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Access to Healthy Foods and Indications of Food Insecurity among Private University Students in a Colombo Suburb, Sri Lanka

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ABSTRACT

Introduction: The limited availability of nutritionally adequate and safe foods or inadequate accessibility to acquire foods can result in food insecurity. This study was conducted to investigate access and attitudes among private university students in a Colombo suburb, Sri Lanka to acquire healthy foods. **Methods:** A self-administered pre-validated questionnaire was used to interview a total of 103 undergraduate students who were conveniently recruited from private universities. Indications of food insecurity were assessed in terms of dietary habits. Relationships between demographic characteristics and dietary habits were determined. Access to healthy foods was based on availability of healthy foods such as herbal porridge, boiled grains and fruit salads at their university premises, and the students' willingness to buy them. **Results:** The majority of the subjects were females (60.2%) and 66.7% of the subjects resided outside their family homes. Frequency of consuming at least one serving per week of grain, milk, fruits & vegetables showed no significant relationship with gender. Location of residence was significantly related to consumption of grains (P=<0.000). The results revealed that 73.1% of the subjects had no access to healthy foods in their respective university premises, while more than half (61.3%) were not satisfied with the foods they consumed. **Conclusion:** This study revealed a lack of access to healthy foods in private higher educational premises in the Colombo suburb, indicating the risk of food insecurity among university students.

Key words: Dietary habits, food insecurity, healthy foods, university students

INTRODUCTION

Physical and economic access to sufficient, safe and nutritious food to meet one's dietary needs and preferences for a healthy and active life style is a fundamental human right in terms of food security (Rebello, Greenway & Finley, 2014). Food security in the global context is threatening not only developing or poor countries but also economically rich developed countries such as Canada, New Zealand and the US (Russell, Parnell & Wilson, 1999; Nord, Andrews & Carlson, 2006). Food insecurity can result from not having sufficient food, experiencing hunger due to shortage of food and unaffordability, eating a poor quality unhealthy diet due to limited options and anxiety about acquiring food (Rychetnik *et al*., 2003).

Unhealthy dietary habits are among the major risk factors for many chronic diseases such as obesity, particularly if the habit

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had been picked up in early adulthood (Rinadi *et al*., 2012). There have been many studies indicating the negative impact of food insecurity on academic outcomes of children irrespective of their age group (Casey *et al*., 2005; Jyoti, Frongillo & Jones, 2005). These negative impacts may include cognitive problems, psychosocial dysfunction and degradation of physical well-being (Casey *et al*., 2005; Jyoti, Frongillo & Jones, 2005). Furthermore, unhealthy dietary habits can lead to an unhealthy life in adulthood. Unhealthy dietary intakes are becoming popular due to the nutritional transition affecting populations across developing countries like Sri Lanka. Diabetes, heart diseases and diseases such as cancer are among the major health problems in Sri Lanka at present.

University students are vulnerable to nutrition transitions due to frequent exposure to unhealthy foods and habits, leading to food insecurity among them (Wengreen & Moncur, 2009). They face life-changing milestones during their transition to adulthood while in university which could have enduring effects (Bhattacharya, Currie & Haider, 2004). Food insecurity in this transition period can have an adverse effect on their cognitive, academic and psychological development (Jyoti, Frongillo & Jones, 2005).

Consuming recommended healthy foods, such as fruit and vegetables, whole grains, and low-fat dairy products (USDA, 2005) has been suggested as the key to improving the diet quality of an individual (Appel *et al*., 1997). Various factors can influence an individual's perception and willingness to buy healthy foods. These factors range from age to culture, income level to tradition, location of residence and health knowledge (Jayasekera *et al.,* 2014). Private universities are situated mainly in sub-urban areas of Sri Lanka and the student population comprise fee paying students from middle to high income families. However, there is not enough discussion on the extent, determinants and consequences of food insecurity among private university students in Sri Lanka. It is important to investigate the prevalence of food insecurity among those students. Therefore, this study aimed to investigate access and attitudes towards acquiring healthy foods and indications of food insecurity among private university students in the Colombo suburb of Sri Lanka.

METHODS

Study setting and population

The cross-sectional survey was conducted among 103 subjects from three private universities located in Malabe suburb, Colombo, Sri Lanka using non-probability sampling with convenience sampling technique. Subjects included under-graduate students of various disciplines such as medicine, engineering, management and finance, maritime, information and communication technology.

Study instruments

A self-administered questionnaire was used as a survey instrument. The questionnaire comprised a series of questions addressing socio-economic status, accessibility and willingness to acquire healthy foods (Table 1). Healthy foods investigated under the present study included low fat milk, grains, fruits and vegetables. The questionnaire was validated prior to the survey on a sample study comprising 10 students.

Data analysis

Data were analysed using the statistical packages of SPSS (version 19.0) and MINITAB (version 14). Hypotheses were tested at an alpha level of 0.05. Chi square analysis and ANOVA tests were performed to observe statistical differences.

Table 1. Study instrument: question guide

Question Type	*Question*
Demographic	Gender From where do you come to the higher education institute
Attitudes, willingness and access to healthy foods	From where do you usually eat your breakfast and lunch?
	During the last seven days how many days did you eat at least one serving of whole grains?
	During the last seven days, how many days did you consume at least one serving of fat free or low fat milk or equivalent milk products?
	During the last seven days how many days did you eat at least one piece of fruit or one cup of fresh juice?
	How often do you contain more than 3 types of vegetables in your meal?
	What do you usually eat for breakfast?
	What do you usually eat for lunch?
	What are the reasons you consider when selecting an outside place to buy food?
	Do you have access to healthy food in your canteen?
	If there is easy access for healthy food like herbal porridge, grains, and fruit salads, would you prefer to buy them?
	Is consuming a variety of fruits and vegetables important in healthy diets?
	What do you consider as healthy foods?
	Are you satisfied with the healthiness of the food that you eat?

(Each question carries choices for answers)

RESULTS

The study investigated the prevalence of unhealthy eating habits and indications of food insecurity among a sample of students in private universities located in Malabe suburb, Sri Lanka.

Socio-demographic characteristics of the study sample

A total of 103 subjects were investigated in this study. The demographic characteristics of the subjects are shown in Table 2.

Socio-demographic characteristics, attitudes and access to healthy foods

Figure 1 presents accessibility to healthy foods and subjects' satisfaction over availability of healthy foods in the university premises. The majority of subjects (73.1%) had no access to healthy foods in their respective university premises while more than half (61.3%) were not satisfied with their dietary habits in terms of consuming healthy foods. A significant relationship was found between

Table 2. Demographic characteristics of private university students at Colombo, suburb Sri Lanka

Demographic characteristics	*Frequency (%) (n=103)*
Gender	
Female	60.2
Male	39.8
Age (years)	
26-30	1.9
21-25	81.6
15-20	16.5
Residential location	
Hostels or boarding houses	66.7
Home	21.6
Relatives' home	11.8

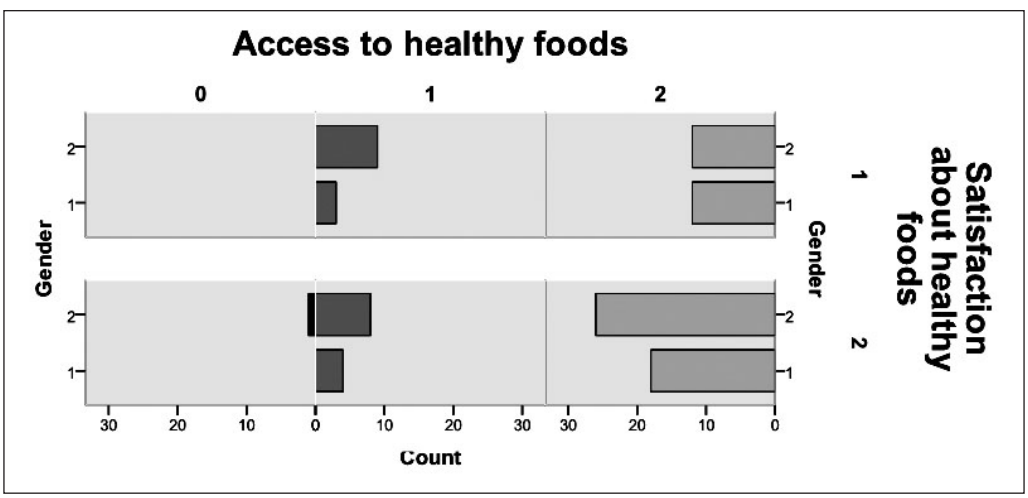

Figure 1. Access and satisfaction with healthy foods by gender
(Gender: 1= male; 2=female; Access to healthy foods at higher educational institutes: 0= no answer, 1=yes, 2= no; Satisfaction with healthy food consumption: 1= satisfied; 2=not satisfied)

residence and satisfaction with healthy foods at 0.05 level of significance (P=0.005).

Dietary patterns

Table 3 shows the recommended dietary intake of selected food items nationally and internationally with the average intake of a Sri Lankan elder. Table 4 shows the number of days of intake of at least one serving of low fat milk, grains, fruits and vegetables over the previous seven days. Gender was found to have no influence on the consumption frequency of selected foods (P=0.115, 0.893, 0.632 & 0.543 respectively for grain, milk, fruits & vegetables; Pearson Chi-square test at 0.05 level of significance).

Table 5 shows the relationship between consumption of selected food items such as low fat milk, grain, fruits

Table 3. National and international recommendations on average dietary intake

Food group	*[1]Average intake of Sri Lankan adults (servings/day)*	*[2]National recommendations (servings/day)*	*[3]US recommendations (servings/day)*
Fruits	0.4	2-3	2-4
Vegetables	2.1	3-5	≥ 5
Pulses	2.8	3-4	2-3
Milk	0.4	1-2	2-3

(Cited from 1= Jayawardena *et al.* (2012); 2= Ministry of Health (2011); 3= USDA (1992)
1 Serving of fruits = medium size fruit or ½ cup (1 cup is 200 ml tea cup) cut fruits or salad; Vegetables= ½ cup cooked vegetables or 1 cup raw salad; Grains=1 cup; Milk= 1 cup milk or 100 ml yoghurt or curd)

Table 4. Distribution of frequency of consumption of healthy foods, grains, milk, fruits and vegetables

Food item	*Number of days consuming at least one serving per day*			
	0 days (%)	*1-2 days (%)*	*3-4 days (%)*	*5-7 days (%)*
Milk				
% from total population	23.7	30.1	26.9	19.4
male	36.4	42.9	36.0	44.4
female	63.6	57.1	64	55.6
Fruits				
% from total population	12.9	48.4	29	9.7
male	33.3	42.2	44.4	22.2
female	66.7	57.8	55.6	77.8
Grain				
% from total population	32.3	33.3	25.8	7.5
male	43.3	22.6	50.0	57.1
female	56.7	77.4	50.0	42.9
Vegetables				
% from total population	1.1	25.8	35.5	37.6
male	100	45.8	36.4	37.1
female	0	54.2	63.6	62.9

(n=93; Responses with more than one choice were not included)

Table 5. Number of days of consuming at least one serving of milk, fruits, grain and vegetables per day according to residence type

Residence type	*Frequency of intake at least one serving (% within the residence type and from the total student population)*				
	0 days	*1-2 days*	*3-4 days*	*5-7 days*	*Pearson Chi-Square statistics P*
Milk					
Hostels or boarding	22.7 (16.1%)	31.8 (22.6%)	27.3 (19.4%)	29.4 (5.4%)	0.798
Home	29.4 (5.4%)	17.6 (3.2%)	23.5 (4.3%)	29.4 (5.4%)	
Relative's place	20.0 (2.2%)	40.0 (4.3%)	30.0 (3.2%)	10.0 (1.1%)	
Total	23.7%	30.1%	26.9%	19.4%	
Grains					
Hostels or boarding	36.4 (25.8%)	34.8 (24.7%)	28.8 (20.4%)	0.0 (0.0%)	0.00
Home	17.6 (3.2%)	35.3 (6.5%)	23.5 (4.3%)	23.5 (4.3%)	
Relative's place	30.0 (3.2%)	20.0 (2.2%)	10.0 (1.1%)	30.0 (3.2%)	
Total	32.3%	33.3%	25.8%	7.5%	
Fruits					
Hostels or boarding	16.7 (11.8%)	48.5 (34.4%)	27.3 (19.4%)	7.6 (5.4%)	0.615
Home	5.9 (1.1%)	47.1 (8.6%)	35.3 (6.5%)	11.8 (2.2%)	
Relative's place	0.0 (0.0%)	50.0 (5.4%)	30.0 (3.2%)	20.0 (2.2%)	
Total	12.9%	48.4%	29.0%	9.7%	
Vegetables					
Hostels or boarding	1.5 (1.1%)	22.7 (16.1%)	40.9 (29.0%)	34.8(24.7%)	0.587
Home	0.0 (0.0%)	29.4 (5.4%)	29.4 (5.4%)	41.2 (7.5%)	
Relative's place	0.0 (0.0%)	40.0 (4.3%)	10.0 (1.1%)	50.0 (5.4%)	
Total	1.1%	25.8%	35.5%	37.6%	

Table 6. Distribution of breakfast and lunch venues by gender and residence

Gender and residence	*Breakfast location % from population*			*Lunch location % from population*		
Gender	1	2	3	1	2	3
Male	29.0	2.2	8.6	26.9	2.2	10.8
Female	24.7	22.6	12.9	32.3	14.0	14.0
Residence	8.6	0.0	9.7	4.3	1.1	12.9
Family home						
Hostel or Boarding house	43.0	23.7	4.3	52.7	14.0	4.3
Relative's home	2.2	1.1	7.5	2.2	1.1	7.5

(Definition of venue: 1=Institute canteen or outside shop; 2=Hostel or Boarding House; 3=Family or relative's home)

and vegetables in relation to residence type of subjects. Residence type was found to have a significant effect on respondents' consumption frequency of grain (P<0.000). Pearson Chi-square statistics showed no significant relationship between consumption of low fat milk (P=0.798), fruits (P=0.615) and vegetables (P=0.587) to type of residence.

Data in Table 6 shows a statistically significant difference in breakfast venue for men and women (P=0.001). However,

no significant difference was observed in terms of the lunch venue (P=0.072) between male and female students.

Willingness and accessibility to acquire healthy foods

Results revealed that 58% of male students and 71% of female students were willing to buy healthy foods if they had easy access.

DISCUSSION

Results of the present study revealed that the suburban university student population is mainly represented by female students and that the majority of students were away from their homes and resided either at boarding houses or hostels.

Student's living arrangements while attending university have been reported to influence food security status (Chaparro *et al*., 2009; Hughes *et al*., 2011). The present study found that the students living in boarding houses were more prone to food insecurity than students living with their parents or relatives. A similar situation had been reported by Chaparro *et al*.(2009) and Maroto, Snelling & Linck (2015). A cross-evaluation showed a relationship between students living arrangements to their opinion on satisfaction with healthy foods consumption (P=0.005). This indicates that students living outside their homes are at high risk of food insecurity. Similarly Gallegos, Ramsey & Ong (2014) reported that students living in boarding houses or rented premises were two or three times more likely to experience food insecurity compared to students who were living at home.

The relationship between food insecurity and dietary intake has been studied and reported. Food insecurity has been reported to be associated with decreased or reduced food supply (Kendall, Olson & Frongillo, 1996; Matheson *et al*., 2002; Kaiser *et al*., 2003). Further it has been reported that food insecurity is associated with a compromised diet variety (Bhattacharya, Currie & Haider, 2004) and nutrient intake (Kendall *et al*., 1996; Lee & Frongillo, 2001).

Healthy eating habits are generally characterised by a variety of foods, adequate amounts of vitamins and minerals, large amounts of vegetables and fruits, and moderate amounts of fat (Florence, Asbridge & Veugelers, 2008; MacLellan, Taylor & Wood, 2008). Therefore diet quality can affect health directly or indirectly. According to Lee & Frongillo (2001), adults who suffer food insecurity usually eat fewer servings of vegetables, fruits, dairy and lower levels of micronutrients such as B complex vitamins and minerals like magnesium, zinc, iron and calcium. Lack of healthy food options could lead to poor diets and diet related food insecurity among university students. The access to healthy foods at their respective university premises was investigated in terms of four food categories of grains, low fat milk, fruits and vegetables since this can have a direct impact on food insecurity as reported by Lee & Frongillo (2001).

Fruit, vegetables, grain and milk intake was assessed using guided short answer questions. Our results revealed that the general intake of fruits, grains and milk was less among young adults studying in higher educational institutes in urban suburbs of Sri Lanka. Supporting our findings, Racette *et al*. (2008) reported that the amount of fruits and vegetables consumed progressively decreased from freshman year to the end of senior year among both male and female students (P<0.001) at a private university in Missouri.

Lupi *et al*. (2015) reported that undergraduate students of northern Italy who lived at home consumed greater amounts of vegetables and fruits compared to students living away home. The present study did not show a statistically significant relationship between fruit and vegetables consumption to residence type.

However, students residing in hostels or boarding houses exhibited greater evidence of not consuming enough fruits or vegetables compared to the students living in homes or relatives' place. Among the study subjects, some 12.9% of students had not taken a single serving of fruits per day during the previous seven days. It is obvious that students have more access to cooked vegetables in a traditional Sri Lankan diet. In general, the Sri Lankan lunch includes rice and curry with at least two, three different types of vegetables. Irrespective of the location of residence 23.7% subjects had not taken at least one serving of low fat milk per day over the previous seven days. The results showed no statistically significant relationship between frequency of milk consumption to location of residence (P=0.798). However, grain consumption showed a significant relationship to residence with P<0.00. The majority of subjects who resided in hostels or boarding houses had no access to grains (whole grains) in their diet. Students who lived in their family home, compared to those living away from home, consumed significantly greater amounts of grains. The data revealed that 32.3% of the student population did not consume at least one serving of grain per day.

Regular breakfast and lunch is essential for sufficient energy to overcome fatigue due to tight learning schedules in the universities. It is obvious that a change in living arrangements has an impact on eating habits and locations. The majority of subjects depended on the university canteen or shops outside the campus for their major meals. This indicates the possibility of food insecurity occurring among private university students.

Food availability and accessibility is one of the determinants of eating behaviours (Eertmans, Baeyens & Van den Bergh, 2001). Therefore the willingness of students to consume healthy foods was further investigated. Results of the present study revealed limited food options at the university canteen and the food served at the respective university canteens tended not to be very healthy.

The results of the present study suggest that students living in hostels or boarding houses are more prone to unhealthy dietary habits indicating the possibility of food insecurity. Similar to the findings of Kresic *et al*. (2009) and Lupi *et al*. (2015), our study showed that university students who lived with their parents ate a lot more fruits, vegetables, pulses etc. The reason behind this could be that home stay students might not be directly engaged in meal preparation, as the family provides support to the consumption of healthy foods.

CONCLUSION

The majority of students studying in private universities in an urban suburb in Sri Lanka represented females and the majority of the subjects stayed away from the family home. Furthermore, the results suggest that students in private universities are not happy with their meals in terms of the health content off the food and are willing to pay to acquire healthy foods. The finding indicates that food insecurity can prevail among students of private universities in the Colombo suburb in Sri Lanka. Clearly there is a need to increase availability of healthy food and accessibility of such food on campus. Further investigations on prevalence of food insecurity among university students are needed as there is conclusive evidence on this subject.

Conflict of interest

The authors state that there is no conflict of interest.

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