# Fruit Consumption by Youth in the United States

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abstract

**OBJECTIVES:** To describe the contribution of whole fruit, including discrete types of fruit, to total fruit consumption and to investigate differences in consumption by sociodemographic characteristics.

**METHODS:** We analyzed data from 3129 youth aged 2 to 19 years from the National Health and Nutrition Examination Survey, 2011 to 2012. Using the Food Patterns Equivalents Database and the What We Eat in America 150 food groups, we calculated the contribution of whole fruit, 100% fruit juices, mixed fruit dishes, and 12 discrete fruit and fruit juices to total fruit consumption. We examined differences by age, gender, race and Hispanic origin, and poverty status.

**RESULTS:** Nearly 90% of total fruit intake came from whole fruits (53%) and 100% fruit juices (34%) among youth aged 2 to 19 years. Apples, apple juice, citrus juice, and bananas were responsible for almost half of total fruit consumption. Apples accounted for 18.9% of fruit intake. Differences by age were predominately between youth aged 2 to 5 years and 6 to 11 years. For example, apples contributed a larger percentage of total fruit intake among youth 6 to 11 years old (22.4%) than among youth 2 to 5 years old (14.6%), but apple juice contributed a smaller percentage (8.8% vs 16.8%), $P < .05$. There were differences by race and Hispanic origin in intake of citrus fruits, berries, melons, dried fruit, and citrus juices and other fruit juices.

**CONCLUSIONS:** These findings provide insight into what fruits US youth are consuming and sociodemographic factors that may influence consumption.

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**WHAT'S KNOWN ON THIS SUBJECT:** Although whole fruit intake has increased among US youth from 2003 to 2010, little is known about the specific types of fruits youth consume and whether consumption varies by age, poverty status, gender, and race or Hispanic origin.

**WHAT THIS STUDY ADDS:** Twelve discrete fruits and fruit juices contribute almost 90% of total fruit consumed by US youth. Consumption of specific fruits and 100% fruit juices was associated with age and race or Hispanic origin but not gender or poverty status.

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Dr Herrick conceptualized and designed the study, drafted the initial manuscript, and performed analyses; Dr Rossen conceptualized and designed the study, performed analyses, and reviewed and revised the manuscript; Drs Nielsen, Branum, and Ogden conceptualized and designed the study and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the National Center for Health Statistics, Centers for Disease Control and Prevention.

www.pediatrics.org/cgi/doi/10.1542/peds.2015-1709

**DOI:** 10.1542/peds.2015-1709

Accepted for publication Jul 22, 2015

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

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Fruits and vegetables are important sources of nutrients that promote health and protect against chronic disease.[1] A diet rich in fruits and vegetables is associated with a decreased risk of diabetes,[2] stroke, overall cancer, and all-cause mortality.[3,4] Increased fruit and vegetable intake may also support healthy weight[5] and weight loss in the context of a reduced-calorie diet.[6] The Dietary Guidelines for Americans (DGA) 2010[1] recommends that people "increase vegetable and fruit intake,"[1] in part because fruits and vegetables are good sources of potassium and dietary fiber while low in sodium, cholesterol, and saturated and trans fat.

The DGA 2010 recommends that children 1 to 18 years of age consume ~1 to 2 cups of fruit per day, depending on age, gender, and physical activity level,[1] with preference given to whole fruits rather than juice or fruits as part of mixed dishes.[1] Furthermore, the American Academy of Pediatrics and the American Heart Association emphasize the importance of consuming a variety of fruits and vegetables while limiting intake of juice and avoiding sugar-sweetened beverages.[7,8] Whole forms of fruit contain valuable nutrients such as fiber and do not contain added sugar, sodium, or fat, nutrients that can often be present in juice or mixed dishes.[1]

Despite many existing recommendations and guidelines, national estimates from 2007 to 2010 showed that only 40% of children aged 1 to 18 years met the recommendation[9] for fruit.[10] Younger children are more likely than adolescents to consume fruits, with 92%, 82%, and 66% of youth aged 2 to 5, 6 to 11, and 12 to 18 years, respectively, reporting any consumption of fruit.[11]

Missing from this picture of fruit consumption among youth is detail about specific types of fruit. Therefore, the objective of the current study was to describe, using national data from 2011 to 2012, the discrete fruits (eg, apples, bananas, melons) youth are consuming by socio demographic characteristics and the contribution of these whole fruits to total fruit consumption. Additionally, for the first time we present national estimates of the contribution of discrete fruits to total fruit intake among non-Hispanic Asian youth.

## METHODS

### Study Design

We used data from 3129 participants in the National Health and Nutrition Examination Survey (NHANES), a complex, stratified, multistage probability sample of the US noninstitutionalized population. NHANES is conducted by the National Center of Health Statistics, Centers for Disease Control and Prevention, which collects and releases data on ~10 000 people every 2 years. Participants receive a detailed in-home interview, followed by a physical examination and dietary interview, at a mobile examination center (MEC). The NHANES protocol was approved by the National Center of Health Statistics Research Ethics Review Board. For children, written parental consent was obtained, and for children 7 to 17 years old, assent was obtained. Data from NHANES 2011 to 2012 were used for the current analysis. Non-Hispanic Asians, non-Hispanic blacks, Hispanics, non-Hispanic whites, and other people at ≤130% of the federal poverty threshold and non-Hispanic white and other people aged ≥80 years were oversampled. The unweighted examination response rate for youth 2 to 19 years of age in the 2011 to 2012 survey cycle was 77%.[12]

### Dietary Intake

Trained interviewers, using a computer-assisted dietary interview system that included a multiple-pass format with standardized probes,[13] collected type and quantity of all foods and beverages consumed in the 24 hours before the physical examination at the MEC (specifically from midnight to midnight). Two 24-hour dietary interviews were obtained from each participant, 1 at the MEC and another 3 to 10 days later by telephone. One 24-hour recall has been shown to be representative of mean population intake because day-to-day variation and random errors cancel out if the data are collected evenly across days of the week and seasons of the year.[14] Because the objective of this analysis was to describe population-level patterns of fruit intake, data from one 24-hour recall were used here, and therefore results refer to intake "on a given day."

Proxy interviews, generally provided by a parent, captured dietary information for children 2 to 5 years old. Children 6 to 11 years old were assisted by proxies, and study participants ≥12 years old self-reported their dietary interview. Dietary interviews were assessed for quality; a detailed description of these criteria and methods are described elsewhere.[15] Only records deemed reliable were used in the current analysis. Of the 3408 youth aged 2 to 19 years examined in the NHANES from 2011 to 2012, 227 did not provide a dietary recall, 52 supplied a recall that was deemed unreliable, and 224 were missing information on poverty (the participants missing poverty information were included in analyses that did not involve poverty). The final analytic sample, after nonmutual exclusions, was 3129.

We determined total fruit consumption by using the Food Patterns Equivalents Database (FPED).[16] The FPED is a database that provides the nutrient values for foods and beverages reported in the 24-hour recalls collected as part of the NHANES. The FPED disaggregates foods consumed into their respective ingredients. For example, the FPED disaggregates the ingredients of apple pie or blueberry smoothies into their component parts and allows the

apples and blueberries to count toward total fruit intake. Tomatoes are included in the red and orange vegetable component of the FPED and do not contribute to total fruit intake in the current analysis.[17]

We determined types of fruit by using the US Department of Agriculture food classification scheme, which characterizes food items as they are commonly consumed. This scheme includes 150 food items, with 9 codes corresponding to whole fruits and 4 codes to fruit juices and fruit drinks (hereafter referred to as What We Eat in America [WWEIA] 150).[18] The WWEIA 150 schema classifies apple pie under the heading "Sweet Bakery Product: Cakes and Pies," and the apples therefore would not be counted toward whole fruit intake. Similarly, a smoothie with blueberries would fall under the heading of "Sweetened Beverages: Fruit Drinks," and the berries would not be counted in estimates of whole fruit intake according to the WWEIA 150.

Using both the WWEIA 150 and the FPED allowed us to examine total fruit intake according to form (eg, whole, juice, or mixed dish and even discrete fruits) by capitalizing on the different ways mixed fruit dishes are treated by the WWEIA 150 and the FPED.

### Demographic Variables

Age was categorized in 3 groups: 2 to 5 years, 6 to 11 years, and 12 to 19 years. Gender (male, female), race, and Hispanic origin (non-Hispanic white, non-Hispanic black, non-Hispanic Asian, and Hispanic) were also used to describe the data. Participants with race and Hispanic origin classified as "other" included those reporting multiple races and are included in the overall estimates but not shown separately in the results. We also included a measure of poverty: poverty income ratio (PIR) ($\leq$130% or $>$130% of the US Department of Health and Human Services poverty threshold according to income and household size). PIR is an index representing the ratio of family income to a threshold for poverty. The US Department of Health and Human Services poverty guidelines were used as the poverty measure to calculate this index. The recommended cutoff point for eligibility for the Supplemental Nutrition Assistance Program[19] and the free school lunch program is 130% of the poverty threshold.[20]

### Analysis

We estimated the percentage of fruit eaten as whole fruit, 100% fruit juice, and mixed fruit dishes. Fruit drinks were included in the mixed fruit dish category. Furthermore, we disaggregated the whole fruit and fruit juices categorized in the WWEIA 150. These 12 discrete fruits and juices were apples, bananas, grapes, peaches and nectarines, berries, citrus, melons, dried fruit, other fruits and fruit salads, and 3 juices: apple juice, citrus juice, and other fruit juices.

We performed statistical analyses by using Stata SE 13.1 (Stata Corp, College Station, TX).[21] Survey design variables and day 1 dietary sample weights, which account for differential probabilities of selection, nonresponse, noncoverage, and sample design, were used to obtain estimates representative of the noninstitutionalized US population. The publicly available dietary sample weights include a poststratification step to balance recalls across days of the week. We estimated SEs by using Taylor series linearization.

We calculated overall mean intake (in cup equivalents) by fruit form by summing the amount of whole fruit, 100% juice, and fruit in mixed dishes consumed by each participant on a given day and then calculating the mean intake by fruit form. To calculate the percentage contribution of fruit form (ie, whole, 100% juice, mixed) and discrete fruits (12 WWEIA food groups) to total fruit intake, we calculated population-weighted intakes by multiplying the amount of total fruit consumed (cup equivalents) by the participant's first day dietary weight.[22] We assessed differences by age group, race and Hispanic origin, PIR, and gender by including these variables as individual covariates in separate logistic regression models (ie, models were not mutually adjusted for all covariates); differences were determined to be significant if $P$ values from adjusted Wald tests were $<$.05. We tested the hypothesis of no linear trend across ordinal variables by using orthogonal contrast matrices ($P < .05$).

## RESULTS

On average, US youth consume 1.25 cup equivalents of total fruit (95% confidence interval [CI], 1.14–1.37) per day. Of this total fruit consumption, nearly 90% of total fruit intake can be attributed to 2 sources: whole fruits (52.9%) and 100% fruit juices (33.5%), with the remainder coming from mixed dishes, which includes fruit drinks (13.5%) (Table 1). By mean cup equivalents, these percentages correspond to 0.60 cups of whole fruits (95% CI, 0.53–0.67), 0.38 cups of 100% fruit juices (95% CI, 0.32–0.44), and 0.15 cups of mixed fruits (95% CI, 0.13–0.18). Youth aged 2–5 years consumed significantly less fruit as whole fruit compared with youth aged 6 to 11 years (48.8% vs 57.2%, $P < .05$). The pattern was opposite for 100% fruit juice, with youth aged 2 to 5 years consuming 40.9% of their total fruit as juice, compared with 28.2% of total fruit intake as juice among youth aged 6 to 11 years ($P < .05$). Among older youth, a larger percentage of their fruit intake came from mixed fruit dishes ($P < .05$ for linear trend by age). Non-Hispanic black youth consumed a significantly smaller percentage of their total fruit intake as whole fruit (42.8%) than did non-Hispanic white (54.6%), non-Hispanic Asian (60.0%), or Hispanic youth (54.6%) ($P < .05$). In

**TABLE 1** Percentage of Total Fruit Intake by Form (Whole, 100% Juice, Mixed Dish) and Selected Characteristics, US Youth Aged 2–19 y, 2011–2012

| | | Fruit Form | | | | | |
|---|---|---|---|---|---|---|---|
| | | Whole Fruit | | 100% Fruit Juice | | Mixed Dishes and Fruit Drinks | |
| | $n$[a] | % | SE | % | SE | % | SE |
| Overall | 3129 | 52.94 | 1.85 | 33.51 | 1.64 | 13.54 | 0.98 |
| Age, y | | | | | | | |
| 2–5 | 828 | 48.84 | 2.69 | 40.85 | 2.65 | 10.31 | 0.76 |
| 6–11 | 1148 | 57.21[b] | 2.10 | 28.15[b] | 2.16 | 14.64[b] | 1.88 |
| 12–19 | 1153 | 51.85 | 3.37 | 33.29 | 3.54 | 14.86[b] | 2.11 |
| Gender | | | | | | | |
| Male | 1582 | 52.33 | 2.18 | 35.03 | 2.04 | 12.65 | 1.24 |
| Female | 1547 | 53.72 | 2.51 | 31.60 | 2.40 | 14.67 | 1.34 |
| Race and Hispanic origin[c] | | | | | | | |
| Non-Hispanic white | 689 | 54.58 | 3.79 | 30.68 | 3.21 | 14.74 | 1.85 |
| Non-Hispanic black | 936 | 42.81[d] | 2.62 | 42.50[d] | 2.17 | 14.69 | 1.57 |
| Hispanic | 966 | 54.59[e] | 2.84 | 34.80[e] | 2.26 | 10.61[d,e] | 1.02 |
| Non-Hispanic Asian | 370 | 59.98[e] | 6.68 | 29.47[e] | 5.39 | 10.54 | 1.76 |
| Poverty status | | | | | | | |
| ≤130% | 1411 | 51.10 | 1.77 | 34.13 | 1.51 | 14.77 | 1.45 |
| >130% | 1494 | 54.56 | 2.59 | 32.61 | 2.70 | 12.84 | 1.40 |

Source: NHANES.

All statistical tests performed with adjusted Wald tests ($P < .05$).

[a] Unweighted sample size includes responses from all reliable and complete recalls.

[b] Significantly different from 2–5 y group.

[c] Other race category not shown ($n = 168$).

[d] Significantly different from non-Hispanic white.

[e] Significantly different from non-Hispanic black.

a complementary pattern, non-Hispanic black youth (42.5%) consumed a significantly larger percentage of their total fruit intake as 100% fruit juice compared with non-Hispanic white (30.7%), non-Hispanic Asian (29.5%), and Hispanic (34.8%) youth. There were no differences in form of fruit intake between boys and girls or by poverty status (Table 1).

Figure 1 shows greater detail in the contribution of discrete fruits and juices to total fruit intake among all youth aged 2 to 19 years. Apples accounted for roughly one-fifth (18.9%) of fruit intake. Citrus juice accounted for 14.3%, apple juice for 10.3%, and other fruit juices for 9.0% of fruit intake, followed by bananas (6.8%), melons (6.0%), and other fruits and fruit salads (5.5%).

The majority of differences in the percentage contribution of the 12 discrete fruits and juices to total fruit intake by age were between youth aged 2 to 5 years and 6 to 11 years (Table 2). Apples contributed a larger percentage of total fruit intake among youth 6 to 11 years old (22.4%) compared with those 2 to 5 years old (14.6%) ($P < .05$). Bananas contributed significantly more to total fruit intake among 2- to 5-year-olds than among 6- to 11-year-olds: 9.0% versus 5.4% ($P < .05$). Berries contributed 5.2% to fruit intake among youth aged 2 to 5 years and 3.9% among youth aged 6 to 11 years ($P < .05$). The contribution of dried fruit to total fruit intake was also highest among youth aged 2 to 5 years (1.4%) compared with youth aged 6 to 11 years (0.3%) ($P < .05$) and youth aged 12 to 19 years (0.2%) ($P < .05$). There were no differences by age in the percentage contribution of melons, other fruits and fruit salads, citrus fruits, grapes, and peaches and nectarines.

The contribution of apple juice to total fruit consumption decreased with age ($P < .05$), 16.8% among youth aged 2 to 5 years, 8.8% among youth aged 6 to 11 years, and 6.8% among teens aged 12 to 19 years ($P < .05$). There was an opposite trend by age in the contribution of citrus juice to total fruit intake, with 10.0% of total fruit consumption attributable to citrus juice for youth aged 2 to 5 years, compared with 14.0% among youth aged 6 to 11 years and 17.6% among youth aged 12 to 19 years ($P < .05$).

There were significant race and Hispanic origin differences in the contribution of berries, citrus fruits, citrus juice, melons, and peaches and nectarines to total fruit intake (Table 3). Berries contributed 5.9% of total fruit intake among non-Hispanic white youth, significantly higher than among non-Hispanic black youth (1.6% to total fruit intake) ($P < .05$). Citrus fruits contributed 10.2% to total fruit intake among non-Hispanic Asians, in contrast to 3.4% of total fruit intake among non-Hispanic white youth ($P < .05$). Citrus juice contributed 11.6% to total fruit intake among non-Hispanic white youth, significantly less than among Hispanic youth (18.3%) ($P < .05$). Melons contributed significantly less to total fruit intake among Non-Hispanic black youth (1.8%) compared with non-Hispanic white (7.6%) and non-Hispanic Asian (7.1%) youth ($P < .05$). Hispanic youth consumed a greater percentage of fruit from peaches and nectarines (3.7%) than non-Hispanic black youth (1.5%; $P < .05$). Hispanic youth also consumed a smaller percentage of fruit in the form of dried fruit (0.2%) compared with both non-Hispanic white (0.8%) and non-Hispanic Asian youth (1.1%; $P < .05$). Additionally, non-Hispanic Asian youth consumed a greater percentage of total fruit as dried fruit as compared with non-Hispanic black youth (0.4%; $P < .05$).

No differences were observed in the types of fruits consumed by US youth by gender, and only 1 difference emerged by PIR. Children from families earning >130% of the

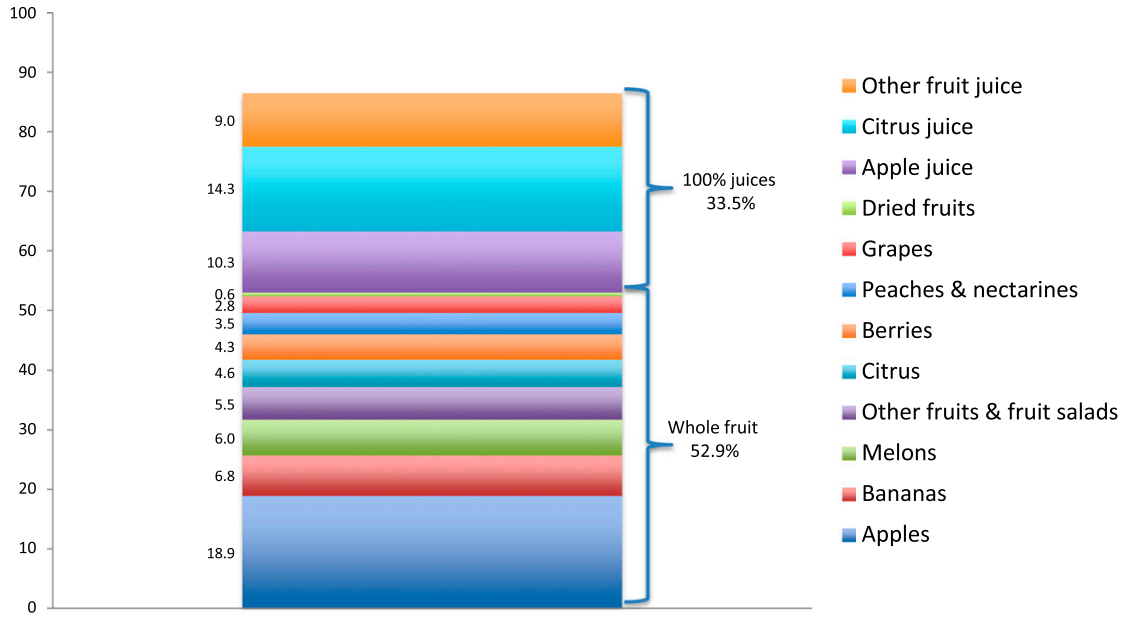


**FIGURE 1**
Contribution of 12 discrete fruits and fruit juices to total fruit intake, US youth 2–19 years old, 2011–2012.

poverty threshold consumed a greater percentage of their fruit as berries (5.4%) than children in families reporting income <130% of the poverty threshold (2.5%; $P < .05$ [Data not shown]).

## DISCUSSION

Twelve discrete fruits and 100% fruit juices were responsible for 86% of total fruit intake in the diet of American youth. The contribution of discrete fruits to total fruit consumption varied by age, with apple juice and dried fruit representing a smaller share of fruit intake and citrus juice accounting for a larger share as age increased. Additionally, youth aged 6 to 11 years consumed more of their total fruit as apples and less as bananas and other fruit juices compared with youth aged 2 to 5 years. Factors such as taste preference, repeated exposures to fruits, social experiences, and availability may drive these differences.[23]

This article adds previously undescribed information about the contribution of discrete fruits to total fruit consumption in a nationally representative sample that includes non-Hispanic Asian youth. Distinct consumption patterns were observed across racial and ethnic subpopulations; for example, non-Hispanic Asians obtained a greater percentage of fruit from citrus fruits than non-Hispanic white youth. Variations in the types of fruits consumed by race and Hispanic origin may be related to acculturalization,[24,25] accessibility, and social experiences.[23]

We found that more than half of all fruit consumed by youth aged 2 to 19 years is whole fruit (52.9%), and another third is consumed as 100% fruit juice (33.5%). Drewnoski and Rehm[26] found that 65% of total fruit intake could be attributed to whole fruit and 35% attributed to 100% fruit juice among a national sample of

**TABLE 2** Contribution of Discrete Fruits and 100% Fruit Juices to Total Fruit Intake Among US Youth Aged 2–19 y, by Age, 2011–2012

| | Age | | | | | |
|---|---|---|---|---|---|---|
| | 2–5 y | | 6–11 y | | 12–19 y | |
| | % | SE | % | SE | % | SE |
| Apples | 14.60 | 1.63 | 22.35[a] | 2.12 | 18.74 | 2.47 |
| Apple juice[b] | 16.78 | 3.17 | 8.83[a] | 1.17 | 6.82[a] | 1.36 |
| Bananas | 8.99 | 0.85 | 5.40[a] | 0.97 | 6.51 | 1.67 |
| Berries | 5.17 | 1.10 | 3.91 | 0.61 | 3.99 | 1.51 |
| Citrus fruits | 4.63 | 0.75 | 4.49 | 0.69 | 4.57 | 1.27 |
| Citrus juice[b] | 9.99 | 1.61 | 14.04[a] | 2.47 | 17.62[a] | 1.59 |
| Dried fruits[b] | 1.43 | 0.59 | 0.26[a] | 0.26 | 0.22[a] | 0.08 |
| Grapes | 3.22 | 0.42 | 3.28 | 0.79 | 2.06 | 0.47 |
| Melons | 3.77 | 1.57 | 8.34 | 1.62 | 5.50 | 2.12 |
| Other fruits and fruit salads | 5.22 | 0.68 | 6.48 | 1.22 | 4.67 | 1.04 |
| Other fruit juice | 14.08 | 2.37 | 5.28[a] | 0.78 | 8.84 | 3.39 |
| Peaches and nectarines | 1.81 | 0.86 | 2.70 | 0.56 | 5.59 | 2.62 |

Source: NHANES.
All statistical tests performed with adjusted Wald tests ($P < .05$). Linear trends tested with orthogonal contrast matrices ($P < .05$).
[a] Significantly different from 2–5 y group.
[b] Significant linear trend by age.

**TABLE 3** Contribution of Discrete Fruits and 100% Fruit Juices to Total Fruit Consumption Among US Youth Aged 2–19 y, by Race and Hispanic Origin, 2011–2012

| | Race and Hispanic Origin | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Non-Hispanic White | | Non-Hispanic Black | | Non-Hispanic Asian | | Hispanic | |
| | % | SE | % | SE | % | SE | % | SE |
| Apples | 18.51 | 2.35 | 17.32 | 1.36 | 19.23 | 3.60 | 21.20 | 2.08 |
| Apple juice | 10.38 | 2.13 | 10.49 | 1.64 | 7.66 | 2.14 | 9.77 | 1.61 |
| Bananas | 6.87 | 1.44 | 5.96 | 0.97 | 7.73 | 1.62 | 6.89 | 1.22 |
| Berries | 5.85 | 1.26 | 1.60[a] | 0.49 | 3.05 | 1.06 | 3.03 | 0.88 |
| Citrus fruits | 3.35 | 0.90 | 4.54 | 0.43 | 10.22[a] | 4.19 | 6.17 | 0.97 |
| Citrus juice | 11.63 | 1.72 | 16.27 | 1.79 | 17.04 | 4.96 | 18.27[a] | 2.17 |
| Dried fruits | 0.76 | 0.33 | 0.35[b] | 0.18 | 1.11 | 0.34 | 0.20[a,b] | 0.10 |
| Grapes | 2.99 | 0.66 | 3.46 | 0.71 | 4.05 | 1.49 | 1.87 | 0.45 |
| Melons | 7.60[c] | 2.26 | 1.76 | 0.76 | 7.13[c] | 3.81 | 5.11 | 1.66 |
| Other fruits and fruit salads | 4.39 | 0.91 | 6.29 | 1.89 | 6.68 | 2.13 | 6.45 | 0.97 |
| Other fruit juice | 8.67 | 2.51 | 15.73 | 2.94 | 4.77 | 1.29 | 6.76 | 1.12 |
| Peaches and nectarines | 4.25 | 1.76 | 1.52 | 0.36 | 0.78 | 0.62 | 3.67[c] | 1.31 |

Source: NHANES.

[a] Significantly different from non-Hispanic white.

[b] Significantly different from non-Hispanic Asian.

[c] Significantly different from non-Hispanic black.

youth and adults aged ≥4 years, from NHANES 2007 to 2010. Drewnoski and Rehm[26] used the US Department of Agriculture MyPyramid Equivalents Database,[27] a precursor to the FPED files, which disaggregates mixed fruit dishes into component parts, potentially overestimating the contribution of whole fruits to total fruit intake.

Similar to Drewnoski and Rehm,[26] we found that non-Hispanic white and Hispanic youth consumed a larger percentage of their total fruit intake as whole fruit compared with non-Hispanic black youth. We also showed for the first time in a nationally representative population that non-Hispanic Asian youth consumed a larger percentage of their total fruit intake as whole fruit compared with non-Hispanic black youth.

Results from the current study demonstrate that more than half of the fruit consumed by American youth comes from the most nutrient-dense form, whole fruit, in line with the 2010 DGA. Fruit consumed in its whole form is most often its most healthful form, without added sugar or fat, and it retains fiber.[28] Additionally, whole fruit is less energy dense and more nutrient dense than juice. We also found that more than one-third of total fruit intake came from 100% fruit juice, which lacks fiber but has no added sugar or fat.[1] However, liquid forms of calories have been shown to bypass many satiety cues[29,30] and may contribute to excess caloric intake because people may not compensate for calories consumed in liquid form.[31]

There are a few limitations to our study. There were differences in who provided answers for the dietary recall by age. These differences could introduce measurement error. Another source of measurement error is the act of recalling diet itself, because it relies on accurate memory of what was consumed and how much, and there is the potential for bias related to underreporting or overreporting of certain food items based on their social influences.[32] The analysis is based on cross-sectional data; therefore, no causal inferences can be made.

## CONCLUSIONS

Twelve discrete fruits and 100% juices contribute almost 90% of total fruit intake in the diet of American youth. Variations in fruit intake exist by age and race and Hispanic origin. Youth aged 2 to 5 years consumed less of their total fruit as apples, whereas bananas, apple juice, citrus juice, dried fruits, and other fruit juices contributed a larger amount to their total fruit intake compared with youth aged 6 to 11 years. Consumption patterns also varied across non-Hispanic Asian, non-Hispanic white, non-Hispanic black, and Hispanic youth. These findings provide insight into what fruits US youth are consuming and sociodemographic factors that may influence that consumption, adding to earlier articles that described who consumes fruit on a given day,[11] the amount of fruit consumed,[10] and the form (whole or 100% fruit juice).[26]

## ABBREVIATIONS

CI: confidence interval
DGA: Dietary Guidelines for Americans
FPED: Food Patterns Equivalents Database
MEC: mobile examination center
NHANES: National Health and Nutrition Examination Survey
PIR: poverty income ratio
WWEIA: What We Eat in America

**FINANCIAL DISCLOSURE:** The authors have indicated they have no financial relationships relevant to this article to disclose.

**FUNDING:** This work was performed under employment of the U.S. federal government, and the authors did not receive any outside funding.

**POTENTIAL CONFLICT OF INTEREST:** The authors have indicated they have no potential conflicts of interest to disclose.

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***VACATION HAPPINESS:*** *I have taken a few vacations over the past two years. Each one has been eagerly anticipated, and I have had wonderful experiences. I have, however, wondered why I have spoken more about some vacations than others – and why some have made a more lasting impact on me.*

*As reported on CNN (Health: July 17, 2015), vacations usually do make people happy – although transiently. While the effects may be relatively short, vacations lead to more sustained happiness than other investments or activities, such as material purchases. One reason for the greater effect may be that a vacation buys an experience or a story that can be shared. Buying a new watch or smartphone is not as easily shared. Among vacations, some types of experiences tend to have more durable effects. Even if the vacation experience is not unique, such as playing golf, concentrating on the distinctive aspects of the golfing experience (for example, the particular hole where the green is totally surrounded by water, or the chance to play with local golfers with intimate knowledge of the course) tend to make people happier and for a longer time.*

*Researchers have shown that there are a few ways to make the happiness associated with vacations last longer. Planning in advance can help, as that way the person can savor and anticipate the experience longer. Scheduling dramatic or highpoint activities very early or very late can also be helpful. Early wonderful experiences set the tone for the trip while we tend to remember the last events more clearly. As I share experiences about my recent vacations with friends, it is clear that it is the unique events (e.g., visiting a plain of Buddhist temples or watching a Shakespeare play at the Globe Theatre) have had the most lasting impact for me, and I will think about that as I plan my next vacation.*

*Noted by WVR, MD*