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Fruit and Vegetable Consumption Among a Selected Group of Undergraduate and Graduate Students

ⓘPatricia E. McLean-Meyinsse

Professor, Department of Agricultural Sciences,
Southern University and A&M College,
113-B Fisher Hall, Baton Rouge, LA 70813, USA

Abstract

Students who consumed 1½-2 cups of fruits daily were more likely to be juniors; to live in households with income levels above $50,000; to be married or divorced; or to be employed. Consumption was not influenced by residence, household size, race, or gender. Forty-six percent of respondents did not eat vegetables daily; 48% ate 2-3 cups daily; and 6% consumed more than 3 cups daily. Students who worked were more likely to eat 2-3 cups of vegetables daily. Based on the 2015-2020 *Dietary Guidelines for Americans*, a majority of the participants met the minimum daily recommendations for fruits and vegetables.

Keywords: fruits, vegetables, undergraduate and graduate students, African Americans, ChooseMyPlate, Dietary Guidelines for Americans

ⓘCorresponding author: Tel: (225) 771-3506
Email: patricia_meyinsse@subr.edu

Introduction

One of the messages included in the ChooseMyPlate toolkit developed by the United States Department of Agriculture encourages Americans to include dark-green, starchy, red, and orange vegetables, beans and peas, and other vegetables in their daily diets (U.S. Department of Agriculture, 2021a). Additional messages expand on the nutritional and health themes by emphasizing that fruits and vegetables have many desirable health benefits and, therefore, should become an integral part of a healthy diet (U.S. Department of Agriculture, 2021b). The researchers also suggested that by incorporating a variety of fruits and vegetables in our daily diets, Americans would get vitally important nutrients, such as potassium, dietary fiber, and vitamins A and C, and would lower the risks of developing chronic illnesses, such as heart disease and stroke, some types of cancers, high blood cholesterol, and high blood pressure, among others. They also mentioned that vegetables did not have cholesterol and that they were naturally low in fat and calories. Therefore, eating lower calorie vegetables such as beans, peas, or lentils instead of other higher calorie foods could impact weight gain and, ultimately, lower the trajectory of U.S. overweight and obesity rates (U.S. Department of Agriculture, 2021a). Researchers at the Harvard T. C. Chan School of Public Health (2020) indicated that although fruits and vegetables provided many desirable health benefits, no single fruit or vegetable contained all the nutrients needed for a healthy diet. Therefore, consumers should choose variety over quantity when incorporating fruits and vegetables into their diets. They suggested further that a diet rich in fruits and vegetables could lower blood pressure, control blood sugar levels, suppress appetite, and also lower the risks of developing heart disease, stroke, eye problems, and digestive problems. Thus, nonstarchy fruits and vegetables, such as apples, pears, and green leafy vegetables, should be a part of a healthy diet because of their weight-lowering potential.

Problem Statement

Despite the overwhelming evidence of the benefits of incorporating a variety of fruits and vegetables in daily diets, many Americans do not eat fruits and vegetables daily, which may be one of the contributing factors to the rising overweight and obesity rates and rates of health-related diseases in the United States. The 2015-2020 *Dietary Guidelines for Americans* (U.S. Department of Health and Human Services, 2021)) recommend that to maintain good health and well-being, adults should eat at least 1½-2 cups of fruits and 2-3 cups of vegetables daily, among others. However, the diets of many American adults, including college students, do not meet these daily dietary recommendations. Given these realities, researchers at many colleges and universities have been studying students' dietary patterns for several years and have been encouraging students to adopt healthier eating habits whenever deficiencies are uncovered. Our study continues this trend by measuring fruit and vegetable consumption among a random sample of students to determine eating frequencies and factors associated with consumption of these food products.

Objectives

The study's objectives are (1) to describe daily consumption of fruits and vegetables by a randomly selected group of students, and (2) to determine the extent to which selected sociodemographic

characteristics, such as academic classifications, household size, household income levels, residence, marital status, employment status, race, and gender, affect daily consumption levels of fruits and vegetables.

Literature Review

Hoy et al. (2020) alluded to the dietary benefits of fruit and vegetable intake and concluded that total intake increased when wider varieties of fruits and vegetables were consumed, and the converse. Further, respondents who consumed salads had better nutrient intakes than those who did not, and that greater variety also led to higher overall consumption. They suggested that intake could be boosted by snacking on fruits and vegetables or adding them to main or side dishes. Martin et al. (2019) assessed how demographic characteristics affected consumption of a variety of fruits and vegetables by adults in the 2013-2016 National Health and Nutrition Examination Survey. Their findings suggested that demographic characteristics affected intake and that respondents aged 60 years or above compared to 20-29 years old, Asians, non-Hispanic blacks, and those with higher educational levels consumed greater varieties of fruits and vegetables. Their findings also suggested that only 25% of adults in the United States met the *Dietary Guidelines* for fruits and vegetables.

Berg et al. (2014) referred to some of the chronic diseases, such as cancer, heart disease, and stroke, that emanated from poor nutrition and lack of physical activity and suggested that these behaviors in adolescent and early adult years should be addressed because of their potential adverse effects on health and well-being later in life. Consequently, their study focused on fruit and vegetable intake based on the *Dietary Guidelines*, physical activity, and overweight/obesity rates among Black and White females attending two and four-year colleges. Their findings suggested that fruit and vegetable intake among White females was associated with greater extraversion, greater conscientiousness, limiting dietary fat intake, and higher level of physical activity. In the case of Black females, intake was associated with self-reported weight, actions toward weight management, limiting dietary fat intake, greater level of physical activity, and lower body mass indices. The study by Sa et al. (2016) found higher levels of overweight or obesity rates among a selected group of students at a historically Black university in Maryland than for the U.S. overall college student population. They also found that physical inactivity was higher among women and overweight or obese students. The authors concluded that historically Black colleges and universities should increase their efforts to promote healthier lifestyles among their student body to combat the prevalence of overweight and obesity on these campuses.

Ramsay et al. (2017) compared college students' reported fruit and vegetable preferences and intake from childhood to adulthood among a selected group of students and observed that females liked fruits and vegetables more than their male counterparts and, as a result, had a higher intake of these foods. Further, upperclassmen liked vegetables more than underclassmen. They also concluded that behavioral strategies were needed to increase fruit and vegetable intake among college students.

As argued previously, many American adults, including college students, do not meet the *Dietary Guidelines* for daily consumption levels for fruits and vegetables. In fact, many college students have very unhealthy eating habits and high levels of physical inactivity, which put them at increased risks for chronic diseases in adulthood. Thus, it is imperative for researchers to continue to study students' eating habits and to help them make healthier food choices when deficiencies are found. By examining college students' daily consumption of fruits and vegetables and factors associated with consumption, we will be able to help them make better food choices if deficiencies are found.

Methods and Procedures

The study's data were compiled from a survey of 132 randomly selected university students in February and March 2020. The survey questions were designed to ascertain nutritional knowledge, fruit and vegetable consumption, and sociodemographic characteristics. Fruit and vegetable consumption was measured by asking participants how many cups of fresh or processed fruit (Fruit) they ate per day. The response categories were none, 1½ to 2 cups, or greater than 2 cups. Vegetable consumption was assessed by asking participants how many cups of fresh or processed vegetables (Vegetab) they consumed daily. The response categories were none, 2 to 3 cups, or greater than 3 cups. Data also were collected on academic classifications (Class); the number of persons living at participants' permanent addresses (Hsize); assessments of their families' total annual household income levels (Income); whether participants lived on or off campus (Live); participants' marital status (Marital status); work status (Work status); race (Race); and gender (Gender).

Descriptive statistics and the Chi-square tests for independence were used to address the two objectives. Percentages and the median were used in the first objective and Chi-square tests for independence were used for the second objective. The chi-square tests allow us to examine whether the two-response variables, fruit and vegetab, are independent of or dependent on the selected sociodemographic characteristics.

Empirical Results and Discussion

Table 1 shows the descriptive statistics of the variables used in the study. The results revealed that 39% of the sampled students reported no consumption of fruits, while 61% reported eating 1½ -2 cups (54%) or more than two cups (7%) per day. A higher percentage of students (46%) reported no vegetable consumption on a daily basis; 48% indicated that they consumed 2-3 cups of vegetables daily; and 6% reported that they ate more than three cups of vegetables daily. The results also suggested that sophomores (47%) comprised the largest group of respondents, followed by juniors and graduate students (19%), freshmen (11%), and seniors. The median household size was three persons, and the median household income level ranged from $35,000–$49,999. The sample was dominated by students who lived off campus (61%), unmarried students (86%), students who worked (66%), African Americans (86%), and female students (77%).

Table 1. Descriptive Statistics for Consumption and Selected Sociodemographic Characteristics

Variables	Summary Statistics
Fruit	
None	39%
1 ½-2 Cups	54%
< 2 Cups	7%
Vegetab	
None	46%
2-3 Cups	48%
< 3 Cups	6%
Class	
Freshmen	11%
Sophomores	47%
Juniors	19%
Seniors	4%
Graduate Students	19%
Hsize	
Median	3
Income	
Median	$35,000-$49,999
Live	
Off campus	61%
Marital status	
Single	86%
Work status	
Work	66%
Race	
African Americans	89%
Gender	
Female	77%

The results presented in Table 2 represent cross-tabulations between fruit consumption levels and students' sociodemographic characteristics. Based on the results, fruit consumption is closely

associated with academic classifications, income levels, marital status, and employment status but is independent of household size, area of residence, race, and gender. The results also indicate that freshmen are least likely to have eaten fruits and that juniors are more likely to eat the daily recommended amount of fruits. Students who reported a household income level between $15,000 and $34,999 are more likely to report that they do not eat fruits daily. Students whose household incomes exceed $50,000 are more likely to consume between 1½-2 cups of fruits daily. Married or divorced students and those who worked are more likely to consume the lower range for fruits on a daily basis compared to their corresponding counterparts.

Table 2. Factors Associated with Daily Fruit Consumption

Variables	None	1½ -2 Cups Percentages	< 2 Cups	χ^2	*p*-Value
Class					
Freshmen	71.4	21.4	7.1		
Sophomores	45.2	48.4	6.5		
Juniors	16.0	76.0	8.0		
Seniors	66.7	33.3	0.0		
Graduate Students	24.0	68.0	8.0	17.567**	0.025
Hsize					
3 ≤	39.6	54.7	5.7		
< 3	39.7	52.6	7.7	0.217	0.897
Income					
> $15,000	47.4	42.1	10.5		
$15,000-$34,999	63.0	33.3	3.7		
$35,000-$49,999	42.1	50.0	7.9		
≤ $50,000	20.8	72.9	6.2	15.186**	0.019
Live					
Off Campus	43.8	51.2	5.0		
On Campus	32.7	57.7	9.6	2.206	0.332
Marital status					
Single	43.0	50.0	7.0		
Other	16.7	77.8	5.6	5.012*	0.082
Work status					
No	33.3	53.3	13.3		
Yes	42.5	54.0	3.4	4.890*	0.087

Table 2. (continued)

Variables	None	1½ -2 Cups Percentages	< 2 Cups	χ^2	*p*-Value
Race					
African Americans	39.8	53.4	57.1		
Other	35.7	57.1	7.1	0.089	0.956
Gender					
Female	38.2	52.9	8.8		
Male	43.3	56.7	0.0	2.860	0.239
Total	39.0	54.0	7.0		

Note: Single and double asterisks (*,**) indicate statistical significance at the 10% and 5% levels, respectively.

Vegetable consumption is lower than fruit consumption, and only one of the selected sociodemographic characteristics is statistically significant at the 5% level (Table 3). The results also suggest that students who worked are more likely to eat 2-3 cups of vegetables daily and that those without jobs are more likely to consume more than 3 cups of vegetables per day. Vegetable consumption is independent of academic classifications, household size, income levels, where students lived, marital status, race, or gender.

Table 3. Factors Associated with Daily Vegetable Consumption

Variables	None	2 -3 Cups Percentages	< 3 Cups	χ^2	*p*-Value
Class					
Freshmen	57.1	35.7	7.1		
Sophomores	54.8	38.7	6.5		
Juniors	36.0	60.0	4.0		
Seniors	66.7	33.3	0.0		
Graduate Students	24.0	68.0	8.0	10.555	0.228
Hsize					
3 ≤	52.8	39.6	7.5		
< 3	41.0	53.8	5.1	2.590	0.274
Income					
> $15,000	42.1	57.9	0.0		
$15,000-$34,999	66.7	25.9	7.4		
$35,000-$49,999	50.0	44.7	5.3		
≤ $50,000	33.3	58.3	8.3	10.339	0.111

Table 3. (continued)

Variables	None	2 -3 Cups Percentages	< 3 Cups	χ^2	*p*-Value
Live					
Off campus	41.2	51.2	7.5		
On campus	53.8	42.3	3.8	2.304	0.316
Marital status					
Single	48.2	45.6	6.1		
Other	33.3	61.1	5.6	1.539	0.463
Work status					
No	51.1	35.6	13.3		
Yes	43.7	54.0	2.3	8.433**	0.015
Race					
African Americans	45.8	48.3	5.9		
Other	50.0	42.9	7.1	0.157	0.925
Gender					
Female	48.0	46.1	5.9		
Male	40.0	53.3	6.7	0.603	0.740
Total	46.0	48.0	6.0		

Note: Double asterisk (**) indicates statistical significance at the 5% level.

Summary and Conclusions

The study's main objectives were to describe daily fruit and vegetable consumption among a selected group of university students and factors associated with consumption levels. The results suggested that juniors, those from households with income levels in excess of $50,000, married or divorced students, and those who were employed were more likely to consume the minimum recommended daily intake for fruits compared to their corresponding counterparts. Vegetable consumers were more likely to be employed compared to those without jobs. Academic classifications, household size, income levels, residence, marital status, race, and gender had no association with vegetable consumption.

Despite the health benefits of eating fruits and vegetables, many Americans, including college students, often fall short of the daily recommendations for these foods. The shortfall may be because fruits and vegetables are more costly than many high-calorie foods, or that many Americans live in food deserts, and therefore, do not have easy access to fresh fruits and vegetables. To the extent that deserts exist, every effort must be made to ensure that more Americans can have access to high-quality produce at reasonable prices. At the university level, we can also expose

students to the benefits of consuming fruits and vegetables alluded to in the introduction and encourage them to adopt healthier eating styles for long-term health and wellbeing.

The study's data were collected prior to the explosion of COVID-19 in the United States, ensuing lockdown, and disruptions in the food supply. Hopefully, the food supply chain will be able to respond more readily to future external shocks and suppliers of fresh fruits and vegetables will be able to seamlessly meet consumer demand and not jeopardize healthy eating habits.

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