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Income and race/ethnicity influence dietary fiber intake and vegetable consumption

Maureen Storey [a,*], Patricia Anderson [b]

[a] Alliance for Potato Research and Education, McLean, VA, USA
[b] Alliance for Potato Research and Education, Monroe, WA, USA

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ABSTRACT

Grains, fruits, and vegetables are the primary sources of dietary fiber (DF), with the white potato contributing nearly 7% of the DF to the US food supply. The DF composition of the white potato—with or without the skin and regardless of cooking method—compares well with the DF content of other vegetables. Many health benefits, including improved gastrointestinal health, are attributed to greater DF consumption; however, less than 3% of males and females have an adequate intake of DF. Because of this population-wide shortfall, DF is considered to be a nutrient of concern. In this study, using data from the National Health and Nutrition Examination Survey 2009 to 2010, we examined the mean intake of DF across sex, age, race/ethnicity, family income, and poverty threshold. This study shows that mean intake of DF is far below recommendations, with children and adolescents aged 2 to 19 years consuming an average of less than 14 g of DF per day. Adults 20+ years old consume, on average, about 17 g of DF per day, and men consume significantly more DF than women. Non-Hispanic black adults consume significantly less DF compared with other race/ethnic groups. Lower family income and living at less than 131% of poverty were associated with lower DF intakes among adults. Federal and local government policies should encourage consumption of all vegetables, including the white potato, as an important source of DF.

1. Introduction

In 2002, the Institute of Medicine (IOM) established an adequate intake (AI) level for dietary fiber (DF) for males and females older than 2 years [1]. The IOM recommendations were based on the median DF intake that achieved the lowest risk of coronary heart disease. Epidemiologic and intervention studies suggested that an intake of 14 g DF per 1000 kcal would promote heart health. Therefore, the recommended intake of DF varies depending on age and sex.

Much like the IOM, the 2010 Dietary Guidelines Advisory Committee concluded that DF from foods may protect against cardiovascular disease, and this nutrient is also essential for optimal digestive health [2]. Greater intakes of vegetables and fruits—as good sources of DF—are associated with a lower risk of cardiovascular disease and certain types of cancer, especially those of the gastrointestinal tract. Increasing DF intake is associated with greater stool bulk and faster transit time, thus leading to improved laxation and other gastrointestinal health benefits. For example, recent research has

Abbreviations: AI, adequate intake; BMI, body mass index; DF, dietary fiber; NHANES, National Health and Nutrition Examination Survey; USDA, US Department of Agriculture.

* *Corresponding author.* Alliance for Potato Research and Education, 2000 Corporate Ridge, Suite 1000, McLean, VA 22102. Tel.:+1 703 245 7694.
E-mail addresses: mstorey@apre.org (M. Storey), patricia.anderson@comcast.net (P. Anderson).

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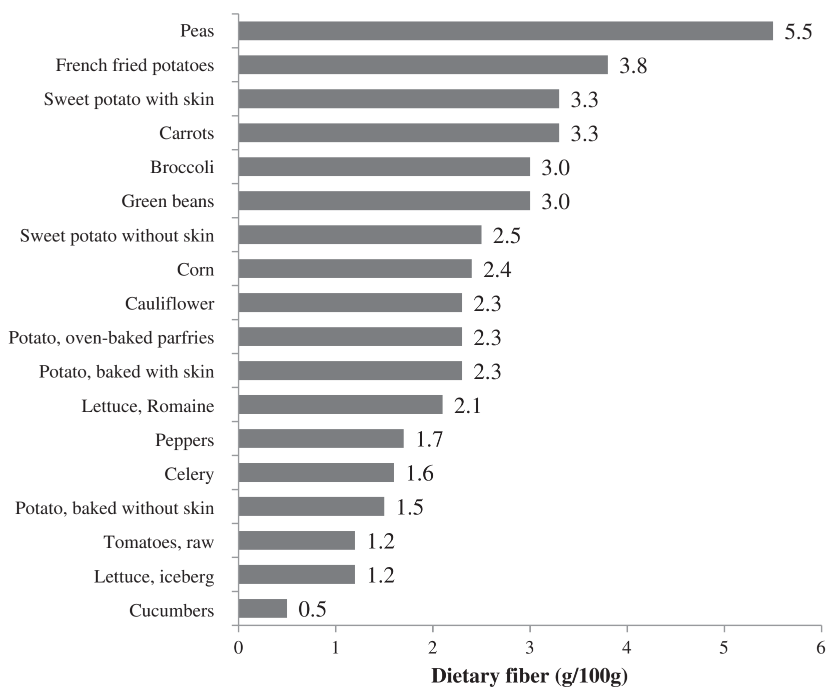
found that DF from white potatoes plays a role in the production of fecal short-chain fatty acids concentration, which is important for immune regulation and maintaining gut health [3]. Potato fiber is shown to protect the small intestinal wall against ingested compounds formed during cooking, such as melanoidins and acrylamide [4]. Studies have also established that potato fiber has antiproliferative functions that may act as chemopreventive agents [5,6]. Other studies have shown that resistant starch may act as a probiotic, which nourishes beneficial gut bacteria and increases the mucus layer that protects the gut from harmful compounds [7].

Grains, fruits, and vegetables contribute significant amounts of DF to the diet [8]. These 3 food groups account for more than 70% of DF in the food supply; however, the proportion of DF provided by grains, vegetables, and fruits has changed somewhat since 1970 [9]. For example, in 1970, based on per-capita availability, vegetables and fruit provided 32% and 13% of the DF, respectively, whereas grains contributed 30% of DF. In 2006, however, per-capita availability of DF from vegetables and fruit declined to 26% and 11%, respectively, whereas DF from grains increased to 36%. White potatoes alone contributed 9.2% of DF in 1970, but only about 7% of DF in 2006. Likewise, DF contributions from dark green and deep yellow vegetables fell from 19.4% to 15.0%, in that same period.

Compared with grain products, the DF content of fruits and vegetables is more modest because of their relatively high water content [8]. Commonly consumed vegetables provide about 1 to 3 g DF per 100 g (g DF/100 g). The DF content of the white potato—with or without the skin—compares favorably with other vegetables (Fig. 1). For example, a baked white potato with skin contributes 2.2 g DF/100 g, whereas a baked white potato without skin contributes 1.5 g DF/100 g. Cooking methods, including frying, do not diminish DF content [10]. French fried potatoes from a quick service restaurant provide 3.8 g DF/100 g—more than an equivalent amount of cooked broccoli (3.3 g), green beans (3.2 g), or spinach or corn (each 2.4 g) [10]. Based on serving size, a medium (148 g serving) baked white potato with skin provides 3.3 g DF; a small (70 g) serving of French fried potatoes or oven-baked potato par-fries—such as those served in schools—provides 2.7 and 1.6 g DF, respectively [10].

The importance of white potatoes in contributing to DF intake is demonstrated in several studies. Keast et al showed that white potatoes, including French fried potatoes, were the fourth leading source of DF for children and adolescents aged 2 to 18 years; similar results were shown by O'Neil et al, who found that white potatoes were among the top 4 contributors of DF for adults 19+ years [11–13].

Although dietary guidance urges greater consumption of vegetables and fruit as sources of DF, these foods can be



*data are from USDA Agricultural Research Service, National Nutrient Database for Standard Reference, Release 26. Values are for frozen vegetables – peas, carrots, broccoli, green beans, corn, and cauliflower – that have been boiled; raw vegetables are Romaine and iceberg lettuce, peppers, celery, tomatoes and cucumbers with peel.

Fig. 1 – Dietary fiber content of selected commonly consumed vegetables*. *Data are from USDA Agricultural Research Service, National Nutrient Database for Standard Reference, Release 26. Values are for frozen vegetables—peas, carrots, broccoli, green beans, corn, and cauliflower—that have been boiled; raw vegetables are Romaine and iceberg lettuce, peppers, celery, tomatoes, and cucumbers with peel.

costly, especially for individuals with limited financial resources [14,15]. Furthermore, data from the US Department of Agriculture show that low-income negatively influences total vegetable consumption. In this secondary analysis, we examine mean intake of DF across age groups, sex, race/ethnicities, family income, and poverty threshold. We hypothesized that lower family income and/or poverty may be associated with decreased DF intake.

2. Methods and materials

2.1. National Health and Nutrition Examination Survey 2009-2010

The data used in this study were from the National Health and Nutrition Examination Survey (NHANES) 2009-2010, which is a continuous population-based survey that collects information on the health and nutrition of individuals living in the United States. These surveys are conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics, and they represent all noninstitutionalized persons older than 2 years. All NHANES data collections receive approval from the National Center for Health Statistics Research Ethics Review Board. Survey data are released in 2-year cycles.

Our analysis used data from the first day of the 24-hour dietary recall and the total nutrient intake files. Dietary intake was measured using a multipass 24-hour recall instrument that has been tested thoroughly for accuracy. Only day 1 dietary recall data were used because, according to the NHANES dietary data tutorial, "the mean of the population's distribution of usual intake can be estimated from a sample of individuals' 24-hour recalls, without sophisticated statistical adjustment." In addition, day 1 dietary recall data are collect in-person, whereas day 2 data are collected on a significantly smaller subsample by phone interview. Dietary data from NHANES 2009-2010 are the most recent data available to the public.

Methods of collecting these data are explained on the US Department of Agriculture's (USDA) Web site [16]. For the purpose of this study, white potatoes included the following: baked, boiled, fried, hash-browned, home-fried, mashed, roasted, salad, scalloped, stuffed, and with sauce. Because potato chips are frequently eaten as a snack, rather than as part of a full meal, they were not included in the analyses.

2.2. Statistical analyses

Appropriate survey weights were used to calculate average consumption of DF across sex, race/ethnicity, family income groups, and poverty threshold. Race/ethnicity groupings included non-Hispanic blacks, non-Hispanic whites, all Hispanic, and other race/ethnicity. Income was examined using categories of household income and categories of poverty-to-income ratio. Annual household income categories included the following: (1) less than \$25 000, (2) \$25 000 to \$74 999, and (3) more than \$75 000. Poverty threshold categories were as follows: (1) less than 131% of poverty, (2) 131% to 185% of poverty, and (3) more than 185% of the poverty threshold. Group means for each data cycle of NHANES were estimated in STATA 9 using the "svyreg" procedure to adjust for the complex design of the survey and the "subpop" option to calculate the group means for the age groups [17]. This procedure used a Taylor linearization approach to correct the estimated standard errors for survey design effects. The statistical significance of differences of mean intakes ($P < .05$) was calculated using the STATA "test" procedure that calculates the probability that any 2 estimated means are equal to one another.

3. Results

3.1. Demographic characteristics

3.1.1. Children and adolescents aged 2 to 19 years

Weighted samples showed that among children and adolescents aged 2 to 19 years, about 57% were non-Hispanic white; 14%, non-Hispanic black; 21%, Hispanic; and 8%, other races/ethnicities (Table 1).

Among children and adolescents aged 2 to 19 years, a greater percentage of Hispanic males were overweight compared with non-Hispanic white males and males of other races/ethnicities. Significantly more non-Hispanic black and Hispanic females were overweight than non-Hispanic white females.

There was a significantly greater percentage of non-Hispanic black and Hispanic children who were living in households with less than \$25 000 annual income and at less than 131% of the poverty threshold compared with non-Hispanic whites.

3.1.2. Adults aged 20+ years

Among adults, the race/ethnicity percentages are slightly different from they were for children: nearly 70% were non-Hispanic white; 11%, non-Hispanic black; 14%, Hispanic; and 6%, other races/ethnicities. Average body mass index (BMI) was significantly higher for non-Hispanic black and Hispanic females than it was for non-Hispanic whites and females of other races/ethnicities. Males and females of other races/ethnicities had significantly lower average BMI than did non-Hispanic white, non-Hispanic black, and Hispanic males and females.

On average, a higher percentage of Hispanic males and females reported having less than a high school education compared with males and females of all other race categories. Non-Hispanic black males and females had higher percentages reporting less than a high school education than did non-Hispanic whites and males and females of other races/ethnicities. Significantly more non-Hispanic black males and females, Hispanic males and females, and males of other races/ethnicities lived in households making less than \$25 000 and at less than 131% of the poverty threshold compared with their non-Hispanic white counterparts.

3.2. Mean intake of DF by age, sex, and race/ethnicity

Mean intakes of DF were far below recommendations for all Americans with all children and adolescents aged 2 to 19 years and adults aged 20+ years consuming 13.7 and 17.1 g DF/d, respectively (Table 2). Males consumed significantly more DF on the day of the survey, on average, than did females. Nevertheless, adult males aged 20+ years consumed less than 19 g DF/d, which is about half of the AI (30-38 g DF/d) recommended by the IOM. Adult females consumed less than 16 g DF/d, on average; AI for adult females is 21 to 25 g DF/d [1].

Table 1 – Characteristics of the study sample by race/ethnicity and age

	Full sample	Non-Hispanic white	Non-Hispanic black	All Hispanic	Other race
Ages 2-19 y					
Male	50.3 (±1.6)	57.5 (±3.9)	13.1 (±1.1)	22.2 (±3.4)	7.2 (±1.2)
Female	49.7 (±1.6)	57.2 (±3.8)	14.4 (±1.3)	20.6 (±3.5)	7.8 (±1.0)
Total		57.3 (±3.6)	13.8 (±1.0)	21.4 (±3.4)	7.5 (±0.9)
Overweight					
Male	31.8^{x} (±1.8)	29.7^{a} (±3.3)	31.9^{a,b} (±2.8)	38.9^{b} (±2.3)	27.2^{a} (±4.5)
Female	28.6^{x} (±1.9)	24.0^{a} (±2.4)	33.1^{b} (±2.7)	38.9^{b} (±2.6)	27.0^{a,b} (±6.2)
HH income<$25 000					
Male	22.8^{x} (±1.8)	10.7^{a} (±1.7)	46.7^{b} (±3.0)	37.4^{c} (±2.8)	32.7^{b,c} (±7.7)
Female	28.1^{y} (±2.1)	20.3^{a} (±2.3)	41.4^{b} (±4.4)	41.9^{b} (±3.3)	25.8^{a,b} (±7.1)
Poverty <131%					
Male	31.9^{x} (±2.1)	16.7^{a} (±2.5)	55.3^{b,c} (±4.5)	56.9^{b} (±2.5)	38.8^{c} (±8.4)
Female	37.4^{x} (±3.0)	26.2^{a} (±4.0)	51.4^{b,c} (±4.3)	59.2^{c} (±3.9)	38.7^{a,b} (±8.0)
Ages 20+ y					
Male	48.2 (±0.6)	69.4 (±3.1)	10.5 (±0.9)	14.1 (±2.8)	6.0 (±1.0)
Female	51.8 (±0.6)	68.0 (±3.8)	12.2 (±1.1)	13.1 (±2.9)	6.7 (±1.0)
Total		68.7 (±3.4)	11.4 (±0.9)	13.6 (±2.9)	6.3 (±0.9)
BMI (kg/m^{2})					
Male	28.7^{x} (±0.2)	28.8^{a} (±0.3)	29.3^{a} (±0.5)	29.1^{a} (±0.4)	26.5^{b} (±0.7)
Female	28.9^{x} (±0.2)	28.3^{a} (±0.2)	32.3^{b} (±0.4)	29.6^{b} (±0.4)	26.4^{c} (±0.9)
Less than HS education (%)					
Male	17.6^{x} (±1.1)	11.0^{a} (±1.1)	24.3^{b} (±3.0)	46.7^{c} (±3.3)	14.4^{a} (±3.3)
Female	19.8^{y} (±1.2)	14.4^{a} (±1.9)	26.0^{b} (±1.9)	44.5^{c} (±2.7)	15.0^{a} (±3.1)
Income <$25 000 (%)					
Male	21.8^{x} (±1.2)	16.1^{a} (±1.1)	33.5^{b} (±3.1)	38.7^{b} (±3.3)	31.2^{b} (±5.3)
Female	26.7^{y} (±1.2)	22.3^{a} (±1.2)	41.8^{b} (±2.8)	38.9^{b} (±2.6)	21.4^{a} (±6.2)
Poverty <131% (%)					
Male	20.6^{x} (±1.5)	13.5^{a} (±13.5)	30.1^{b} (±2.2)	47.1^{c} (±2.7)	30.7^{b} (±4.2)
Female	24.9^{y} (±1.2)	18.0^{a} (±1.4)	41.9^{b} (±3.7)	48.8^{b} (±2.8)	24.0^{a} (±6.0)

* The values presented are percentages (unless noted otherwise) of weighted means of sample by age, sex, and race/ethnicity ± SE. The means of non-Hispanic white, non-Hispanic black, all Hispanic, and other race (male and female) were compared using difference of means tests. Male and female means were also compared using the superscripts x and y. Means with different superscripts are statistically significant at $P < .05$.

In general, non-Hispanic blacks had the lowest mean intake of DF. However, mean DF intake was below AI across all races/ethnicities. Hispanic children and adults consumed significantly more DF than did non-Hispanic blacks; however, there was no difference in average DF intake between non-Hispanic whites and non-Hispanic black children and adolescents on the day of the survey. While Hispanic males aged 2 to 19 years consumed more DF than non-Hispanic black males, there was no difference in mean intake of DF among female children and adolescents across race/ethnicity.

Race/ethnicity played a role in average DF intake among adults as well (Table 2). Overall, non-Hispanic white adults consumed significantly more DF than did non-Hispanic black adults. Non-Hispanic black males had significantly lower DF intake on the day of the survey compared with non-Hispanic white, Hispanic, and males of other races/ethnicities. Females of other races/ethnicities, on average, consumed the most DF among all females. Moreover, Hispanic and non-Hispanic white females consumed significantly more DF than did non-Hispanic black females.

3.3. *Mean DF intake by family income and poverty threshold*

3.3.1. *Annual family income and DF intake*

Annual family income does not appear to influence DF intake among children and adolescents (Table 3); however, this study supported the hypothesis that lower family income negatively affects DF intake among adults (Fig. 2). On average, adults with annual family income more than $75 000 consumed about 18 g DF/d—significantly more than adults in lower-income categories. Among adult males, those with the lowest annual income (<$25 000) had significantly lower DF intake than did males with higher incomes (Table 3). Females with the highest income ($75 000+) consumed significantly more DF, on average, than did females in the 2 lower-income categories.

3.3.2. *Poverty and DF intake*

Based on poverty threshold, female children at 131% to 185% poverty had significantly lower intakes of DF than did female children at more than 185% poverty; however, there were no differences in mean DF intake among male children based on poverty threshold (Table 3). Adults at more than 185% poverty consumed significantly more DF than did adults at less than 131% poverty and at 131% to 185% poverty. Nevertheless, those with higher income and more than 185% poverty, on average, did not have an AI of DF.

4. Discussion

Our results are consistent with other studies that show that DF intake is far below recommendations for all ages, sexes, and races/ethnicities. Certain subpopulations, such as non-Hispanic blacks, are at particular risk for having very low

Table 2 – DF intake by age, sex, and race/ethnicity

	All	Non-Hispanic white	Non-Hispanic black	All Hispanic	Other race
Ages 2-19 y					
Male	14.4^{x} (±0.35)	14.1^{a,b} (±0.63)	13.5^{a} (±0.58)	15.7^{b}± (0.45)	14.8^{a} (±0.88)
Female	13.0^{y} (±0.22)	12.9^{a} (±0.40)	12.5^{a} (±12.5)	13.1^{a} (±0.46)	13.9^{a} (±1.20)
All	13.7 (±0.23)	13.5^{a,b} (±0.43)	13.0^{a} (±0.32)	14.4^{b} (±0.37)	14.3^{a,b} (±0.79)
Ages 20+ y					
Male	18.7^{x} (±0.39)	18.9^{a} (±0.49)	15.0^{b} (±0.53)	20.9^{c} (±0.66)	17.8^{a,c} (±1.23)
Female	15.6^{y} (±0.22)	15.7^{a} (±0.31)	12.7^{b} (±0.33)	16.0^{a,c} (±0.57)	18.4^{c} (±1.12)
All	17.1 (±0.24)	17.3^{a} (±0.31)	13.7^{b} (±0.36)	18.4^{a} (±0.53)	18.1^{a} (±0.92)

* The values presented are weighted means (in grams per day) ± SE by age, sex, and race/ethnicity. The means of non-Hispanic white, non-Hispanic black, all Hispanics, and other races were compared using difference of means tests. Male and female means were also compared using the superscripts x and y. Means with different superscripts are statistically significant at $P < .05$.

intakes of DF compared with other race/ethnic groups. Low income or living in poverty is also associated with a lower intake of DF among adults, but not children.

To help achieve an AI of DF and other micronutrients, the *2010 Dietary Guidelines for Americans* recommend consumption of 1 to 5 cups of vegetables a day, depending on caloric requirements. This recommendation includes 2 to 8 cups of potatoes, sweet corn, green peas, and lima beans (starchy vegetables) per week. Although these vegetables are popular in the American diet, consumption data show that, like other vegetables, these are underconsumed when compared with recommendations [18,19]. Living in poverty exacerbates low consumption of all vegetables and appears to be a primary factor in eating fewer vegetables.

Most (91%) women with children report buying fresh vegetables because they are "healthy" [20]. Availability of vegetables in the home was very high (94%) in 2014, but in-home availability of vegetables was lower than it was in 2007 (98%). For most mothers (63%), cost is the most important factor when shopping for produce, followed by freshness and taste. In fact, for mothers who did not usually have vegetables in the home, the top reason was that they are "too expensive." This suggests that although consumers acknowledge vegetables are "good for them," affordability may be a real or perceived barrier to greater consumption, especially for individuals with low income [20].

To meet dietary guidelines for fruit and vegetable intake, low-income households would have to allocate most (70%) of their at-home food budget to fruits and vegetables—proportionally far more than the average households that spend 15% to 18% of their at-home budget on produce [21,22]. Therefore, it is not surprising that lower-income households spend less on fruits and vegetables than higher-income households [23]. In addition, low-income households may have other food priorities for any additional income made available through food assistance programs. For example, a study conducted in 2003 found that a small increase in income was unlikely to entice households earning less than 130% of the poverty line to spend more on fruits and vegetables. For taste and convenience, higher priority was placed on buying beef and frozen prepared foods instead of produce [24].

The challenges of eating a variety of vegetables are illustrated in a study of low-income women in California [25]. The use of 21 different vegetable categories was estimated over a 1-week period. Women were categorized as having low variety (LV), medium variety (MV), or high variety (HV) of vegetable usage. The percentage of women having household incomes less than $1500 per month were 65.8% LV, 46.3% MV, or 36.4% HV, thus suggesting income disparities within the broader classification of "low-income." High-variety women consumed significantly more DF than did LV women, but HV women also consumed significantly more total vegetables,

Table 3 – DF intake by family income and percentage of poverty threshold *

	Family income			Poverty threshold		
	<$24 999	$25 000-$74 999	$75 000+	<131%	131%-185%	>185%
Ages 2-19 y						
Male	13.7^{a} (±0.49)	14.0^{a} (±0.63)	14.6^{a} (±0.61)	13.8^{a} (±0.47)	15.0^{a} (±0.64)	14.3^{a} (±0.48)
Female	12.3^{a} (±0.53)	13.0^{a} (±0.39)	13.6^{a} (±0.59)	12.7^{a,b} (±0.40)	11.2^{a} (±0.62)	13.7^{b} (±0.41)
All 2-19 y	12.9^{a} (±0.42)	13.5^{a} (±0.43)	14.2^{a} (±0.54)	13.2^{a} (±0.35)	13.1^{a} (±0.62)	14.0^{a} (±0.40)
Ages 20+ y						
Male	17.4^{a} (±0.78)	18.8^{b} (±0.52)	19.3^{b} (±0.47)	17.8^{a} (±0.51)	17.5^{a,b} (±1.20)	19.1^{b} (±0.44)
Female	13.9^{a} (±0.38)	15.0^{b} (±0.39)	17.2^{c} (±0.52)	13.9^{a} (±0.44)	13.6^{a} (±0.80)	16.3^{b} (±0.26)
All 20+ y	15.4^{a} (±0.41)	16.9^{b} (±0.40)	18.3^{c} (±0.44)	15.6^{a} (±0.38)	15.4^{a} (±0.81)	17.7^{b} (±0.29)

* The values presented are percentage of weighted means (in grams per day) ± SE. Male, female, and combined means were compared across income categories using difference of means tests. Means with different superscripts are statistically significant at $P < .05$.

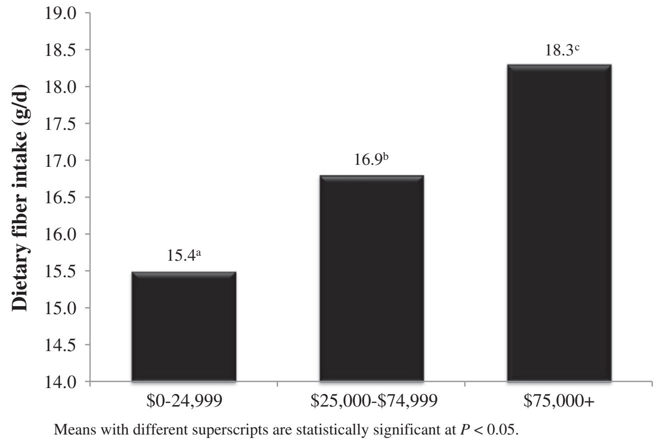


Fig. 2 – Mean DF intake (in grams per day) among all adults aged 20+ years, by income. Means with different superscripts are statistically significant at $P < .05$.

green salad (the most popular vegetables), potatoes, whole fruit, and whole grains than did LV women. Within this population, LV, MV, and HV low-income women spent $0.53, $0.85, and $1.32 per day on vegetables, respectively.

Other USDA data show that living in poverty negatively affects vegetable consumption. Adults at less than 131% of poverty consume fewer total vegetables, tomatoes, dark green, and other vegetables than those at more than 185% of poverty (Supplementary Figure) [26]. Starchy vegetable and white potato consumption does not appear to be affected by poverty status, suggesting that white potatoes are recognized as an affordable vegetable, irrespective of financial means.

White potatoes—regardless of preparation methods—are important sources of DF in the diets of children, adolescents, and adults. Using NHANES 2003-2006, Freedman and Keast [27] showed that white potatoes—including oven-baked par-fries and French fried potatoes—contributed about 19% of DF intake, but only 9% to 10.5% of total energy to the diets of adult consumers. They also showed that among consumers aged 2 to 13 years and 14 to 18 years, white potatoes (including oven-baked par-fries and French fried potatoes) contributed 16% to 17% of DF and 22-23% of DF, respectively, but only 8% to 9% of food energy [28]. In 2009 to 2010, white potatoes contributed 17% to 23% of DF among male consumers aged 2 to 71+ years, but only 10% to 11% of energy; whereas among female consumers aged 2 to 71+ years, potatoes provided 14% to 26% DF, but only 8% to 13% of energy [29]. These studies demonstrate the high nutrient density of the white potato compared with its contribution to total energy intake.

Most commonly consumed vegetables contain similar amounts of DF; however, dark green leafy vegetables are more expensive, have higher perishability, and have greater storage requirements (eg, refrigeration) than the potato [30]. Cooked spinach, for example, costs $2.02 per edible cup and provides 3.7 g DF/100 g, whereas white potatoes with skin and flesh cost $0.19 cents per edible cup and provide 2.1 g DF/100 g [31]. On a cost-per-nutrient basis, one would need just 33 cents to get the same amount of DF from white potatoes. Conversely, for 19 cents, one could "buy" only 0.3 g DF from spinach. Moreover, Drewnowski and Rehm [32] have demonstrated that in the vegetable category, potatoes and beans deliver the most nutrients per penny spent. In addition to better affordability, white potatoes have high consumer acceptability, have a long shelf-life, and are easily stored in a dark, cool place, that is, no refrigeration.

There are some limitations to this study. The National Health and Nutrition Examination Survey is a cross-sectional database that cannot determine a cause-and-effect relationship. The 24-hour recall used in the collection of these data is subject to many limitations that have been discussed herein. The automated multipass method uses 5 steps to acquire a thorough and accurate food recall that reduces possible errors, such as underreporting. As with other types of dietary collection instruments, most validation studies of 24-hour dietary recall instruments indicate that there is some degree of misreporting, particularly among children [33]. For this particular study, the other races/ethnicities category that we used was very diverse and had relatively small sample size; therefore, results for this group should be interpreted with caution.

In conclusion, total vegetable consumption is lower than recommendations, and consumption of nearly all vegetables, including white potatoes, has declined in the last several years. This may be one reason why DF intake remains less than optimal. Encouraging consumption of all vegetables, including the white potato, is more likely to achieve the goal of increasing DF intake by all Americans. Therefore, government policies that single out and discourage consumption of white potatoes, especially among low-income individuals who receive food assistance, may lead to unintended consequences of exacerbating already low intakes of DF among financially disadvantaged individuals and certain race/ethnic groups, such as non-Hispanic blacks.

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.nutres.2014.08.016.

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