An evaluation of fruit and vegetables consumption in selected primary school children in Trinidad and Tobago

Marquitta C. Webb[1*] and Cherrelle Lewis[2]

[1,2]Department of Agricultural Economic and Extension, The University of the West Indies - St. Augustine, Trinidad and Tobago

***Corresponding Author**

Department of Agricultural Economic and Extension
The University of the West Indies - St. Augustine
Trinidad and Tobago, West Indies
Email: marquitta.webb@sta.uwi.edu
Telephone: 1-868-662-2002 Ext. 82094

ABSTRACT

Objective: To assess the level of nutrition knowledge, attitudes, and practices related to the consumption of fruits and vegetable of primary school children attending three north-west area government primary schools in Trinidad and Tobago.

Methods: A self-administered questionnaire comprising validated questions relating to knowledge, attitudes, and fruits and vegetable consumption was conducted at three government primary schools.

Results: Approximately 60% of the students gained a score less than 60% on nutrition knowledge questions. The students had negative attitudes toward vegetables but positive attitudes about fruits. An average of 23.5% of students indicated that they consume fruits two or more times a day; whereas, less than 25% of the students reported eating green salad, vegetable soup, or other vegetables excluding potatoes.

Conclusion: The consumption of fruits and vegetable are below the recommended amounts. Further studies are needed to examine fruit and vegetable consumption in larger and more diverse groups of primary school students in Trinidad and Tobago.

Key Words: Attitude, Knowledge, Fruit, Vegetable, Consumption

1.0 INTRODUCTION

Extensive documentation exists in relation to the health benefits from the consumption of fruits and vegetables. (Lock, Pomerleau, Causer, Altmann, & McKee, 2005; Bazzano, 2006; Azagba & Sharaf, 2011). Consuming a diet rich in fruits and vegetables promotes good health and protects against many chronic diseases, including cardiovascular disease (Gaziano, Manson, Branch, Colditz, Willet, & Burring, 1995; Dauchet, Amouyel, Hercberg, & Dallongeville, 2006; Chen, Maruthur, & Appel, 2010; Oude Griep, Geleijnse, Kromhout, Ocke, & Verschuren, 2010), hypertension (Alonso, de la Fuente, Martín-Arnau, de Irala, Martínez, Martínez-González, 2004; Savica, Bellinghieri, Kopple, 2010; Azagba & Sharaf, 2011), stroke (Gillman, Cupples, Gagnon, Posner, Ellison, Castelli, et al., 1995; He, Nowson, & MacGregor, 2006; Azagba & Sharaf, 2011), diabetes (Sargeant, Khaw, Khaw, Bingham, Bingham, Day, et al., 2001), and cancer (Steinmetz & Potter, 1996; American Institute for Cancer Research, 2007; Tantamango, Knutsen, Beeson, Fraser, & Sabate, 2011). Additionally, studies have reported that fruits and vegetables provide a protective effect which can be linked to a variety of antioxidants and anti carcinogenic compounds (Block, Patterson, & Subar, 1992; Steinmetz & Potter, 1996). Other potential benefits include a reduction of inflammatory symptoms associated with rheumatoid disease (Pattison, Harrison, & Symmons, 2004), a decrease in body weight (Rolls, Ello-Martin, & Tohill, 2004; Tohill, Seymour, Serdula, Kettel-Khan, & Rolls, 2004; Astrup, Dyerberg, Selleck, & Stender, 2011) and reduction in adiposity (Ledoux, Hingle, & Baranowksi, 2011). Reports have indicated that the intake of fruits and vegetables during childhood may reduce the risk of several childhood illnesses, including respiratory symptoms (Antova, Pattenden, Nikiforov, Leonardi, Boeva, Fletcher, et al., 2003; Barros, Moreira, Fonseca, Ferraz de Oliveira, Delgado, Castel-Branco, et al., 2008).

Despite the well-established benefits of fruits and vegetables, a study conducted by WHO, revealed that only 3 (Israel, Spain, and Italy) out of the 21 studied countries met the average intakes of fruits and vegetables according to the WHO/FAO recommended level of 400 grams per day (IARC, 2003). Several researchers found that children and adolescents are not eating the recommended five or more daily servings of fruit and vegetables (Krebs-Smith, Cook, Subar, Cleveland, Friday, & Hahle, 1996; Munoz, Krebs-Smith, Ballard-Barbash, Cleveland, 1997; Gregory, Lowe, Bates, Prentice, Jackson, Smithers, et al., 2000; Currie, Robert, Morgan, Smith, Settertobulte, Samdal, et al., 2004). Further, nutritional surveys consistently show that many children do not meet consumption levels identified in nutritional guidelines (Brady, Lindquist, Herd, & Goran, 2002; Antova, et al., 2003). Perry-Hunnicutt & Newman (1993) and Beech, Rice, Myers, Johnson, & Nicklas (1999) confirmed that among adolescents there are low daily intakes of fruits and vegetables. Cooke, Wardle, Gibson, Sapochnik, Sheiham, & Lawson (2003) provided further evidence of low consumption of fruits and vegetables in children, with more than one-third of children on a daily basis not consuming fruits and vegetables. McGinnis (1992) and the American Cancer Society (1995) postulated that during the period of adolescence these potentially adverse dietary practices are important. During this developmental phase negative dietary practices, such as low intakes of fruits and vegetables can be transferred to adulthood. A 2003 study conducted by Caribbean Food and Nutrition Institute which focused on obesity prevention, fruits

and vegetables consumption was found to be restricted in most meals (CFNI & Ennis, 2003). Another study showed that persons in rural communities and those who are food insecure are associated with lower food expenditures, low fruit and vegetable intakes and lower quality diets (Verma, Hertela, & Precke, 2011).

Many factors can be attributed to inadequate intake of fruits and vegetables, including socioeconomic status (Smith & Baghurst, 1992); demographic factors, such as age and gender (Anderson & Hunt, 1992; Reime, Novak, Born, Hagel, & Wanek, 2000); lifestyle habits, such as smoking (Thompson, Margets, Speller, & McVey, 1999), and psychological factors (Kristal, Patterson, Glanz, Heimendinger, Hebert, Feng, et al., 1995). In relation to children and adolescents, several other factors may contribute to poor dietary intakes of fruit and vegetables. These include lack of availability and accessibility (Cooke, 2007), maternal influence of food consumption (Scaglioni, Salvioni, & Galimberti, 2008; Addessi, Galloway, Visalberghi, & Birch, 2005), child feeding habits (Birch &, Davison, 2001), and type of family environment at mealtime (Feldman, Eisenberg, Neumark-Sztainer, Story, 2007).

Besides the aforementioned factors, knowledge and attitude seem to have a negative impact on fruit and vegetables consumption. In large population groups, including children and adolescents, studies have demonstrated that children and adolescents lack adequate nutritional knowledge about fruit and vegetables (Beech et al., 1999). Many eating behaviors are initiated in childhood, track over the childhood years (Kelder, Perry, Klepp, & Lytle, 1994; Resnicow, Smith, Baranowski, Baranowski, Vaughan, & Davis, 1998; Lytle, Seifert, Greenstein, & McGovern, 2000) and continue into adulthood (Lytle et al., 2000; Lien, Lytle, & Klepp, 2001; Mikkilä, Räsänen, Raitakari, Pietinen, & Viikari, 2004). There is cause for concern fruit as a natural product is being replaced with fruit substitutes as a snack, such as nutritionally–dense fruit bars with added sugars (Sanigorski, Bell, Kremer, & Swinburn, 2005). Livingstone & Robson, (2000) cited that this trend reflects the knowledge that most children view eating as a way to satisfy hunger rather than a means to maximize health while at school.

Attitude plays a significant role in children's fruit and vegetable intakes. Studies have shown that children and adolescents are willing to learn about healthier eating practices (Murphy, Youatt, Hoerr, Sawyer, & Andrews, 1994; Havas, Heimendinger, Reynolds, Baranowski, Nicklas, Bishop, et al., 1994)**.** Researchers indicated that the consumption of fruits and vegetables by primary school students was associated with their mother's attitude towards healthy eating (Yung, Lee, Ho, Keung, & Lee, 2010).

Limited epidemiologic studies investigating the level of nutrition knowledge, attitudes, and practices related to fruit and vegetable consumption in school-aged children have been conducted in Trinidad and Tobago. Moreover, within Trinidad and Tobago relatively little data are available for cultural minorities in relation to fruit and vegetable consumption. In that context, this study investigated the level of nutrition knowledge, attitudes, and practices related to fruit and vegetable consumption of Standard Four primary school children.

2.0 RESEARCH METHODOLOGY

2.1 Research Design and Population

The study utilized a descriptive survey design and relied on a structured, self-administered questionnaire to solicit information from students. The study was conducted in the Post of Spain and Environs Education District (POS-EED), one of eight educational districts in Trinidad and Tobago. The POS-EED is made up of five (5) fraternities, namely, private, north, central, east, and west; which represent approximately 26 private and 76 government primary schools. Four (4) government primary schools were selected; however, one school declined to participate. Hence, only three (3) schools were included in the study. All Standard Four students were recruited for the study. Permission to conduct the study was obtained from the Ministry of Education and the school principals. Signed informed consent was obtained from participants and/or their parent/guardian.

2.2 Data Collection and Analysis

A 29-item self-administered fruit and vegetable questionnaire was completed by students. The questionnaire was reviewed by faculty members to establish its face validity. The questionnaire items included demographic characteristics of participants, 7 food frequency statements to assess fruit and vegetable intakes, 5 nutrition knowledge statements, and 12 statements to evaluate the attitudes toward nutrition, which participants responded using a 5-point Likert-scale with option ranging from “strongly agree” to “strongly disagree.” For the assessment of nutrition knowledge, correct answers were given a score of “1” and incorrect answers were given a score of “0.” For the evaluation of attitude towards nutrition a score ranging from “1-5” was assigned to each response, “5” was given to the most positive response and “1” was given to the most negative.

All data were analyzed using the SPSS version 19, (SPSS Inc, Chicago, IL, USA, 2010). Descriptive statistics were used to compile the data. The significant differences were analyzed using ANOVA. Gender differences regarding fruit and vegetables intake were examined using independent sample t-tests. All statistical analyses were evaluated at the < 0.05 level of significance.

3.0 RESULTS

3.1 Demographic Profile of Study Participants

Of the 111 eligible students, 102 completed the questionnaire giving a response rate of 92%. Among the 102 students surveyed, 48 (47.1%) were girls and 54 (52.9%) were boys, with a total mean age of 10.96 ± 0.954. The age profile of the students ranged from 10 to 15 years, with the majority of the students being in the 10-11 age group. The study sample was made up of several different ethnic groups, with most of the respondents (57.8%) reporting their ethnicity as Mixed[1] (Table 1).

3.2 Knowledge Scores

The nutrition knowledge scores are presented in Table 2. Findings revealed that the mean knowledge score (not shown) was 2.72 ± 0.924. Approximately 60% of the students gained a score less than 60% on nutrition knowledge questions. Additionally, 7.8% of males received the highest percentage (80%) of correct answers than their female counterparts. Further, 6.9% of students in the Mixed category obtained the highest correct knowledge items.

3.3 Attitude toward Fruits and Vegetables

Data regarding the students' attitude towards fruits and vegetables are presented in Table 3. The majority of the students (84.3%) strongly agree with the statement that they like fruits, 79.4% reported that they think that eating fruits make them feel healthy, and 68.6% think that fruit is a nice snack. Most of the students (61.8%) stated that they strongly disagree with the statement that they cry to eat fruits. In relation to vegetable consumption, only 30.4% of children strongly agree with the statement that they like vegetables and 6.9% strongly disagree. Twenty-eight percent (28%) of participants reported that they were not sure how they felt about vegetables; however, 42% stated that they do not cry to eat vegetables.

3.4 Fruit and Vegetable Consumption

Fruit and vegetable intakes were measured by selected food frequency items in which the participants were asked to indicate how many times they ate fruit and vegetable items using a 6-point scale ranging from never to 4 to 6 times a week. Table 4 illustrates the average number of times students reported fruit and vegetable consumption for the week. An average of 23.5% students indicated that they consume fruits two or more times a day. Less than 25% of the students reported eating green salad, vegetable soup, or other vegetables excluding potatoes 2 or more times

[1]Mixed refers to "a person, descended foreparents and ancestors of more than one "race", i.e. European/white, African/negro, Indian, etc." Dictionary of the English/ Creole of Trinidad and Tobago - On historical principles. Edited by Lise Winer. McGill-Queen's University Press. Canada. 2009.

a day. Males (8.7%) consumed on average higher intakes of fruit and vegetables than their female counterparts (3.2%) 2 or more times per day (not shown).

There were no significant differences observed in the consumption of fruits and vegetables among the participants of the different schools, $F(2, 99) = 1.6$, $p > 0.001$. Additionally, no significant difference was observed between male and female intakes of fruits and vegetables ($t = 1.069$, $df = 100$, $p > 0.05$).

4.0 DISCUSSION

The current study examined the knowledge, attitude, and practices of primary school children regarding fruit and vegetable consumption. It is noteworthy to mention that there is a severe shortage of data on fruit and vegetable consumption in this population, as well as the adult population in Caribbean countries. The students had low nutrition knowledge of fruit and vegetables. These results were similar to those reported by other survey studies of nutrition knowledge of fruit and vegetables (Perry-Hunnicutt & Newman, 1993; Beech et al., 1999; Banwat, Lar, Daboer, Audu, & Lassa, 2012). Although these studies did not used the same nutrition knowledge questions, it is important to note; however, that the current study was conducted with primary school children, aged 10-15 years, unlike the study by Beech et al. (1999) who studied adolescent and Banwat et al. (2012) whose study was conducted in the community. Gender differences were observed in nutrition knowledge. Male students obtained the highest number of correct answers than the female students, which was inconsistent with reported by Perry-Hunnicutt & Newman (1993), where girls had higher nutrition knowledge scores.

Results from the attitudinal component of this study show that children have negative attitudes toward consumption of vegetables and positive attitudes toward consumption of fruit. This may be explained by the bright colors of fruits, which is sometimes associated with a sweet taste and the health properties of the fruit as most children agreed that fruits are healthy. This may also be the case because of differences in availability, ease, or attractiveness as reported by Perry et al. (2004). Further, Basch, Zybert, & Shea (1994) cited that fruits are generally easier to eat than vegetables because they mostly come in their own ‘packages’. Kirby, Baranowski, Reynolds, Taylor, & Binkley (1995) postulated that fruits may be more appealing to children, since they are sweet and juicy. This view was opposite for vegetables as they can be looked at as having a ‘bad’ taste and texture that is unappealing. Cooke et al. (2003) that reported children are unwilling to try new fruits and vegetables, which is inconsistent with this study.

The children’s fruit and vegetable consumption was insufficient; therefore, there was no significant difference between the three schools in the sample. These findings support that by Beech et al. (1999), which concluded that adolescents were consuming substantially fewer servings of fruit and vegetables. This study found that there are no significant changes observed in boys and girls related to fruit and vegetable consumption which supports the findings of Beech et al. (1999). However, it was noted that more males consumed slightly more fruits and vegetables per day than females which is contrary to reports by Perry, Bishop, Taylor, Murray, Warren-Mays, Dudovitz, et al. (2004) which indicated that girls appeared to be more receptive than boys to increasing their

vegetable consumption because girls have been shown to be more receptive to other health education programs concerning eating patterns and physical activity (Perry, Kelder, & Klepp, 1994).

Limitations to this study were that the participants had to recall from memory their intake of fruits and vegetables over the last week, which can lead to recall bias. Also, the schools selected were from one school district; therefore, the findings of this study may not be generalized to all primary school students in the country. Additionally, the information collected was self reported by the students; hence the information may be over- or underestimated.

5.0 CONCLUSIONS

Based on the findings of this study, students are consuming fewer amounts of fruits and vegetables than what is expected, which place them at a greater risk of developing chronic noncommunicable diseases in the future. The children were not knowledgeable about fruit and vegetable related questions as evident by their responses and low knowledge scores. Nutrition education programs should be implemented in schools to educate children about the benefits of fruits and vegetables and how much should be consumed on a daily basis to provide optimal nutrition. Parents should create innovative ways and promote food environments to serve fruits and vegetables to children in order to increase their consumption. Finally, further studies are needed to examine fruit and vegetable consumption in larger and more diverse groups of primary school students in Trinidad and Tobago.

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Table 1: Demographic Profile of Study Participants

Variable	Frequency (N = 102)	Percentage
Age (Years)		
10-11	78	76.5
12-13	23	22.5
14-15	1	1.0
Sex		
Females	48	47.1
Males	54	52.9
Ethnicity		
Black/African	20	19.6
East Indian	10	9.8
Chinese	3	1.0
White/Caucasian	1	2.9
Mixed	59	57.8
Other	7	6.9
Missing	2	2.0

Table 2: Frequency of Correct Answer for Knowledge Questions by Gender and Ethnicity (n =102)

	Frequency (Percent) Correct Answer				
Variable	0	20	40	60	80
Sex					
Females	2(2.0)	6(5.9)	20(19.6)	17(16.7)	3(2.9)
Males	0(0.0)	16(15.7)	17(16.7)	16(15.6)	5(4.9
Ethnicity					
Black/African	0	3	9	8	0
East Indian	0	2	6	2	0
Chinese	0	0	1	0	0
White/Caucasian	0	0	1	1	1
Mixed	2	10	19	21	7
Other	0	6	1	0	0
Missing	0	1	0	0	0

Table 3: Attitudes towards fruits and vegetables (n = 102)

Selected Attitude Items	**Strongly Agree**	**Agree**	**Not Sure**	**Disagree**	**Strongly Disagree**	**No Response**
Fruits						
Fruit is a nice snack	70 (68.6%)	29 (28.4%)	2 (2%)	0 (0%)	1 (1%)	0 (0%)
Fruits are healthy	81 (79.4%)	13 (12.7%)	3 (2.9%)	2 (2%)	1 (1%)	2 (2%)
Cry to eat fruits	11 (10.8%)	2 (2%)	5 (4.9%)	21 (20.6%)	63 (61.8%)	0 (0%)
Like fruits	86 (84.3%)	9 (8.8%)	3 (2.9%)	2 (2%)	2 (2%)	0 (0%)
Vegetables						
Like vegetables	7 (6.9%)	13 (12.7%)	29 (28.4%)	13 (13%)	7 (6.9%)	0 (0%)
Cry to eat vegetables	16 (15.7%)	9 (8.8%)	11 (10.8%)	20 (19.6%)	43 (42.2%)	3 (3%)
Like trying new vegetables	31 (30.4%)	34 (33.3%)	12 (11.8%)	11 (10.8%)	13 (12.7%)	1 (1%)

Table 4: Frequency/Percent Fruit and Vegetable Consumption Profile (n = 102)

F&V intake question	Never	Once a week	2 to 3 times a week	4 to 6 times a week	Once a day	2 or more times a day	No response
	F(%)	F(%)	F(%)	F(%)	F(%)	F(%)	F(%)
100% FJ	38(37.3)	20(19.60	13(12.7)	8(7.8)	14(13.7)	9(8.8)	0(0)
Fruits	7(6.9)	19(18.6)	27(26.5)	13(12.7)	12(11.8)	24(23.5)	0(0)
VJ	71(69.0)	16(15.7)	4(3.9)	1(1.0)	8(7.8)	1(1.0)	1(1.0)
Green salad	16(15.7)	40(39.2)	18(17.6)	5(4.9)	11(10.8)	7(6.9)	5(4.9)
Potatoes	8(7.8)	33(32.4)	16(15.7)	13(12.7)	18(17.6)	11(10.8)	3(2.9)
VS	32(31.4)	36(35.3	10(9.8)	5(4.9)	10(9.8)	7(6.9)	2(2.0)
OV	15(14.70	35(34.3)	9(8.8)	14(13.7)	17(16.7)	10(9.8)	2(2.0)

Code: FJ - Fruit Juice VJ – Vegetable Juice VS – Vegetable Soup OV – Other Vegetables