Foods Consumed by United States Adults from Non-School Cafeterias and Vending Machines: NHANES 2005-2014

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Abstract

Purpose: As part of wellness efforts, employers may seek to improve the nutritional quality of foods offered and consumed in cafeterias and vending machines. However, little is known about who consumes food from these venues and the types and dietary quality of the foods consumed.

Design: Cross-sectional

Setting: Non-School Cafeterias and Vending Machines

Subjects: US adults ≥20 years old

Measures: Prevalence of consuming foods, most common foods eaten, leading calorie sources, 2010 Healthy Eating Index

Analysis: Using 24-hour dietary recall data from NHANES 2005–2014 (N=25,549 adults), we estimated the prevalence of consuming foods, assessed the most commonly consumed foods, and calculated dietary quality of foods.

Results: On a given day, 3.1% of adults consumed foods from cafeterias and 3.9% from vending machines. Consumers averaged 692 kcal from cafeterias and 264 kcal from vending machines. Cafeteria consumers had higher income and education while vending consumers were more likely to be male and younger adults. Common cafeteria foods included vegetables and fruits, but cafeteria foods were generally high in sodium and low in whole grains. Sugar-sweetened beverages and candies accounted for approximately half of all vending calories.

Conclusion: Foods chosen from cafeterias and vending machines do not align well with the Dietary Guidelines for Americans. Improving the dietary quality of foods consumed from these venues could impact millions of adults.

Keywords

nutrition; vending; cafeteria; food environment

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PURPOSE

Implementing food service guidelines in places such as worksites, hospitals, government facilities, and parks is a strategy to enable people to choose foods that align with dietary recommendations and, in turn, impact the current obesity epidemic and prevent chronic diseases by creating more healthful eating environments.[1] Food service guidelines include nutrition standards for foods offered and may also promote the selection of healthier foods through behavioral design methods such as default healthy choices, pricing incentives, labeling, or convenient placement. [2, 3] Efforts to use food service guidelines often focus on cafeterias and vending machines, which are common venues through which foods and beverages are made available to employees and visitors. Although evidence suggests that efforts to improve the healthfulness of foods eaten or purchased from cafeterias and vending machines can be successful [4–8], detailed, nationally representative information on the foods consumed from these venues and the people who consume them is not available. Existing research studies have focused on dietary interventions implemented in cafeterias and vending machines in localized settings and have not systematically examined the foods or beverages consumed from these venues or assessed the frequency of consumption in a nationally representative sample.

Although foods offered in primary and secondary school cafeterias and vending machines have been the focus of numerous studies, there are few studies focusing on non-school cafeterias and vending machines serving adult populations. Information on the types and nutritional quality of the foods consumed at the national level from cafeterias and vending machines would help contextualize and better target efforts to improve the availability of healthier foods through food service guidelines and provide a baseline by which to measure future progress. Furthermore, information on the number of American adults who consume foods from these venues and their demographic characteristics has not been published, making it difficult to enumerate the potential reach of efforts to improve foods offered in cafeterias and vending machines. Therefore, the current study aimed to assess the prevalence of adults consuming foods from cafeterias and vending machines and describe the demographic characteristics of such consumers. We also examined the leading types of foods and beverages consumed from cafeterias and vending machines and the dietary quality of foods consumed.

METHODS

Design

The study is a cross-sectional analysis of survey data collected from 2005–2014.

Sample

We used data on adults ages 20 years and older from the 2005–2006, 2007–2008, 2009–2010, 2011–2012, and 2013–2014 waves of the National Health and Nutrition Examination Survey (NHANES).[9] NHANES is a continuous survey to assess the health and nutritional status of adults and children in the United States. It includes both physical examinations and interviews, including assessment of dietary intake. Out of 28,461 adults ages 20 and above in the total sample for the 2005–2014 time period, our study sample included all who completed the first day dietary recall (n=25,549). Adults were classified as those 20 years of age and older consistent with NHANES recommendation to make the analytical age groupings match the survey design groupings.[9] The NHANES survey protocols are approved by the Research Ethics Review Board of the National Center for Health Statistics.

Measures

Comprehensive dietary intake data in NHANES are collected by trained interviewers through two non-consecutive 24-hour recalls using the validated, computer-assisted Automated Multiple-Pass Method, which uses standardized probes to reduce under reporting.[10] The first day dietary recall is performed in person at the NHANES mobile examination center and the second day is conducted by telephone.[10] During dietary recalls, participants report all foods consumed during the previous day and the source of each food, with specific food source response options for non-school cafeterias (hereafter referred to as 'cafeterias') and vending machines. Five waves of NHANES data were utilized because cafeteria and vending foods represent a relatively small proportion of foods reported by NHANES participants overall. For the present study, dietary intake from cafeterias and vending machines was assessed based on the day one dietary recall. A single day recall provides valid estimates of the mean population intake of particular foods or nutrients.[11]

Demographic and other variables examined included sex, age (20–34, 35–49, or 50 years), race (non-Hispanic white, non-Hispanic black, Hispanic, or non-Hispanic other), education (high school graduate, some college, or college graduate), income (<130%, 130 - <350%, or 350% family income to poverty ratio), marital status (currently married or single/divorced/widowed/separated), employment status (currently employed or unemployed/retired), and recall day of week (weekday or weekend).

Analysis

First, we calculated the percentages and 95% confidence intervals of adults who reported consuming at least one food or beverage item obtained from a cafeteria or from a vending machine on a given day. Estimates were also stratified by age, sex, race/ethnicity, educational attainment, income, marital status, employment status, NHANES wave time period, and recall day of the week. Chi-square tests were used to assess prevalence differences in consuming foods from cafeterias and vending machines according to demographic characteristics, survey time period, and day of dietary recall. For this chi-square analyses, participants with missing data, who refused to answer the survey question, or who responded "don't know" to the survey question were excluded from analysis for income (n=1942), education (n=25), marital status (n=13), and employment status (n=7).

Next, we calculated the overall mean per capita calories consumed from all foods and beverages obtained from cafeterias and vending machines among consumers. We then assessed the reported meal occasion (snack, breakfast, lunch, or dinner) associated with foods consumed from cafeterias and vending machines.

We then assessed the types of foods and beverages consumed from cafeterias and vending machines. To do this, food and beverage items consumed from cafeteria or vending machines were classified into categories according to USDA 3 digit food codes (available online from USDA), with each of the approximately 215 distinct 3-digit food codes corresponding to a group of similar foods or beverages.[12] Because they are similar, individual codes corresponding to carbonated soft drinks, fruit drinks, and teas were combined into a single soft drink category, which encompasses both calorically sweetened and non-calorically sweetened versions of these beverages. We assessed the ten most commonly reported food categories obtained from each venue according to the number of instances each food category was reported and the percent of food items from each venue represented by each category. We also assessed the top ten food categories that accounted for the greatest proportion of energy consumed from each venue by calculating the proportion of total calories from each venue attributable to specific food categories and the per capita caloric intake from each food category among consumers of cafeteria or vending machine foods.

Finally, we estimated the dietary quality of foods and beverages consumed from cafeteria and vending venues using the 2010 Healthy Eating Index (HEI-2010), which measures adherence to *Dietary Guidelines for Americans*.[13] The HEI-2010 feature both adequacy (dietary components to increase) and moderation (dietary components to decrease) components and uses a density-based scoring method based upon specific, quantified recommendations for various food groups and nutrients from USDA Food Patterns.[13] The HEI has been used extensively beyond measuring the diet quality of individuals to measure such things as the food supply, food offerings at stores and restaurants, and foods purchased. [14] For adequacy components, increasing intake results in higher HEI subscores. For moderation components, increasing intake results in lower subscores. Higher total HEI-2010 scores and subscores indicate greater adherence to dietary guidance.[13] Specific components assessed by subscores include total fruit, whole fruit, total vegetables, greens and beans, whole grains, dairy, total protein foods, seafood and plant proteins, fatty acids, refined grains, empty calories (added sugar, solid fats, and excess alcohol), and sodium. Because we were interested in the dietary quality of cafeteria and vending machine foods at the national population level rather than estimating HEI at the individual level, we used the population ratio method to calculate HEI-2010 subscores.[14] This method does not estimate usual intake at the individual level but can be used to estimate usual intake at the population level.[14]

All analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC) survey procedures, Surveyfreq and Surveymeans, with NHANES survey design variables and dietary day one sample weights.

RESULTS

During the study period, 2005–2014, 3.1% of adult Americans age 20 years and above reported consuming foods or beverages obtained from cafeterias on a given day (Table 1). Among those who reported consuming foods from cafeterias, mean energy intake on a given day from cafeteria foods was 692 kcal (95% CI: 584–781), which represented 31.1% (95% CI: 27.2% - 35.0%) of consumers' total energy intake for the recall day (data not shown). Prevalence of consumption from cafeterias varied by race (p=0.003) and was most common among non-Hispanic Blacks (4.2%). Prevalence also varied by education (p<0.0001), income (p=0.0007), and current work status (p<0.0001) with consumption most common among college graduates (4.6%), those with greater income (4.3% for family income to poverty ratio 350%), and those who were presently employed (4.3%). Cafeteria consumption was also more common (p<0.0001) on weekdays (4.1%) than on weekend days (2.1%). However, prevalence of consuming foods from cafeterias did not differ according to time period, age, sex, or marital status.

On a given day during the study period, 3.9% of adult Americans consumed foods or beverages obtained from vending machines (Table 1). Mean energy intake from vending machines among adults who consumed any foods from vending machines was 264 kcal on a given day (95% CI: 235–293) which represented 10.7% (95% CI: 9.7% - 11.7%) of consumers' total energy intake for the recall day (data not shown). Prevalence of consuming foods from vending machines differed by time period (p=0.01), age (p<0.0001), sex (p<0.0001), race/ethnicity (p<0.0001), marital status (0.01), education (p=0.004), and employment status (p<0.0001). The prevalence was highest among younger adults ages 20–35 and 36–49 (both 5.0%), men (5.0%), non-Hispanic Blacks (6.0%), adults not currently married (4.4%), and those who had attended but not completed college (4.6%). Consumption of foods from vending machines was also more common (p<0.0001) among those currently employed (5.7%) and more common (p<0.0001) on weekdays (4.7%). Prevalence of consuming foods from vending machines did not differ according to income.

Lunch was the most common meal occasion cited for foods consumed from cafeterias, accounting for 57.7% of foods (Figure 1). Snack was the most common meal occasion reported for vending foods consumed, accounting for 56.9% of vending foods.

The most commonly reported food category consumed from cafeterias was "other vegetables, raw" (e.g. salads and many other raw vegetables; reported 283 times and representing 7.4% of all reported cafeteria foods) closely followed by carbonated soft drinks, fruit drinks, and teas (reported 282 times; representing 7.4%) and white breads and rolls (reported 171 times; 4.5%) (Table 2). Other commonly reported food items from cafeterias were (in descending order) "mixtures, mainly grain, pasta, or bread" (e.g. pizza, pasta and rice dishes, and Mexican dishes; 4.1%); regular salad dressings (3.1%); raw tomatoes (3.0%); tomato sauces (2.8%); chicken (2.8%); "other vegetables, cooked" (e.g. corn, green beans, and many other types of vegetables; 2.8%); and "fruits (excluding berries)" (2.5%). Collectively, the ten most common food item categories reported accounted for 40.2% of all cafeteria food items consumed.

The leading food category source of calories consumed from cafeterias was "mixtures, mainly grain, pasta, or bread", which accounted for 12.9% of all calories consumed from cafeterias, corresponding to 89 kcal/day for consumers of cafeteria foods (Table 2). This was followed by carbonated soft drinks, fruit drinks, and teas (6.5%; 45 kcal per capita) and white breads and rolls (6.1%; 43 kcal per capita). In descending order, other leading sources of energy from cafeterias included chicken (5.4%); regular salad dressings (3.5%); egg dishes (3.1%); frankfurters, sausages, and lunch meats (2.4%); fried white potatoes (2.3%); cooked cereals and rice (2.2%); and finfish (1.8%). These ten food categories collectively accounted for 46.1% of cafeteria calories.

The most commonly reported food category consumed from vending machines was carbonated soft drinks, tea, and fruit drinks, which was reported 728 times and accounted for 46.1% of all vending machine food items consumed (Table 3). This was followed by bottled water (reported 119 times; 7.5%), salty grain snacks (reported 106 times; 6.7%), and candies (reported 98 times; 6.2%). In descending order, other frequently consumed vending machine foods included potato chips and sticks (4.8%); cookies (3.4%); non-sweet crackers (3.0%); coffee (2.9%); white breads and rolls (2.3%); and Danishes and breakfast pastries (1.4%). The top ten most common food categories accounted for 84.4% of all vending food items consumed.

The leading food category source of calories from vending machines on a given day was carbonated soft drinks, fruit drinks, and teas which accounted for 40.9% of all calories consumed from vending machines, corresponding to 108 kcal/day for consumers of vending machine foods. This was followed by candies (9.9%; 26 kcal per capita) and salty snacks from grains (9.2%; 24 kcal per capita) (Table 3). In descending order, other leading sources of vending machine calories were white breads and rolls (5.2%); cookies (5.1%); white potatoes, chips, and sticks (5.1%); non-sweet crackers (3.8%), grain mixtures (3.7%); cakes (3.0%); and Danishes and breakfast pastries (2.6%). The top ten food category sources of energy collectively accounted for 88.5% of all calories consumed from vending machines.

The overall HEI-2010 scores for foods consumed from cafeterias and vending machines were 58.3 and 36.7, respectively (Table 4). For cafeteria foods, HEI-2010 subscores were lowest for sodium (0 out of 10 points, reflecting low adherence to dietary sodium guidance), whole grains (2.1 out of 10 points), total fruit (2.4 out of 5 points), and fatty acids and dairy (each 5.5 out of 10 points). The highest scores were seen for total protein foods, seafood and plant proteins, total vegetables, and greens and beans, which all received maximum scores, reflecting better adherence to dietary guidance. For vending foods, the highest HEI-2010 subscores were sodium (10 out of 10 points), refined grains (8.7 out of 10 points), seafood and plant proteins (4.0 out of 5 points), and fatty acids (6.5 out of 10 points). Conversely, many vending subscores were zero or close to zero including empty calories (0 out of 10 points), greens and beans (0 out of 5 points), whole fruit (0.3 out of 5), total fruit (0.7 out of 5), and total vegetables (0.9 out of 5).

DISCUSSION

Our findings show that on a given day in the United States, approximately 7.5 million adults in the United States consume foods from cafeterias and approximately 9.5 million consume foods from vending machines. Although foods commonly consumed from cafeterias on a given day include vegetables and fruits, some of the leading sources of calories from cafeterias include sugar sweetened beverages and refined grain breads. Furthermore, HEI scores suggest that foods from cafeterias contain large amounts of sodium. Foods consumed from vending machines were generally high in empty calories and overwhelmingly represented by sugar-sweetened beverages, candies, and calorically dense snacks. Our analysis provides evidence to support the potential reach of using food service guidelines in cafeterias and vending machines and underscores the need to improve the foods and beverages consumed from these venues.

For both cafeterias and vending machines, consumption prevalence was greatest among those currently employed and when the recall day of the week was a weekday. Although we do not have data to indicate where cafeterias and vending machines were located, this may indicate that many foods and beverages from cafeterias and vending machines reported by study participants were obtained at the workplace. Research suggests that a large proportion of working adults have access to these food venues at work, with approximately one third reporting access to a cafeteria and half reporting access to vending machines.[15] This highlights the opportunity for employers to offer and promote foods that align with dietary guidance. Employers can use food service guidelines to improve the healthfulness of foods available in cafeterias and vending machines at their facilities and promote the selection of healthier foods as part of larger employer wellness initiatives.[16–20] While the present study examined foods obtained from cafeterias and vending machines, these foods only represent a portion of foods consumed at worksites, which may also include those served at meetings or social events, shared by coworkers, or provided for free in break rooms. Therefore, comprehensive efforts by employers to improve dietary intake among employees should also address foods obtained from other sources during working hours.

Beyond employment status and recall day of week, different demographic patterns were observed between cafeteria and vending machine use. Vending consumers are more likely to be male, younger, and not currently married. Cafeteria consumers are more likely to have higher income and education status, perhaps indicating greater access to cafeterias in their workplaces or more disposable income to spend in these venues. These demographic differences may be useful in customizing efforts to offer and promote healthy foods in these venues by identifying healthy foods and messaging that appeal to likely customers.

To our knowledge, this is the first study to comprehensively examine foods consumed from non-school cafeterias and vending machines and their dietary quality. Our findings are consistent with a recent survey of employed adults where approximately 80% reported that their worksite cafeteria offered some or many healthy options, but 65% reported that worksite vending machines offered few or no healthy options.[15] Our research findings regarding leading foods consumed and dietary quality of foods from cafeterias and vending machines provide useful insight to guide nutritional improvements in these venues. For

example, foods consumed from cafeterias include some nutrient-dense choices such as vegetables and fruits, but also had sodium levels that would make it challenging to meet recommended sodium daily intake levels. Likewise, cafeteria foods consumed were high in refined grains and low in whole grains. Furthermore, sugar-sweetened beverages such as carbonated soft drinks, fruit drinks, and teas were a leading source of calories. Our results can inform efforts to improve dietary intake from cafeterias such as reducing sodium in recipes and packaged foods; replacing refined grain breads, pastas, rice, and cereal with whole-grain versions; and encouraging the selection of healthier beverage options in place of sugar-sweetened beverages. Regarding vending machines, the foods and beverages consumed were generally high in empty calories and low in nutrients. Although HEI scores suggest that foods and beverages consumed from vending machines collectively have low sodium density per total calories, this is likely due to the overwhelming amount of vending machine calories from added sugars in sugar-sweetened beverages, which generally contain little or no sodium. Our results suggest that efforts to improve foods consumed from vending machines might focus on making available foods lower in empty calories and higher in fruits, vegetables, whole grains, dairy, nuts, and seeds. More recent vending configurations, such as micro markets, may allow the offering of a greater variety of nutrient-dense and fresh foods, such as sandwiches made with whole-grain breads, salads, and boiled eggs.[21]

Cafeterias and vending machines have often been targeted in efforts to improve food offerings through the adoption of food service guidelines [3, 22], which translate nutrition recommendations from the *Dietary Guidelines for Americans* into practical and actionable recommendations. A number of local and state governments and federal agencies and departments have implemented food service guidelines for the foods offered to employees or the public in government facilities and places such as public parks.[3, 6, 23–25] Many worksite wellness programs in the private sector also include food service guidelines as part of broader wellness efforts to ensure that healthful foods are available to employees and visitors.[16] Food service guidelines are also used in healthcare facilities and universities to improve the healthfulness of food and beverage offerings in cafeteria and vending machines. [26–27] Many leading food service companies now feature wellness initiatives as part of the food service and vending services they offer to employers, which could help to improve the nutritional quality of foods consumed from the venues they service.[28–30] Research suggests that efforts to improve the healthfulness of foods offered in places such as cafeterias and vending machines can be successful in shifting choices towards healthier selections.[5, 7, 8, 25, 31] Future research studies may want to consider further investigating the impact of efforts to increase the healthfulness of foods consumed from cafeterias and vending machines in worksites and public places.

Our study has a few limitations. First, because cafeteria and vending foods are relatively uncommon we pooled nearly a decade of NHANES data to ensure enough observations were available for analyses. It is possible that foods consumed in cafeterias and vending machines have changed somewhat during that time period so that our overall results may not reflect the current situation. Further research should attempt to investigate such temporal changes in foods consumed from these venues. Second, while our use of one day of dietary recall allows us to estimate the prevalence of consuming foods from cafeterias and vending machines on a given day, we are not able to differentiate occasional consumers from

frequent consumers. Furthermore, although we can infer dietary quality of foods from cafeterias and vending machines at the population level, we did not calculate usual intake or dietary quality of foods from these venues at the individual level. Further research could better capture the frequency of consuming foods from these venues using food frequency data collection methodologies or could assess usual intake at the individual level to allow further investigation of within person variability of consumption of foods from cafeterias and vending machines. Third, foods consumed do not necessarily reflect all the foods offered in these venues. As such, it is possible that healthier options were available in cafeterias and vending machines but not chosen and consumed. Finally, our results may also be impacted by other limitations associated with 24-hour dietary recalls, particularly the misreporting of foods and calories consumed in a socially-desirable manner.[32]

In conclusion, we found that a large number of adults in the United States consume foods from cafeterias and vending machines and that the foods consumed from these venues generally do not align with dietary guidance. Using food service guidelines, such as *Food Service Guidelines for Federal Facilities*, in cafeterias and vending machines is one way to ensure that consumers have the opportunity to choose healthy foods from these venues while at work or during leisure time.

SO WHAT?

What is already known about this topic?

Although evidence suggests that efforts to improve the healthfulness of foods eaten or purchased from cafeterias and vending machines can be successful, little is known about the foods consumed from these venues and the people who consume them.

What does this article ad?

Our study provides the first examination of adults who consume foods from non-school cafeterias and vending machines, the foods that they eat, and the diet quality of these foods.

What are the implications for health promotion and practice?

Our results suggest that a large number of adults in the United States consume foods from cafeterias and vending machines and that the foods consumed from these venues generally do not align with dietary guidance. Using food service guidelines is one way to ensure that consumers have the opportunity to choose healthy foods from these venues while at work or during leisure time.

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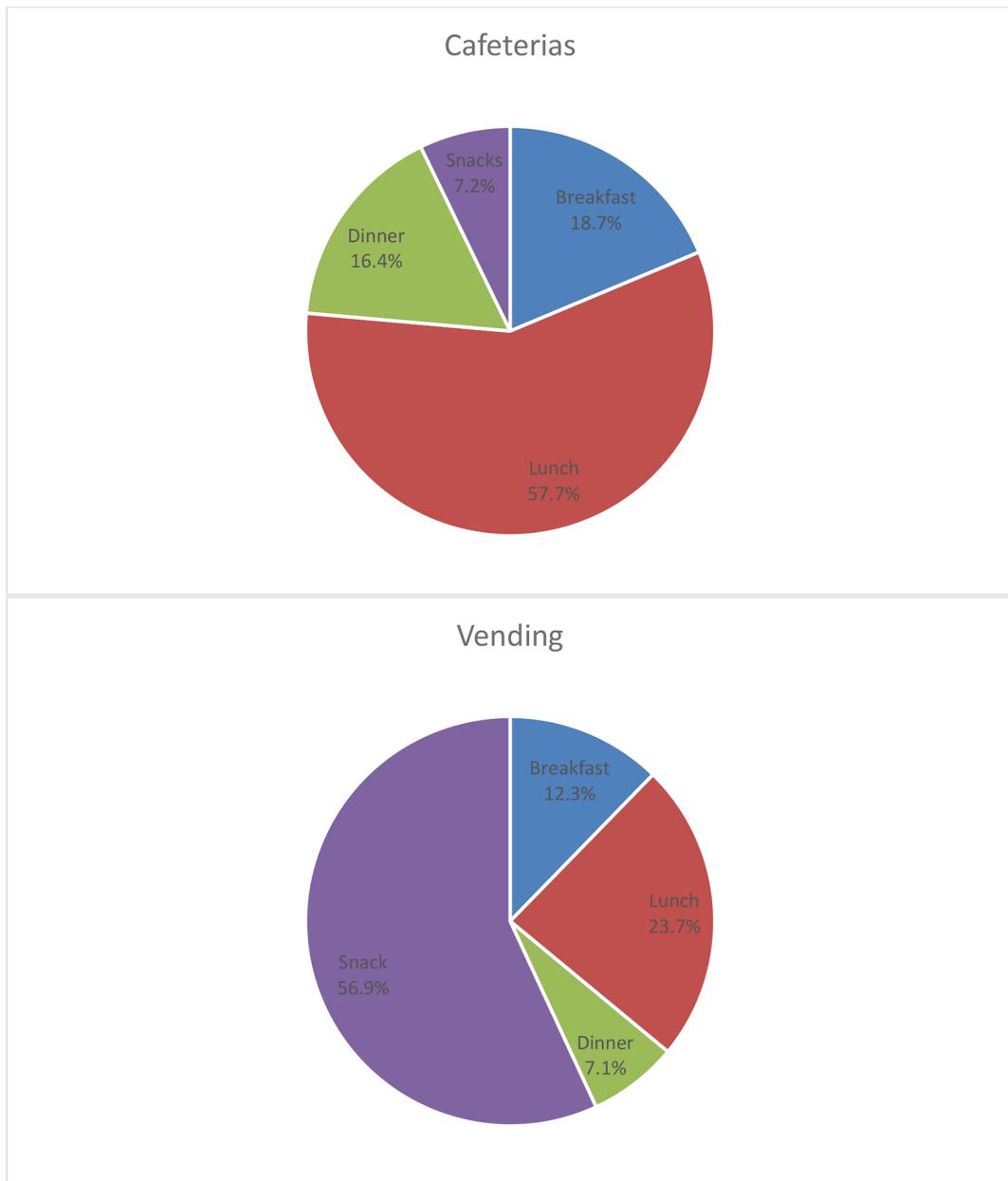
Figure.
Meal occasion reported for foods consumed from non-school cafeterias (n=3810 food items) and vending machines (n=1578 food items) on a given day by adults ages   20 years, NHANES 2005–2014

Table 1.

Prevalence of Obtaining Food from Non-School Cafeterias or Vending Machines on a given day among United States Adults Ages 20 Years and Older, NHANES 2005–2014

	Obtained Food in (Non-School) Cafeteria		X² p-value[a]	Obtained Food in Vending Machine		X² p-value[a]
	Yes	**No**		**Yes**	**No**	
Overall (n=25,549)	3.1 (2.7–3.5)	96.9 (96.5–97.3)	-	3.9 (3.6–4.2)	96.1 (95.8–96.4)	-
Time Period			0.23			0.01
2005–2006 (n=4520)	3.3 (2.3–4.4)	96.7 (95.6–97.7)		4.7 (3.9–5.6)	95.3 (94.4–96.1)	
2007–2008 (n=5419)	2.5 (1.8–3.2)	97.5 (96.8–98.2)		4.2 (3.3–5.1)	95.8 (94.9–96.7)	
2009–2010 (n=5762)	3.2 (2.5–3.9)	96.8 (96.1–97.5)		3.3 (2.6–3.9)	96.7 (96.1–97.4)	
2011–2012 (n=4801)	3.8 (2.4–5.2)	96.2 (94.8–97.6)		4.2 (3.3–5.1)	95.8 (94.9–96.7)	
2013–2014 (n=5047)	2.7 (2.2–3.2)	97.3 (96.8–97.8)		3.1 (2.5–3.7)	96.9 (96.3–97.5)	
Age			0.14			<0.0001
20–35 (n=7120)	3.6 (2.7–4.5)	96.4 (95.5–97.3)		5.0 (4.2–5.8)	95.0 (94.2–95.8)	
36–49 (n=6594)	3.2 (2.6–3.8)	96.8 (96.2–97.4)		5.0 (4.2–5.8)	95.0 (94.2–95.8)	
50+ (n=11835)	2.7 (2.2–3.2)	97.3 (96.8–97.8)		2.3 (1.9–2.8)	97.7 (97.2–98.1)	
Sex			0.89			<0.0001
Male (n=12421)	3.1 (2.6–3.7)	96.8 (96.3–97.4)		5.0 (4.5–5.6)	95.0 (94.4–95.5)	
Female (n=13128)	3.1 (2.5–3.6)	96.9 (96.4–97.5)		2.8 (2.4–3.3)	97.2 (96.7–97.6)	
Race/Ethnicity			0.003			<0.0001
NH White (n=11684)	3.0 (2.6–3.5)	97.0 (96.5–97.4)		3.5 (3.0–3.9)	96.5 (96.1–97.0)	
NH Black (n=5456)	4.2 (3.1–5.3)	95.8 (94.7–96.9)		6.0 (5.1–6.9)	94.0 (93.1–94.9)	
Hispanic (n=6278)	2.3 (1.9–2.8)	97.7 (97.2–98.1)		4.7 (3.9–5.5)	95.3 (94.5–96.1)	
NH Other (n=2131)	3.4 (2.4–4.3)	96.6 (95.7–97.6)		3.2 (2.0–4.4)	96.8 (95.6–98.0)	
Education[b]			<0.0001			0.004
High School Graduate or Less (n=12561)	1.9 (1.5–2.3)	98.1 (97.7–98.5)		3.9 (3.3–4.4)	96.1 (95.6–96.7)	
Some College (n=7353)	3.3 (2.4–4.2)	96.7 (95.8–97.6)		4.6 (4.0–5.3)	95.4 (94.7–96.0)	
College Graduate (n=5610)	4.6 (3.8–5.4)	95.4 (94.6–96.2)		3.1 (2.5–3.7)	96.9 (96.3–97.5)	
Family Income-to-Poverty Ratio[b]			0.0007			0.30
<130% (n=7515)	2.2 (1.1–3.3)	97.8 (96.7–98.9)		3.5 (3.0–4.1)	96.5 (95.9–97.0)	
130 – <350% (n=8741)	2.5 (2.1–3.0)	97.5 (97.0–98.0)		3.8 (3.3–4.4)	96.2 (95.6–96.7)	
350% (n=7351)	4.3 (3.6–5.0)	95.7 (95.0–96.4)		4.2 (3.5–4.9)	95.8 (95.1–96.5)	
Marital Status[b]			0.67			0.01
Married (n=13257)	3.0 (2.5–3.5)	97.0 (96.5–97.5)		3.5 (3.1–3.9)	96.5 (96.1–96.9)	

	Obtained Food in (Non-School) Cafeteria		X² p-value[a]	Obtained Food in Vending Machine		X² p-value[a]
	Yes	**No**		**Yes**	**No**	
Single/Divorced/Widowed/ Separated (n=13257)	3.2 (2.6–3.8)	96.8 (96.2–97.4)		4.4 (3.8–4.9)	95.6 (95.1–96.2)	
Employment Status[b]			<0.0001			<0.0001
Currently Employed (n=14153)	4.3 (3.8–4.9)	95.7 (95.1–96.2)		5.7 (5.2–6.2)	94.3 (93.8–94.8)	
Unemployed/Retired/ Looking for Work (n=11389)	1.1 (0.5–1.7)	98.9 (98.3–99.5)		1.0 (0.7–1.3)	99.0 (98.7–99.3)	
Recall Day of Week			<0.0001			<0.0001
Mon-Fri (n=15798)	3.8 (3.3–4.3)	96.2 (95.7–96.7)		4.7 (4.2–5.2)	95.3 (94.8–95.8)	
Sat-Sun (n=9751)	1.4 (1.1–1.7)	98.6 (98.3–98.9)		1.9 (1.5–2.3)	98.1 (97.7–98.5)	

[a]Chi-square tests assessed difference according to demographic characteristics, survey year, and day of dietary recall

[b]Participants with missing data, who refused to answer the survey question, or who responded "don't know" to the survey question were excluded from analyses for income (n=1942), education (n=25), marital status (n=13), and employment status (n=7)

Table 2.

Most commonly consumed foods and leading food sources of calories among foods and beverages obtained from non-school cafeterias on a given day, NHANES 2005–2014

	Most Commonly Consumed Foods From Cafeterias[a]		Leading Food Sources Of Calories From Cafeterias[b]
Rank	**Food Category** **Number Of Times Food Consumed From Cafeterias** **(% Of All Cafeteria Foods Reported)**		**Food Category** **Per Capita Kcal Consumed By Cafeteria Consumers** **(% Of All Cafeteria Calories Consumed)**
1	Other vegetables, raw[c] 283 instances (7.4% of foods)		Mixtures, mainly grain, pasta, or bread[c] 89 kcal (12.9% of calories)
2	Carbonated soft drinks, fruit drinks, and tea 282 instances (7.4% of foods)		Carbonated soft drinks, fruit drinks, and tea 45 kcal (6.5% of calories)
3	White breads and rolls 171 instances (4.5% of foods)		White bread and rolls 43 kcal (6.1% of calories)
4	Mixtures, mainly grain, pasta, or bread[c] 155 instances (4.1% of foods)		Chicken 37 kcal (5.4% of calories)
5	Regular salad dressings 117 instances (3.1% of foods)		Regular salad dressings 24 kcal (3.5% of calories)
6	Raw tomatoes 114 instances (3.0% of foods)		Egg dishes 21 kcal (3.1% of calories)
7	Tomato sauces 106 instances (2.8% of foods)		Frankfurters, sausages, lunch meats 17 kcal (2.4% of calories)
8	Chicken 106 instances (2.8% of foods)		White potatoes, fried 16 kcal (2.3% of calories)
9	Other vegetables, cooked[c] 105 instances (2.8% of foods)		Cooked cereals and rice 15 kcal (2.2% of calories)
10	Fruits, excluding berries 96 instances (2.5% of foods)		Finfish*** 13 kcal (1.8% of calories)

[a] These food categories collectively account for approximately 46.1% of cafeteria calories

[b] These 10 food categories collectively account for approximately 40.2% of all cafeteria food items consumed

[c] "Other vegetables, raw" includes lettuce, mixed salad greens, cabbage and cole slaw, peppers, onions, mushrooms, alfalfa sprouts, cauliflower, celery, cucumbers, radish, squash, chives, and cilantro;

"Mixtures, mainly grain, pasta, or bread" includes pizza, pasta dishes, rice dishes, sushi dishes, and Mexican dishes;

"Other vegetables, cooked" includes artichokes, beets, cabbage, cauliflower, corn, green and string beans, squash, mushrooms, okra, onions, peas, and peppers

"Finfish" includes tuna, salmon, tilapia, catfish, cod, whiting, fish sticks/patties, and other non-shellfish seafood

Table 3.

Most commonly consumed foods and leading food sources of calories among foods obtained from vending machines on a given day, NHANES 2005–2014

	Most commonly consumed foods from vending machines[a]		Leading food sources of calories from vending machines[b]
Rank	**Food Category** **Number Of Times Food Consumed** **(% Of All Vending Machine Foods Reported)**		**Food Category** **Per Capita Kcal Among Vending Machine Consumers** **(% Of All Vending Machine Calories Consumed)**
1	Carbonated soft drinks, fruit drinks, and tea 728 instances (46.1% of foods)		Carbonated soft drinks, fruit drinks, and tea 108 kcal per capita (40.9% of kcal)
2	Water, bottled 119 instances (7.5% of foods)		Candies 26 kcal per capita (9.9% of kcal)
3	Salty snacks from grain products 106 instances (6.7% of foods)		Salty snacks from grain products 24 kcal per capita (9.2% of kcal)
4	Candies 98 instances (6.2% of foods)		White breads and rolls 14 kcal per capita (5.2% of kcal)
5	White potatoes, chips and sticks 76 instances (4.8% of foods)		Cookies 14 kcal per capita (5.1% of kcal)
6	Cookies 54 instances (3.4% of foods)		White potatoes, chips and sticks 14 kcal per capita (5.1% of kcal)
7	Nonsweet crackers 48 instances (3.0% of foods)		Nonsweet crackers 10 kcal per capita (3.8% of kcal)
8	Coffee 45 instances (2.9% of foods)		Mixtures, mainly grain, pasta, or bread[c] 10 kcal per capita (3.7% of kcal)
9	White breads and rolls 37 instances (2.3% of foods)		Cakes 8 kcal per capita (3.0% of kcal)
10	Danishes and breakfast pastries 22 instances (1.4% of foods)		Danishes and breakfast pastries 7 kcal per capita (2.6% of kcal)

[a]These ten food categories collectively account for 84.4% of all vending foods consumed

[b]These ten food categories collectively account for 88.5% of vending calories consumed

[c]"Mixtures, mainly grain, pasta, or bread" includes pizza, pasta dishes, rice dishes, sushi dishes, and Mexican dishes

Table 4.

Dietary quality of foods and beverages consumed from non-school cafeterias and vending machines on a given day, NHANES 2005–2014

HEI 2010 Component	Maximum Possible Score	Cafeteria Foods and Beverages Score	Vending Machine Foods and Beverages Score
Adequacy Components			
Total Fruit	5	2.4	0.7
Whole Fruit	5	3.2	0.3
Total Veggies	5	5.0	0.9
Greens and Beans	5	5.0	0.04
Whole Grains	10	2.1	1.9
Dairy	10	5.5	1.7
Total Protein Foods	5	5.0	2.0
Seafood and Plant Proteins	5	5.0	4.0
Fatty Acids	10	5.5	6.5
Moderation Components			
Refined Grains	10	6.3	8.7
Empty Calories	20	13.4	0
Sodium	10	0	10
Total HEI 2010 Score	100	58.3	36.7