What Fruits & Vegetables are Americans Eating?

An In-Depth Examination of National Dietary Survey Data across Three Racial/ Ethnic Populations

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INTRODUCTION

Increasing fruit and vegetable consumption continues to be an area of focus for nutrition, health, and consumer research. Despite research supporting the health benefits of eating fruits and vegetables and on-going educational campaigns to increase intake, Americans are not consuming the daily recommended servings (4 ½ cups), especially among different racial/ethnic, age, and gender sub- segments of the U.S. population.

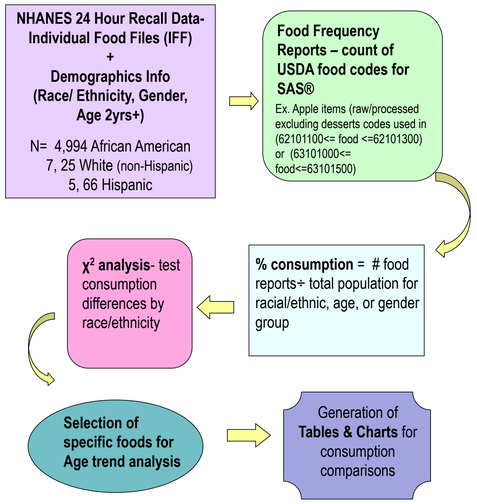
There is limited published research on the types of fruits and vegetables consumed and the proportion of Americans, by race /ethnicity and age, eating these food items. Research is needed to update and expand information on specific fruit and vegetable consumption patterns. This type of research can help diet and health educators, counselors, consumer researchers, and food product developers craft educational materials and food items tailored for various cultural/age groups.

OBJECTIVE

To examine the consumption of selected fruits and vegetables (F/V) based on race/ethnicity and age using 24-hour recall dietary data from 2003-2006 survey years of the National Health and Nutrition Examination Survey (NHANES)*.

METHODS

Data Sampling/ Analysis Flow Chart



*NHANES is a survey conduct by the Centers for Disease Control (CDC) to access the health and nutrition status of adults and children for policy development and other research studies.

RESULTS

Fruits

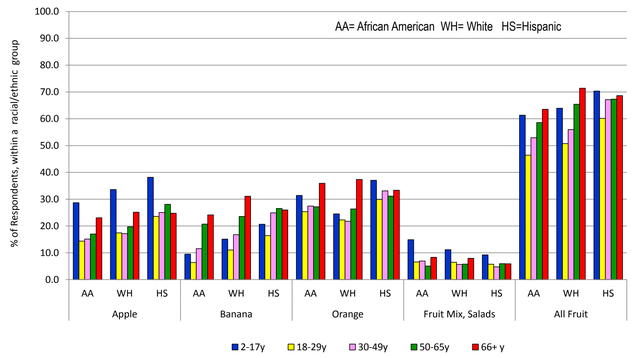
Table1. Fruit Consumption- % of respondents, 2 years or older, by race/ethnicity

	African American n= 4994			White (non-Hispanic) n= 7525			Hispanic n= 5366			
Food Group/Item[a]	%	±	SE[b]	%	±	SE	%	±	SE	p -value[c]
All Fruits	57.3	±	0.7	62.2	±	0.6	67.6	±	0.6	<.0001
Apple	22.5	±	0.6	23.8	±	0.5	31.6	±	0.6	<.0001
Apricot	0.0	±	0.0	0.7	±	0.1	0.2	±	0.1	<.0001
Avocado	0.6	±	0.1	2.9	±	0.2	7.0	±	0.3	<.0001
Banana	11.5	±	0.5	19.7	±	0.5	21.4	±	0.6	<.0001
Berries (blue, black, raspberries)	1.0	±	0.1	4.7	±	0.2	0.8	±	0.1	<.0001
Cherries	0.6	±	0.1	1.5	±	0.1	0.5	±	0.1	<.0001
Citrus (i.e. tangerines)	1.3	±	0.2	2.0	±	0.2	1.5	±	0.2	0.0111
Coconut	0.2	±	0.1	0.2	±	0.1	0.2	±	0.1	0.7505
Fruit Mix, salads	10.7	±	0.4	7.8	±	0.3	7.3	±	0.4	<.0001
Grapefruit	1.1	±	0.1	1.9	±	0.2	0.9	±	0.1	<.0001
Grapes	10.8	±	0.4	12.1	±	0.4	8.8	±	0.4	<.0001
Kiwi	0.2	±	0.1	0.6	±	0.1	0.4	±	0.1	0.0022
Mango	0.7	±	0.1	0.6	±	0.1	4.1	±	0.3	<.0001
Melons	2.3	±	0.2	5.2	±	0.3	2.5	±	0.2	<.0001
Orange	29.6	±	0.6	26.8	±	0.5	34.3	±	0.6	<.0001
Papaya	0.1	±	0.1	0.1	±	0.0	0.9	±	0.1	<.0001
Peach	4.3	±	0.3	5.9	±	0.3	4.4	±	0.3	<.0001
Pear	1.9	±	0.2	3.5	±	0.2	3.7	±	0.3	<.0001
Pineapple	2.9	±	0.2	3.4	±	0.2	3.2	±	0.2	0.2283
Strawberry	2.7	±	0.2	6.8	±	0.3	3.7	±	0.3	<.0001
Watermelon	2.0	±	0.2	3.9	±	0.2	2.6	±	0.2	<.0001

[a] Repeated counts of consumption could occur across food groups or items
[b] SE=Standard Error
[c] P value for Pearson's chi-square test

• Examples of consumption differences for specific fruits across race/ethnicity

Figure 1. Selected Fruit Consumption, *Age by Race/Ethnicity comparisons*



• Fruit consumption notably decreased from childhood ages (2-17 yrs) to young adult (18-29 yrs), and gradually increased from 30 years to 66+ years.

• Promoting the consumption of fruit in mixes/ salads is an area of opportunity to increase fruit consumption especially among young adults and African Americans.

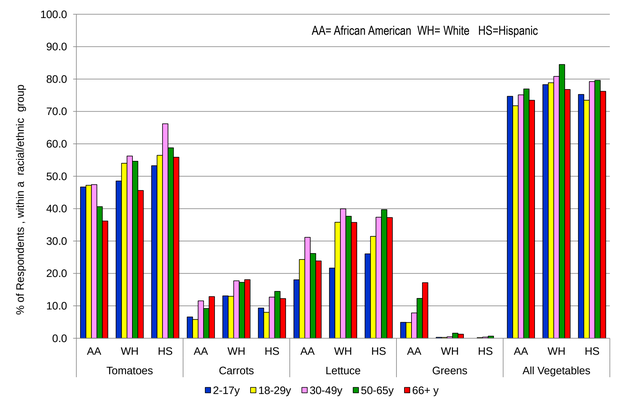
Vegetables

Table 2. Fruit Consumption- % of respondents, 2 years or older, by race/ethnicity

	African American n=4994			White (non-Hispanic) n= 7525			Hispanic n= 5366			
Food Group/Item[a]	%	±	SE[b]	%	±	SE	%	±	SE	p -value[c]
All Vegetables	67.4	±	0.7	74.6	±	0.5	70.7	±	0.6	<.0001
Green/Leafy Vegetables										
Artichoke	0.0	±	0.0	0.5	±	0.1	0.1	±	0.0	<.0001
Asparagus	0.3	±	0.1	1.9	±	0.2	0.3	±	0.1	<.0001
Beans- green, yellow	12.0	±	0.5	11.2	±	0.4	4.0	±	0.3	<.0001
Broccoli	6.2	±	0.3	7.7	±	0.3	5.2	±	0.3	<.0001
Brussels Sprouts	0.1	±	0.0	0.3	±	0.1	0.1	±	0.0	0.0002
Cabbage- green, red	6.7	±	0.4	8.0	±	0.3	4.1	±	0.3	<.0001
Celery	1.1	±	0.1	4.0	±	0.2	1.5	±	0.2	<.0001
Coleslaw	2.5	±	0.2	4.1	±	0.2	0.8	±	0.1	<.0001
Cucumber, pickles	10.1	±	0.4	16.6	±	0.4	10.4	±	0.4	<.0001
Greens-collard, mustard, turnip	7.0	±	0.4	0.7	±	0.1	0.1	±	0.1	<.0001
Kale	0.3	±	0.1	0.1	±	0.0	0.0	±	0.0	0.0016
Lettuce	22.4	±	0.6	33.1	±	0.5	30.8	±	0.6	<.0001
Okra	0.8	±	0.1	0.5	±	0.1	0.1	±	0.0	<.0001
Peas, green	3.0	±	0.2	3.8	±	0.2	1.4	±	0.2	<.0001
Romaine, endive, chicory, escarole	1.0	±	0.1	3.6	±	0.2	1.4	±	0.2	<.0001
Sauerkraut	0.3	±	0.1	0.7	±	0.1	0.1	±	0.0	<.0001
Other Vegetables										
Beets	0.3	±	0.1	1.4	±	0.1	0.3	±	0.1	<.0001
Carrots	7.9	±	0.4	15.7	±	0.4	10.3	±	0.4	<.0001
Cauliflower	0.7	±	0.1	2.4	±	0.2	1.3	±	0.2	<.0001
Corn- white, yellow	10.7	±	0.4	11.3	±	0.4	7.7	±	0.4	<.0001
Eggplant	0.2	±	0.1	0.5	±	0.1	0.2	±	0.1	0.002
Mushrooms	0.7	±	0.1	3.9	±	0.2	1.0	±	0.1	<.0001
Onions- green, pearl, mature	9.2	±	0.4	16.4	±	0.4	14.1	±	0.5	<.0001
Peppers- green, red, yellow	3.8	±	0.3	6.9	±	0.3	2.9	±	0.2	<.0001
Peppers- banana, Serrano, chili	1.3	±	0.2	2.1	±	0.2	8.0	±	0.4	<.0001
Radish	0.4	±	0.1	1.9	±	0.2	1.6	±	0.2	<.0001
Squash- summer, green, yellow	0.7	±	0.1	3.0	±	0.2	1.6	±	0.2	<.0001
Squash- winter	0.1	±	0.1	0.5	±	0.1	0.1	±	0.0	0.0001
Sweet Potatoes	3.0	±	0.2	2.2	±	0.2	0.8	±	0.1	<.0001
Tomato (catsup, juice, sauce)	45.5	±	0.7	51.2	±	0.6	56.5	±	0.7	<.0001
Vegetable mixtures, soups	4.5	±	0.3	6.4	±	0.3	5.2	±	0.3	<.0001

• Racial/ethnic differences in consumption of dark green and leafy vegetables

Figure 2. Selected Vegetable Consumption, *Age by Race/Ethnicity comparisons*



• Adults reported consumed more vegetables than children especially tomatoes and lettuce; perhaps as salad ingredients.

• Researchers can use this vegetable consumption data as a basis for future research to better understand sensory characteristics of low-consumption vegetables such beets, asparagus, artichoke and identify ways to make these foods more appealing and/or available.

SUMMARY/ IMPLICATIONS

• Consistent with previous research, there is a trend that still too few Americans are eating sufficient amounts of fruits and vegetable[1,2] .

• The types of fruits and vegetables consumed by racial and ethnic populations and age subgroups are inherently different.

• This research provides Quantitative Reference Values for the consumption of specific fruits/ vegetables, which can used in future food consumption behavioral research.

• This baseline information can help sensory, consumer, diet/health educators, and product researchers develop fruit and vegetable food, snack, and meal options for specific culture/age market segments.

LIMITATIONS

• Overall categories of fruit or vegetables were coded based on the USDA food nutrient database coding scheme, excluding desserts and foods outside of F/V categories (e.g. vegetables in a meat pie).

• Primary focus of the research was not to imply that different racial/ethnic groups are genetically pre-disposed or limited to eating specific fruits and vegetables but to understand dietary intake patterns using race/ethnicity as a differentiating factor in the absence of confounding socioeconomic/ lifestyle factors.

REFERENCES

1. Guenther PM, Dodd KW, Reedy J, Krebs-Smith SM. Most Americans eat much less than recommended amounts of fruits and vegetables. *J Am Diet Assoc*. 2006;106(9):1371-1379.
2. Kant AK, Graubard BI, Kumanyika SK. Trends in Black–White Differentials in Dietary Intakes of U.S. Adults, 1971–2002. *Am J Prev Med*. 2007;32(4):264-272.
3. Lin B-H, Reed J, Lucier G. U.S. Fruit and Vegetable Consumption: Who, What, Where, and How Much. *Economic Research Service*. 2004.(Agriculture Information Bullentin No. 792-02). http://purl.umn.edu/33699. Accessed April 6, 2010.
4. Yeh M, Ickes SB, Lowenstein LM, Shuval K, Ammerman AS, Farris R, Katz DL. Understanding barriers and facilitators of fruit and vegetable consumption among a diverse multi-ethnic population in the USA. *Health Promotion International*. 2008;23(1):42-51.