

Dear Respondent,

The following is a questionnaire which is aimed at collecting data towards a final year research project in partial fulfilment of the Bachelor of Science in Human Nutrition and Dietetics at the University of the West Indies. The questionnaire examine knowledge, perception and acceptance of coconut water as a functional food among consumers in North, South, East, West and Central Trinidad. You are kindly asked to answer the questions by placing a tick (✓) or circle for the answer of your choice.

Thanks for your time and cooperation.

#### **SECTION I - KNOWLEDGE QUESTIONNAIRE**

1) Have you heard of functional foods?       Yes       No

*A functional food may be defined as a food having health promoting benefits and/or disease preventing properties over and above its usual nutritional value.*

2) How well do you know of the roles that functional foods play in contributing to health and well-being?

- Well informed       Informed       Neutral  
 Not so informed       Not informed at all

3) Do you think coconut water is a functional food?

Yes                       No                                       I do not know

4) Do you know of the health benefits of coconut water?

Yes                                       No                                       I do not know

5) From the list below select what you believe to be the functional property or properties of coconut water?

- |  |  |
|--|--|
| <input type="checkbox"/> Prevent diseases          | <input type="checkbox"/> Strengthen muscles                    |
| <input type="checkbox"/> Flush kidneys and bladder | <input type="checkbox"/> Lowers blood pressure and cholesterol |
| <input type="checkbox"/> Assist in weight control  | <input type="checkbox"/> Rich source of nutrients              |
| <input type="checkbox"/> Increase blood glucose    | <input type="checkbox"/> Improve blood circulation             |
| <input type="checkbox"/> Anti – aging              | <input type="checkbox"/> Prevents dehydration                  |
| <input type="checkbox"/> Lowers body metabolism    | <input type="checkbox"/> Boost the immune system               |

6) Where have you received information about coconut water?

- |  |  |
|--|--|
| <input type="checkbox"/> Doctor/ Dietician     | <input type="checkbox"/> Family/Friends            |
| <input type="checkbox"/> TV, radio, newspaper  | <input type="checkbox"/> Facebook, you tube, email |
| <input type="checkbox"/> Other (specify) _____ |  |

**SECTION II – CONSUMPTION OF COCONUT WATER**

1) Do you drink coconut water?              Yes                       No                       Never

**If, no skip to question 8**

2) Which factor/s caused you to consume coconut water? Tick as many

- |  |                                |                                      |
|--|--------------------------------|--------------------------------------|
| <input type="checkbox"/> Health Benefits | <input type="checkbox"/> Taste | <input type="checkbox"/> Convenience |
| <input type="checkbox"/>                 | <input type="checkbox"/>       | <input type="checkbox"/>             |

Price

Directed by a doctor

Others\_\_\_\_\_

3a) What type of coconut water do you consume?

Bottled       Fresh       Both       Other (specify) \_\_\_\_\_

b) If your answer to question 3a) was fresh have any of the factors listed below contribute to you not consuming bottled coconut water?

Rancidity of the product       Flavour changes       Free access to fresh coconut water  
 Colour changes       Product expiry       Other \_\_\_\_\_  
 Price of bottled coconut water       Preference

4) How often do you drink coconut water?

Once per week       Twice per week  
 More than three times per week       Other (specify) \_\_\_\_\_

5a) Do you buy coconut water?

Yes       No

b) How often do you buy coconut water?

Once per week       Twice per week  
 More than three times per week       Other \_\_\_\_\_

6) How much do you drink at one time? (1 bottle = 250mL coconut water)

One coconut       One bottle  
 Two coconuts       Two bottles  
 More than three coconuts       More than two bottles  
 Other \_\_\_\_\_

7) In what ways do you consume coconut water?

- As a regular thirst quenching beverage                       Together with alcohol (as a chaser)
- As a natural energy drink     Together with foods
- Other \_\_\_\_\_

8) Would you consider drinking coconut water, if it will improve your health status?

- Yes                       No                       I do not know

9) Would you choose coconut water over modern day medicine?

- Yes                       No                       I do not know

***For the following question, please circle the number on the ranked scale that best represents how you feel; with 0 being the lowest and 10 being the highest.***

10) How will you rank the importance of drinking coconut water to maintain a healthy body?

Not important      0----1----2----3----4----5----6----7----8----9----10      Very important

11) How do you feel about the following statement, “coconut water is better than typical sport drinks?”

- 1- Strongly disagree
- 2- Disagree
- 3- Neither agree or disagree
- 4- Agree
- 5- Strongly agree

12) Do you consume any other functional foods?

- Yogurt     Fortified drinks
- Fortified cereals                                       Other (specify) \_\_\_\_\_

**SECTION III: DEMOGRAPHICS**

1. Sex :       Male                       Female
2. Age:       ≤ 18                       19-29                       30-49                       ≥ 50
3. Ethnicity:    East Indian                       African                       Chinese  
                     Hispanic                       Caucasian                       Other\_\_\_\_\_
4. What area of Trinidad do you live?
- North                       East                       Central
- South                       West
5. Level of education:    Primary                       Secondary                       Tertiary
6. Occupation:\_\_\_\_\_

*Thank you for your time! Have a blessed day! ☺*