



P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2017; 4(6): 58-65
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www.kheljournal.com
Received: 11-09-2017
Accepted: 12-10-2017

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Gender difference in dietary practice on vegetables and fruits among undergraduate college students in Kerala

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Abstract

The study examines the dietary practices on vegetables and fruits among undergraduate students in Kerala and is intended to provide reliable data describing the characteristics of undergraduate college students of 18 to 23 years of both sexes. The sample represent proportionately the various districts of Kerala state with 1153 male (Mean Age = 19.44 years) and 1794 female (Mean Age = 19.35 years). Among the respondents 26.6% male and 30.3% female from 1st year, 30% male and 32.7% females from 2nd year, 41.5% males and 34.6% females from 3rd year and 1.9% male and 2.4% female from 4th year of study at their respective colleges. Statewide 24.56% girls and 27.25% boys have eaten vegetables 3 times per week during the 7 days before the survey. The prevalence of having not eaten vegetables during the 7 days before the survey was higher among male (8.76%) than female (5.74%) students. It also found that, there is significant difference between male and female in eating vegetables during the last 7 days. Statewide 47.06% students have not drunk 100% fruit juice during the past 7 days before the survey. The prevalence of having not drunk 100% fruit juice during the past 7 days before the survey was higher among female 50.72% than male 41.37% students. Statewide 19.65% students have not eaten fruit during the past 7 days before the survey. The prevalence of having not taken fruits during the past 7 days before the survey was higher among male 20.20% than female 19.28% students. But 48.6% male and 46.87% female consumed fruits 1 to 3 times during past 7 days before the survey.

Keywords: Fruit and vegetable consumption, college students

1. Introduction

Fruits and vegetables (F AND V) provide a diversified, flavored, colorful, tasty, low caloric, and protective, micro-nutrient rich diet. It is widely accepted that fruit and vegetables are the important component of health diet, and that consumption will could help to prevent a wide range of diseases. Epidemiological data supports its protective effect against several types of cancers and cardio vascular diseases (Hu FB, 2003 and IARC, 2003) ^[14, 15]. The increasing scientific evidence that consumption of fruit and vegetables decreases the risk of several chronic diseases has created a firm basis for policy initiatives. Insufficient consumption of fruits and vegetables was among the risk factors recognized as contributing to the worldwide non communicable diseases (NCD) burden (WHO, 2002) ^[16]. Fruits and veggies are low in calories and high in vitamins, minerals, phytochemicals and fibre. Experts have recommended the daily intake of at least 5-9 servings (400 gm) fruits and vegetables (WHO, 2003) ^[17].

In 1995, the National College Health Risk Behavior Survey (NCHRBS) determined that 74% of U.S. college students ate less than five servings of fruits and vegetables daily and 22% consumed three or more high-fat foods per day (CDC 1997) ^[9]. About a decade later, Sparling (2007) ^[10] found that produce consumption has further declined and 9 of 10 college students consumed fewer than five servings of fruits and vegetables per day. Recent data from the National College Health Assessment (NCHA) showed that 94.4% of its respondents consumed less than the recommended 5 or more servings of fruit and vegetables per day (American College Health Association (ACHA 2013) ^[11]. These declining trends in produce consumption patterns are commonly attributed to a changing food culture, such as rising demand for convenience foods and declining food preparation skills (e.g. Mancino *et al.* 2009, Stewart and Blisard 2008) ^[12, 13]

Dietary Practices refers to a person's choices in food consumption. In present India due to increased urbanization and various other factors, there is a drastic change in the dietary

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patterns of college students and young adults. Poor eating habits are a major public health concern among college students who experience transition into university life, during which they are exposed to stress and lack of time (Kurubaran *et al.*, 2013) [18]. There is no data available regarding the food choices of college students in Kerala. Detrimental habits picked up during this age generally persist in adult life. Dietary patterns developed during adolescence may contribute to obesity and eating disorders and may increase the risk for several chronic diseases later in life (Moy FM *et al.*, 2009) [19]. This study will help to understand present status of dietary practices among college Students of Kerala State of both genders. This will directly benefits policymakers and industry with information about young adult food choices in the state.

2. Methods and Materials

This part consists of study design and period, study population, instrumentation, data collection protocol and data processing procedure.

2.1 Study Design and Period: A cross-sectional quantitative study design was used via a structured self-administered questionnaire over a period from September 2015 to November 2015.

2.2 Study Population: The study is intended to provide reliable data describing the characteristics of undergraduate college students of 18 to 23 years of both sexes. The sample represent proportionately the various districts of Kerala state with 1153 male (Mean Age = 19.44 years) and 1794 female (Mean Age = 19.35 years).

Table 1: Class wise details of respondents

Class	Male		Female	
	Frequency	Percent	Frequency	Percent
Ist year	307	26.6	544	30.3
IInd year	346	30.0	586	32.7
IIIrd year	478	41.5	621	34.6
IVth year	22	1.9	43	2.4
Total	1153	100.0	1794	100.0

Among the respondents 26.6% male and 30.3% female from 1st year, 30% male and 32.7% females from 2nd year, 41.5% males and 34.6% females from 3^{rs} year and 1.9% male and 2.4% female from 4th year of study at their respective colleges.

Table 2: How many times per day did you usually eat vegetables, such as ladies finger, Pumpkin, cabbage, ivy gourd, Drumstick, Brinjal, Tomato, Raw plantain or any others

			Options of respondent					Total
			No response	I did not eat vegetables	1 time per day	2 times per day	3 or more times per day	
Sex	Male	Count	83	101	333	353	283	1153
		Percentage	7.20	8.76	28.90	30.55	24.56	
		Expected Count	94.7	79.8	293	383.4	302	1152.
	Female	Count	159	103	416	627	489	1794
		Percentage	8.06	5.74	23.18	34.94	27.25	
		Expected Count	147.3	124.2	456	596.6	470	1794
Total		Count	242	204	749	980	772	2946
		Expected Count	242	204	748	980.0	772	2946

Chi-square = 26.49, *p* = 0.000, C =, 0.094, *p* =,000

The graphical representation to the responses to how many times per day did you usually eat vegetables, such as ladies

2.3 Instrumentation

Questions from internationally representative surveys were incorporated into the survey. Several questions about dietary and health knowledge were drawn from the National Health and Nutrition Examination Survey (NHANES), which is administered by the U.S. Department of Health and Human Services (CDC, 2004). The National College Health Risk Behavior Survey (NCHRBBS) provided the dietary intake and lifestyle questions (CDC, 1997) [9]. Dietary practices contains 12 questions regarding diet, consumption pattern, vegetables and fruits consumption, daily water intake, consumption of fast food, etc.

2.4 Data processing and statistical analysis

Data extracted from questionnaires were analyzed in accordance with gender. Microsoft ACCESS© was used to code the data. The category wise response to each question was drawn using structured query (SQL). The extracted data were analysed using SPSS Version 20 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics, Chi-square were used for analysing of data.

3. Results

The Table 2 shows statewide 6.92% students have not eaten vegetables during the 7 days before the survey. The prevalence of having not eaten vegetables during the 7 days before the survey was higher among male (8.76%) than female (5.74%) students. The response of male who has not taken vegetables 8.76% (N = 101), 1 time per day 28.90% (N = 333), 2 time per day 30.55% (N = 352), 3 or more time per day 24.56% (N = 283) and 7.20% (N = 83) no response. Among the female respondents who has not taken vegetables 5.74% (N = 103), once a day 23.18% (N = 416), twice a day 34.94% (N = 627), thrice or more times per day 27.25% (N = 489) and 8.06% (N = 159) no response. The value of Chi-Square (X²) is 26.492, which is significant at 0.05 levels of significance as the *p*-value is 0.00. That means both male and female not equally eaten vegetables during the 7 days. The value of contingency is 0.094. This is a measure of association between the gender and response. Further the value of contingency coefficient is significant as its *p*-value 0.00 which is less than 0.05. This indicates that the relationship is strong between the variables. The result is showing statistically significant dependence between gender and not eaten vegetables during the 7 days.

finger, Pumpkin, cabbage, ivy gourd, Drumstick, Brinjal, Tomato, Raw plantain or any others are presented in Figure 1.

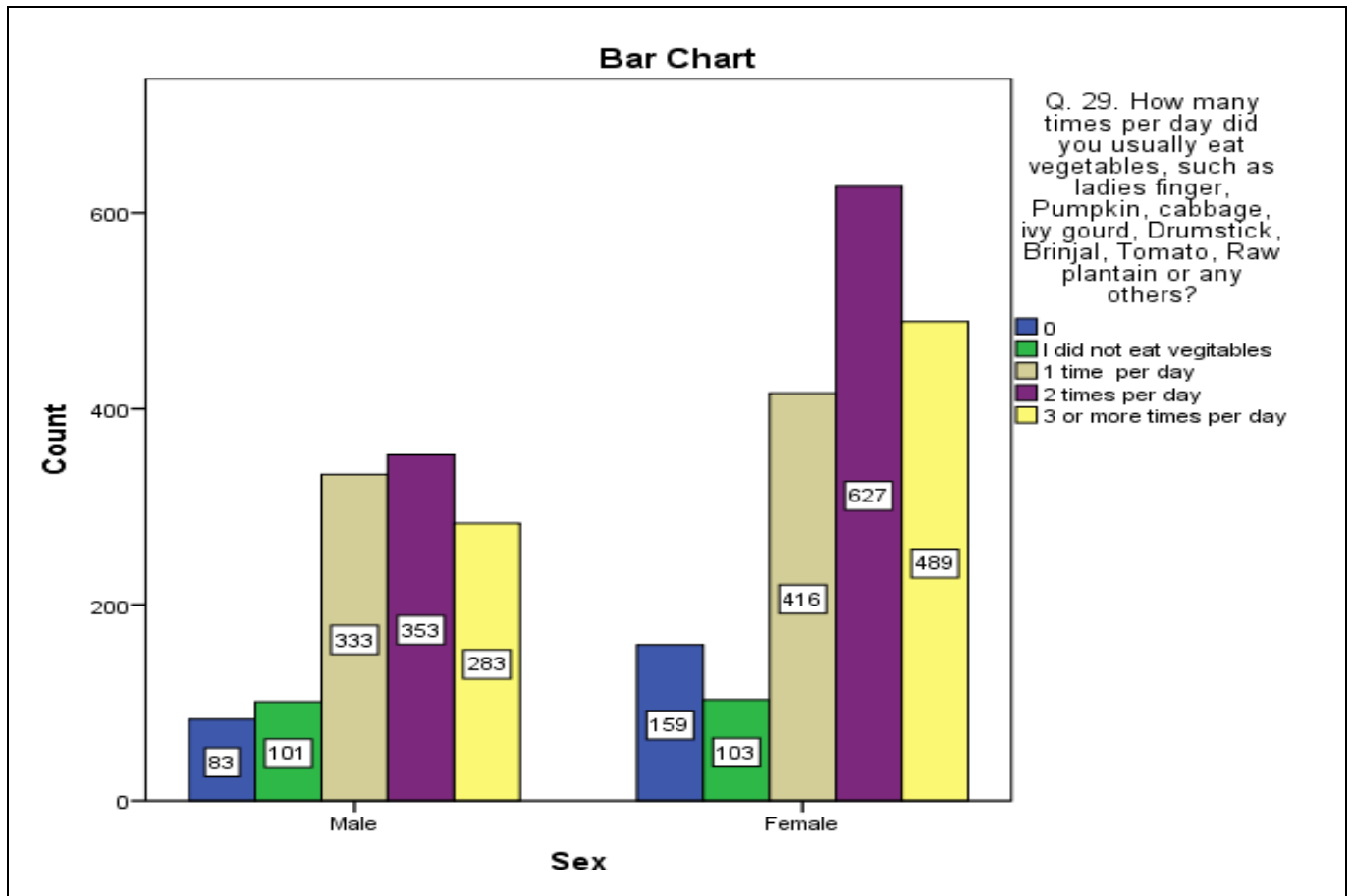


Fig 1: How many times per day did you usually eat vegetables, such as ladies finger, Pumpkin, cabbage, ivy gourd, Drumstick, Brinjal, Tomato, Raw plantain or any others.

The table 3 shows statewide 47.06% students have not drunk 100% fruit juice during the past 7 days before the survey. The prevalence of having not drunk 100% fruit juice during the past 7 days before the survey was higher among female 50.72% than male 41.37% students. The response of male was I did not drink 100% fruit juice during the past 7 days 41.37% (N = 477), 1 to 3 times during the past 7 days 36.86% (N = 425), 4 to 6 times during the past 7 days 9.36% (N = 108), 7 or more times during the past 7 days 4.59% (N = 53) and 7.80% (N = 90) no response. In the female of was I did not drink 100% fruit juice during the past 7 days 50.72% (N = 910), 1 to 3 times during the past 7 days 32.05% (N = 575), 4 to 6 times during the past 7 days 4.29% (N = 77), 7 or more times during the past 7 days 2.67% (N = 48) and 10.25% (N =

184) no response. The value of Chi-Square (X^2) is 58.721, which is significant at 0.05 levels of significance as the p-value is 0.00. That means there is statistically significant association between gender and response; that is, both male and female have not equally drink 100% fruit juices such as orange juice, apple juice, or grape juice. The value of contingency is 0.140. This is a measure of association between the gender and response. Further the value of contingency coefficient is significant as its p-value 0.00 which is less than 0.05. This indicates that the relationship is strong between the variables. The results are showing statistically significant dependence between genders and how many times did you drink 100% fruit juices.

Table 3: during the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice

			Options of respondent				Total	
			No response	I did not drink 100% fruit juice during the past 7 days	1 to 3 times during the past 7 days	4 to 6 times during the past 7 days		7 or more times during the past 7 days
Sex	Male	Count	90	477	425	108	53	1153
		Percentage	7.80	41.37	36.86	9.36	4.59	
		Expected Count	107.2	542.7	391.2	72.4	39.5	1153
	Female	Count	184	910	575	77	48	1794
		Percentage	10.25	50.72	32.05	4.29	2.67	
		Expected Count	166.8	844.3	608.8	112.6	61.5	1794
Total		Count	274	1387	1000	185	101	2947
		Expected Count	274	1387	1000	185	101	2947

Chi-square = 58.721, $p = 0.04$, $C = 0.140$, $p = .00$

The graphical representation to the responses to during the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice are presented in Figure 2.

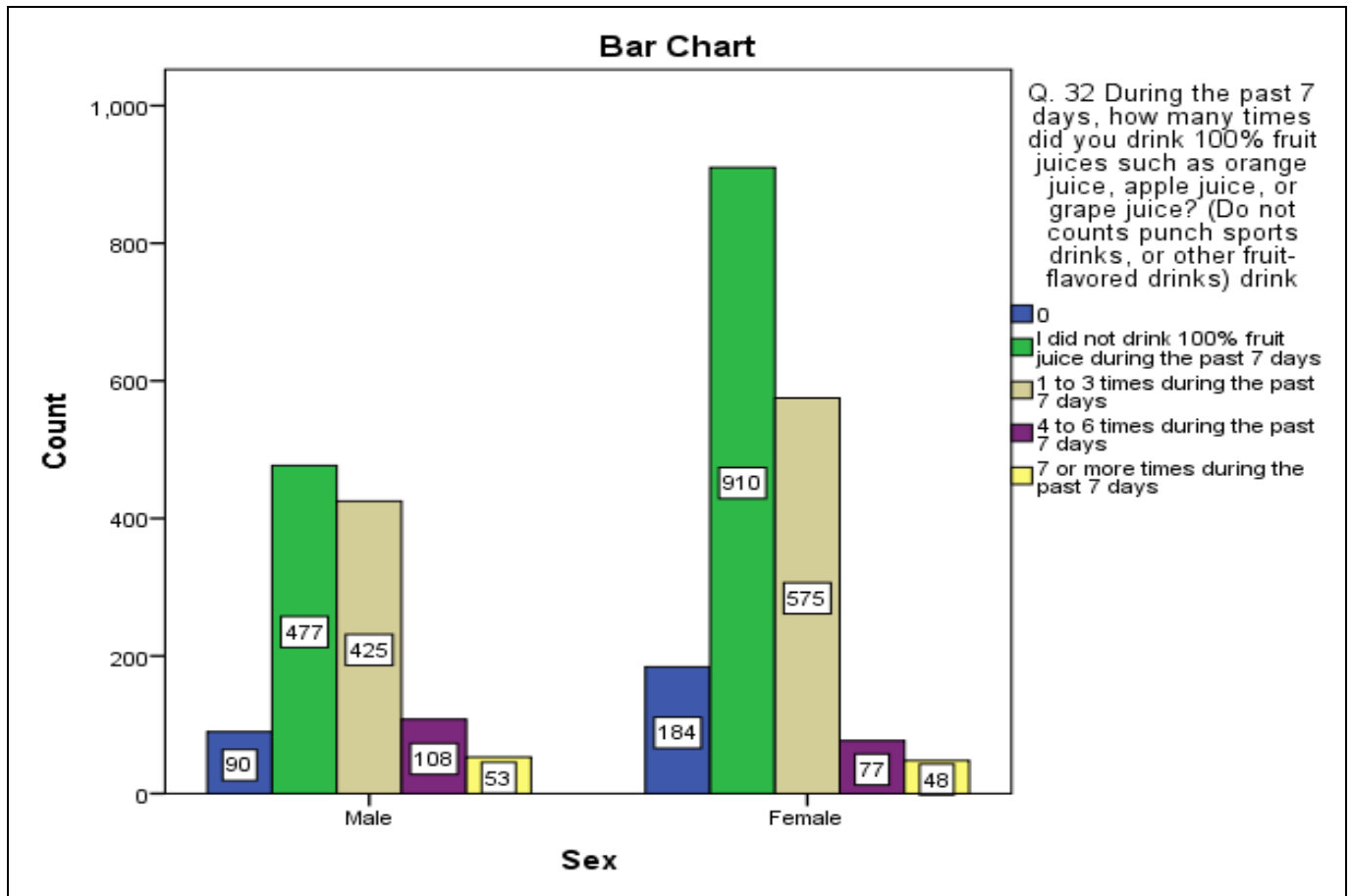


Fig 2: during the past 7 days, how many times did you drink 100% fruit juices such as orange juice, apple juice, or grape juice

The table 4 statewide 19.65% students had not eaten fruit during the past 7 days before the survey. The prevalence of having not taken fruits during the past 7 days before the survey was higher among male 20.20% than female 19.28% students. The response of male who didn't eat fruits during the past 7 days 20.20% (N = 233), 1 to 3 times during the past 7 days 48.48% (N = 559), 4 to 6 times during the past 7 days 16.47% (N = 190), 7 or more times during the past 7 days 6.76% (N = 78) and 8.06% (N = 93) no response. In the female I did not eat fruit during the past 7 days 19.28% (N = 346), 1 to 3 times during the past 7 days 46.87% (N = 841), 4 to 6 times during the past 7 days 17.33% (N = 311), 7 or

more times during the past 7 days 6.96% (N = 125) and 9.53% (N = 171) no response. The value of Chi-Square (X^2) is 2.712, which is not significant at 0.05 levels of significance as the p-value is 0.607. That means there is statistically not significant association between gender and response. The value of contingency is 0.30. This is a measure of association between the gender and response. Further the value of contingency coefficient is not significant as its p-value 0.607 which is higher than 0.05. This indicates that the relationship is not strong between the variables. The result is showing statistically not significant dependence between genders and how many times did you eat fruits.

Table 4: during the past 7 days, how many times did you eat fruit

		Options of respondent					Total	
		No response	I did not eat fruit during the past 7 days	1 to 3 times during the past 7 days	4 to 6 times during the past 7 days	7 or more times during the past 7 days		
Sex	Male	Count	93	233	559	190	78	1153
		Percentage	8.06	20.20	48.48	16.47	6.76	
		Expected Count	103.3	226.5	547.7	196	79.4	1153
	Female	Count	171	346	841	311	125	1794
		Percentage	9.53	19.28	46.87	17.33	6.96	
		Expected Count	160.7	352.5	852.3	305	123.6	1794
Total		Count	264	579	1400	501	203	2947
		Expected Count	264	579	1400	501	203	2947

Chi-square = 2.712, $p = 0.60$, $C = 0.30$, $p = 0.60$

The graphical representation to the responses to during the past 7 days, how many times did you eat fruit are presented in Figure 3.

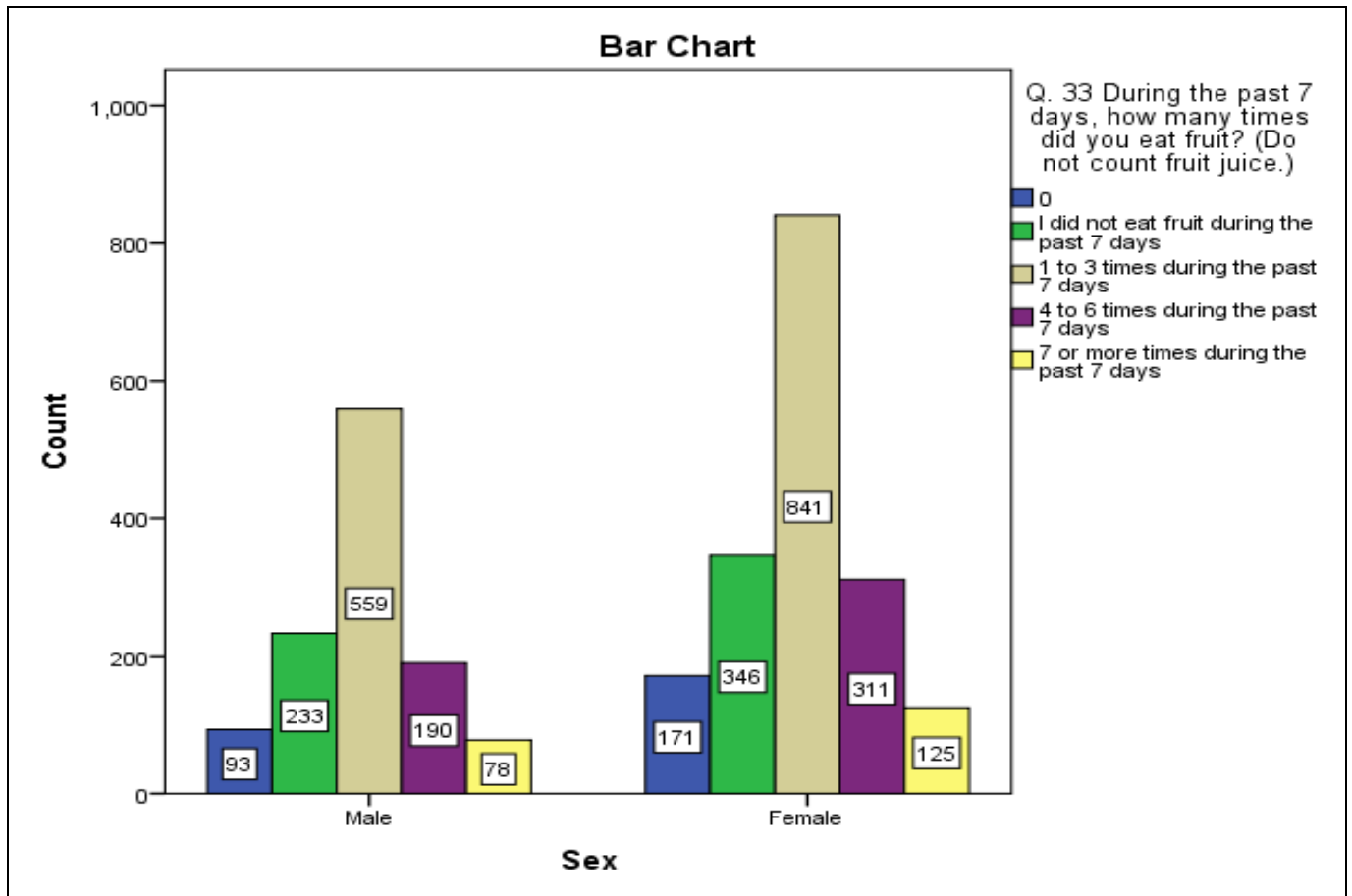


Fig 3: during the past 7 days, how many times did you eat fruit.

Table 5: during the past 7 days, how many times did you eat green salad

		Options of respondent					Total		
		No response	I did not eat green salad during the past 7 days	1 to 3 times during the past 7 days	4 to 6 times during the past 7 days	7 or more times during the past 7 days			
Sex	Male	Count	97	592	333	100	31	1153	
		Percentage	8.41	51.34	28.88	8.67	2.68		
		Expected Count	113.5	638.5	304.8	66.5	29.7	1153	
	Female	Count	193	1040	446	70	45	1794	
		Percentage	10.75	57.97	24.86	3.90	2.50		
		Expected Count	176.5	993.5	474.2	103.5	46.3	1794	
Total	Count	290	1632	779	170	76	2947		
	Expected Count	290	1632	779	170	76	2947		

Chi-square = 41.567, $p = 0.00$, $C = 0.118$, $p = 0.00$

The table 5 shows statewide 55.37% students have not eaten green salad during the past 7 days before the survey. The prevalence of having not eaten green salad during the past 7 days before the survey was higher among female 57.97% than male 51.34% students. The responses of male was I did not eat green salad during the past 7 days 51.34% (N = 592), 1 to 3 times during the 7 days 28.88% (N = 333), 4 to 6 times during the past 7 days 8.67% (N = 100), 7 or more times during the past 7 days 2.68% (N = 31) and 8.41% (N = 97) no response. In the response of female was I did not eat green salad during the past 7 days 57.97% (N = 1040), 1 to 3 times during the past 7 days 24.86% (N = 446), 4 to 6 times during the past 7 days 70% (N = 3.90), 7 or more times during the past 7 days 2.50% (N = 45) and 10.75% (N = 193) no

response. The value of Chi-Square (X^2) is 41.567, which is significant at 0.05 levels of significance as the p-value is 0.00. That means there is statistically significant association between Gender and response. The value of contingency is 0.118. This is a measure of association between the gender and response. Further the value of contingency coefficient is significant as its p-value 0.00 which is less than 0.05. The result is showing statistically significant dependence between gender and during the past 7 days, how many times did you eat green salad?

The graphical representation to the responses to during the past 7 days, how many times did you eat green salad are presented in Figure 4.

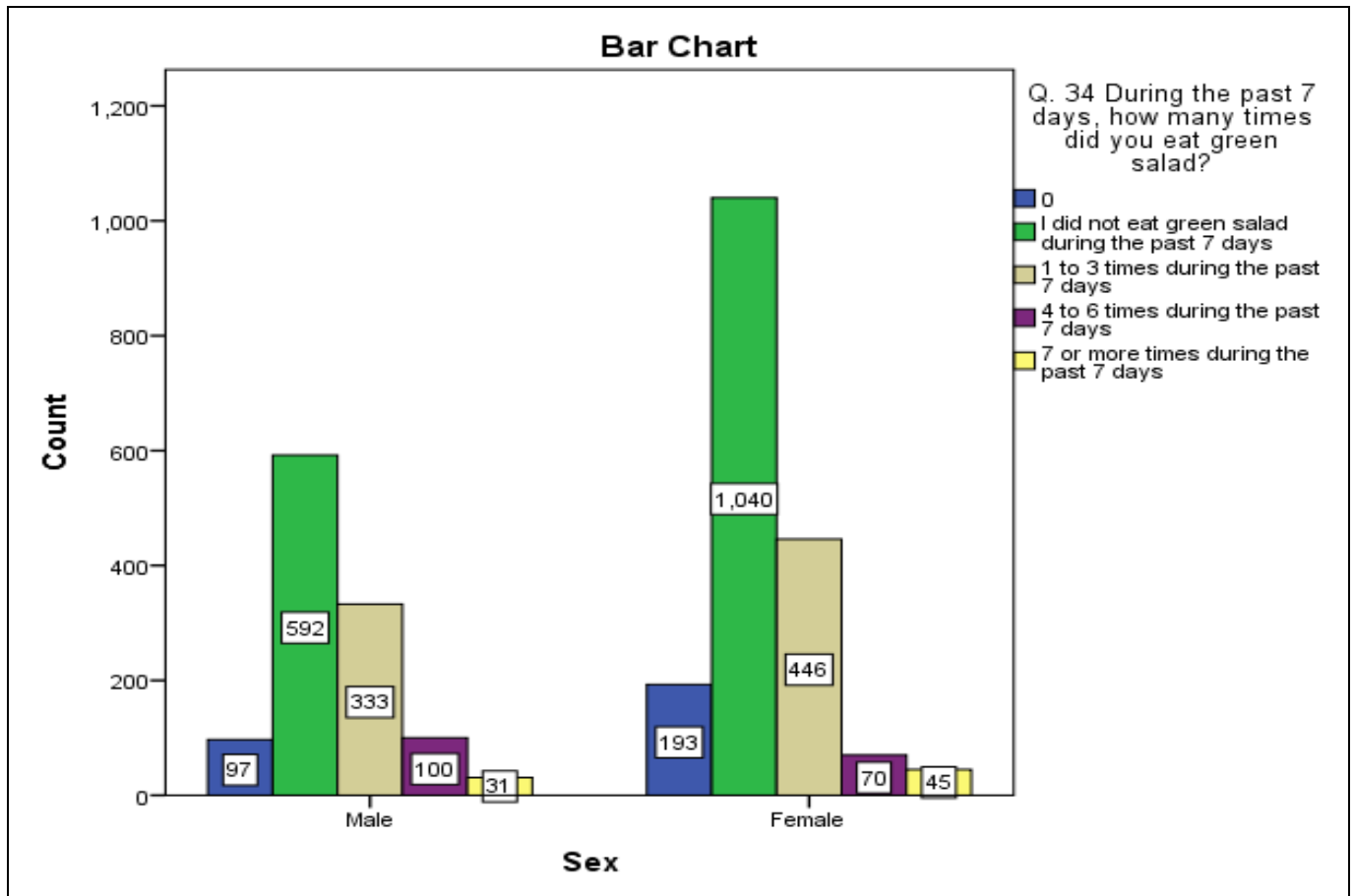


Fig 4: during the past 7 days, how many times did you eat green salad

The table 6 shows statewide 37.05% students had not eaten carrots during the past 7 days before the survey. The prevalence of having not eaten carrots during the past 7 days before the survey was higher among female 38.79% than male 34.34% students. The response of male was I did not eat carrots during the past 7 days 34.34% (N = 396), 1 to 3 times during the past 7 days 42.49% (N = 490), 4 to 6 times during the past 7 days 12.48% (N = 144), 7 or more times during the past 7 days 3.03% (N =35) and 7.63% (N = 88) no response. In the response of female was I did not eat carrots during the past 7 days 38.79% (N = 696), 1 to 3 times during the past 7 days 40.46% (N =726), 4 to 6 times during the past 7 days 8.41% (N =151), 7 or more times during the past 7 days

3.06% (N =55) and 9.25% (N = 166) no response. The value of Chi-Square (X^2) is 18.222, which is significant at 0.05 levels of significance as the p-value is 0.01. That means there is statistically significant association between gender and response; that is both male and female have not equally eaten carrots. The value of contingency is 0.078. This is a measure of association between the gender and response. Further the value of contingency coefficient is significant as its p-value 0.01 which is less than 0.05. This indicates that the relationship is strong between the variables. The result is showing statistically significant dependence between genders and eat carrots.

Table 6: during the past 7 days, how many times did you eat carrots.

		Options of respondent					Total	
		No response	I did not eat carrots during the past 7 days	1 to 3 times during the past 7 days	4 to 6 times during the past 7 days	7 or more times during the past 7 days		
Sex	Male	Count	88	396	490	144	35	1153
		Percentage	7.63	34.34	42.49	12.48	3.03	
		Expected Count	99.4	427.2	475.8	115.4	35.2	1153
	Female	Count	166	696	726	151	55	1794
		Percentage	9.25	38.79	40.46	8.41	3.06	
		Expected Count	154.6	664.8	740.2	179.6	54.8	1794
Total		Count	254	1092	1216	295	90	2947
		Expected Count	254	1092	1216	295	90	2947

Chi-square = 18.22, $p = 0.00$, $C = 0.078$, $p = 0.00$

The graphical representation to the responses to during the past 7 days, how many times did you eat carrots are presented in Figure 5.

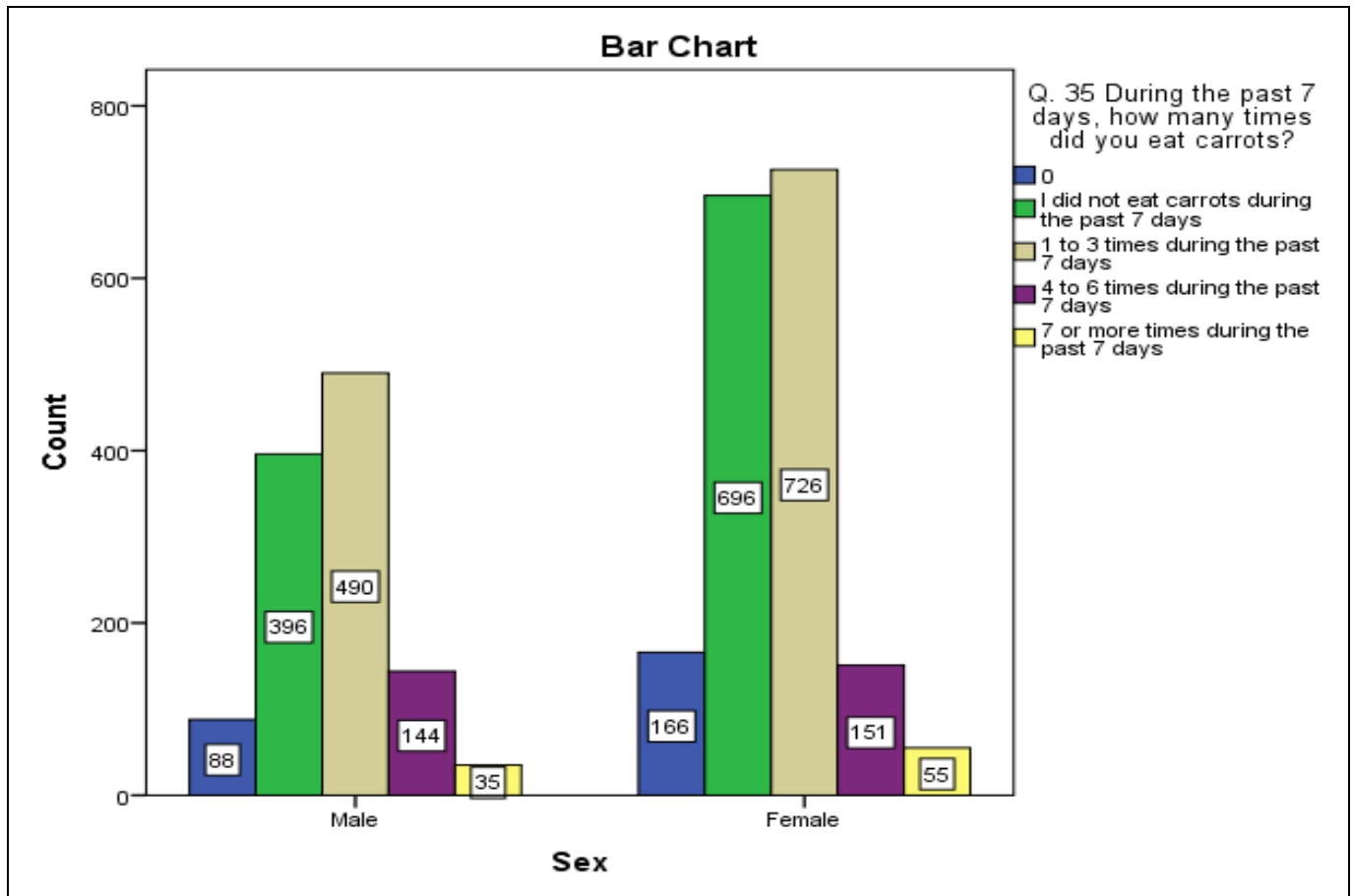


Fig 5: during the past 7 days, how many times did you eat carrots

4. Discussion

Statewide 24.56% girls and 27.25% boys have eaten vegetables 3 times per week during the 7 days before the survey. The prevalence of having not eaten vegetables during the 7 days before the survey was higher among male (8.76%) than female (5.74%) students. It also found that, there is significant difference between male and female in eating vegetables during the last 7 days. In a study from 52 low and middle-income countries 77.6% of men and 78.4% of women consumed less than the minimum recommended servings of F AND V. Same study reported 74% low F AND V consumption amongst adults in India (Hall *et al.*, 2009) [22].

Statewide 47.06% students have not drunk 100% fruit juice during the past 7 days before the survey. The prevalence of having not drunk 100% fruit juice during the past 7 days before the survey was higher among female 50.72% than male 41.37% students. Statewide 19.65% students have not eaten fruit during the past 7 days before the survey. The prevalence of having not taken fruits during the past 7 days before the survey was higher among male 20.20% than female 19.28% students. But 48.6% male and 46.87% female consumed fruits 1 to 3 times during past 7 days before the survey. The fruits consumption among Kerala adolescents were very similar to studies conducted by Harika Yadav *et al.*, (2015) also found that 27.3% of respondents in urban area of Belagavi consumed fruits at least three times per week similar to study in Syria (Sakamaki R. *et al.*, 2005) [20]. Fruit consumption was higher in urban areas but no difference was noticed in vegetable consumption across rural-urban divide. The proportion of respondents eating less than five servings of F AND V ranged from 76% (Maharashtra) to 99% in Tamil Nadu (NIMS, 2009) [24].

Fruits were consumed less often indicating the need for

nutrition education about healthy and unhealthy foods, where teachers can play an important role. Opportunity in parent-teacher meetings can also be used to orient them about healthy dietary practices. These poor food choices during college years can often lead to problems such as lowered immunity, hormonal imbalance, frequent bouts of cold and cough, digestive problems, skin and hair problems and even depression. Research also suggests that girls may develop menstrual disturbances due to erratic eating patterns during this phase of life (Vani K., R., K.S., V., L., S., Kumar V.R., H., & A., B., 2013) [23]. It's time our education institutions take note of these issues. Food security along with a safe, healthy food environment is the right of every students and foundation for a healthy youth and a healthy nation.

5. Conclusion

Food guidelines should therefore always make explicit the need for people to eat a variety of fruits and vegetables, not simply because of the nutritional benefits, but because, by doing so, there an increased likelihood that they will consume at least the recommended daily of 400g. On a positive note, let's make a beginning by introspecting our consumption pattern and ensuring every opportunity for communicating and eating seasonal F AND V using daily checklist!

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