SUPPLEMENT

Removing Potatoes from Children's Diets May Compromise Potassium Intake[1–3]

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ABSTRACT

White potatoes are a forgotten source of nutrients. The goal of this study was to identify the nutritional implications of replacing a composite of white potatoes with a composite of vegetables commonly consumed by children aged 2–18 y (n = 3460) in a nationally representative sample. The NHANES 2005–2012 24-h dietary recall data were used to determine nutrient intake. Two replacement models were developed: one for potato consumers and another for those consuming vegetables other than potatoes. Analyses focused on *1*) mean nutrient contributions per 1 cup equivalent vegetable composite (VC)/potato composite (PC) consumed by participants, and *2*) mean daily nutrient intake when the nutrients per 1 cup equivalent PC replaced the nutrients per 1 cup equivalent VC. Covariate adjusted analysis was tested for statistical significance (P < 0.002). When 1 cup equivalent VC replaced 1 cup equivalent PC, significantly lower mean intakes were found for 20 of the 23 nutrients studied and higher mean intakes of total sugars, folate, and calcium. Differences were found including higher total intakes of monounsaturated fatty acids and potassium and lower total intakes of vitamins A and K. The percentage contribution of the PC to total daily nutrient intake was 6% for total energy, 8% for total fat, 5% for saturated fatty acids, 13% for dietary fiber, 4% for sodium, and 11% for potassium. Both composites contributed a variety of nutrients to the total diet; the consumption of white potatoes may be an important strategy to help meet the potassium recommendation. *Adv Nutr* 2016;7(Suppl):247S–53S.

Keywords: potassium, fiber, nutrients, potatoes, vegetables, NHANES, statistical modeling

Introduction

Eating a diet rich in vegetables, as part of an overall healthy diet, may reduce the risk of cardiovascular disease (1–3), type 2 diabetes (4, 5), and some types of cancer (6, 7). Many of the health benefits may be due to shortfall nutrients (8) and nutrients of public health concern (9) found in vegetables, most notably potassium and dietary fiber (10).

Vegetables are defined by the 2010 Dietary Guidelines for Americans (11) as nutrient-dense foods and are also recognized as part of a healthy eating pattern. This was confirmed more recently by the 2015 Dietary Guidelines Advisory Committee (12). Eating nutrient-dense foods, such as vegetables, helps Americans balance nutrient needs within their energy needs. The daily recommended number of servings of vegetables depends on age, sex, and physical activity and ranges from 1 cup equivalent for children aged 2–3 y to 3 cups-equivalent for male teenagers 14–18 y (11). However, most children fail to meet the recommended daily servings of fruit and vegetables (13, 14). From 2003 to 2010, total vegetable intake among children has not changed (15).

White potatoes account for ~30% of total vegetable intake (10, 15). Plain white potatoes are a nutrient-dense vegetable. They are low in fat and high in potassium, dietary fiber, and vitamin C (16). On average, Americans are consuming (depending on age-sex groups) the equivalent of 0.28 cups/d (10). White potatoes provided <15% of mean total energy, >13% of total potassium, and >16% of total dietary fiber in the diet (depending on age-sex groups) (10).

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Unfortunately, Americans consume white potatoes prepared in many ways that may add calories, especially with added fat, and sodium to the diet (17, 18). At home, potato chips are the most commonly consumed form, whereas away from home, fried potatoes predominate (17). Other potato dishes, such as mashed and scalloped potatoes, are often prepared with fat and sodium. Baked potatoes are also popular but, when the skin is not eaten, the dietary fiber content is reduced (17). The 2010 Dietary Guidelines for Americans (11) and 2015 Dietary Guidelines Advisory Committee (12) have identified potassium and dietary fiber as nutrients of concern because most Americans do not consume sufficient amounts to meet the recommendations. Studies show that only 2–3% of Americans had total usual intakes of potassium that met the Adequate Intake (19, 20) and ≥90% had fiber intakes below the daily recommended amount (21).

The white potato in all of its cooked forms provides more potassium and as much dietary fiber as do other commonly consumed vegetables (10). Further, white potatoes, including french fries, contribute shortfall nutrients to children's diets (8, 9). A recent study of white potato consumers aged 14–18 y showed that white potatoes provided ~23% of dietary fiber and 20% of potassium total intakes but only ~11% of total energy in the diet (10).

Despite the nutritional benefits of white potatoes in the diet, they continue to be a forgotten source of nutrients (22), and they are under continuous attack. In 2011, a federal plan emerged to limit potatoes served on school menus (23). However, the Senate moved to block the proposal by adopting an amendment to the 2012 Spending Bill for the USDA that prohibited the department from setting any maximum limits on the serving of vegetables in school meal programs (24). In 2005, the Institute of Medicine (IOM)[6] reported that white potatoes were being consumed in sufficient quantities by the eligible population for the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and should remain banned from the program (25); however, in February 2015, the IOM conducted a comprehensive review of the food packages used in the WIC program (26). The review recommends that the USDA should allow white potatoes as a WIC-eligible vegetable, in forms currently permitted for other vegetables.

Of concern is that the 2001–2010 food categories used in the What We Eat in America national nutrition database included potatoes as a separate food group under the vegetable category (27). This potentially opens the opportunity for researchers who use this publically available database to analyze and report on vegetable consumption (excluding potatoes) in the American diet as it relates to nutrient intake, diet quality, and health outcomes. The goal of this study was to identify the nutritional implications of replacing a composite of white potatoes with a composite of vegetables commonly consumed in the diets of children.

[6] Abbreviations used: IOM, Institute of Medicine; PC, potato composite; VC, vegetable composite; WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

Methods

Data collection

The NHANES is conducted on a continual basis by the National Center for Health Statistics of the CDC. One main objective of NHANES is to examine the relation among diet, nutrition, and health (28). Details about the survey design, content, operations, and procedures are available online (29–31).

Study population and dietary intake

Participants were children aged 2–18 y (n = 3460) from the 2005–2012 NHANES. Dietary data were obtained from the interviewer-administered 24-h dietary recall (day 1) in the Mobile Examination Center. Parents/guardians provided the 24-h dietary recalls of children aged 2–5 y, children aged 6–11 y were assisted by an adult, and all others provided their own recalls. The recalls were administered with an automated multiple-pass method (32). The following were excluded from the analyses: participants with unreliable recall data as assessed by the USDA Food Surveys Research Group (n = 1452) and participants who were pregnant and who were lactating in this sample (n = 40). Detailed descriptions of the dietary interview methods are provided in the NHANES Mobile Examination Center In-Person Dietary Interviewers Procedures Manual (33), which includes pictures of the Computer-Assisted Dietary Interview system screens, measurement guides, and charts used to collect dietary information. The NHANES has stringent protocols and procedures that ensure confidentiality and protect individual participants from identification with the use of federal laws (34). This study was a secondary data analysis that lacked personal identifiers; therefore, this study did not require the approval of the institutional review board.

Determination of vegetables, potatoes, and nutrient intake

Two survey-specific food composition databases were used to determine the foods consumed by NHANES participants. The USDA Food and Nutrient Database for Dietary Studies (35) was used to determine the nutrient content of foods in 2005–2012 NHANES survey foods, and the Food Patterns Equivalents Database was used to translate foods consumed into the number of serving equivalents (36).

Development of PC and other VC and nutrient profiles

A number of steps were taken to create the potato composite (PC) (model 1) and VC (model 2) and the weighted nutrient profiles that were used in both replacement models. Figure 1 illustrates how the original sample of 14,307 resulted in a final sample of 3460 on the basis of eligibility criteria that were used to define the sample and the steps used to create the PC and VC.

Step 1: Determine eating occasions and food forms to be included and to be excluded from the analysis. Among vegetable/potato consumers, the goal was to identify all instances of consumption of vegetables/potatoes in which the vegetables/potatoes were reported alongside other foods but not in recipes or combinations of multiple ingredients (casseroles, soups, stews). Only vegetables/potatoes eaten at breakfast, lunch, or dinner were included (i.e., baked/roasted, broiled/cooked, mashed, french fries/hash browns, and scalloped). Vegetable/potato forms eaten as noncombination, salad, refried beans/vegetables were included. If vegetables/potatoes were consumed as a snack, chips, condiment, or as an ingredient in sandwiches or tortilla products, they were excluded.

The investigators reviewed recipes released from NHANES for noncombination forms and all food codes in a combination to ensure that only forms with no fat or only 1 type of fat were included. Vegetable/potato recipes or combinations with multiple sources of fat were excluded. Type of fat (e.g., shortening, oil, butter) or percentage of contribution in the recipe or combination was not part of the selection criteria and did not play a role when creating the vegetable/potato clusters that were used in the replacement models.

Step 2: Respondents were separated into 2 nonoverlapping and distinct groups: potato consumers and vegetable consumers. Potato consumers were respondents who reported consuming only potato and no other vegetables in a 24-h period; vegetable consumers were respondents who reported consuming only vegetables other

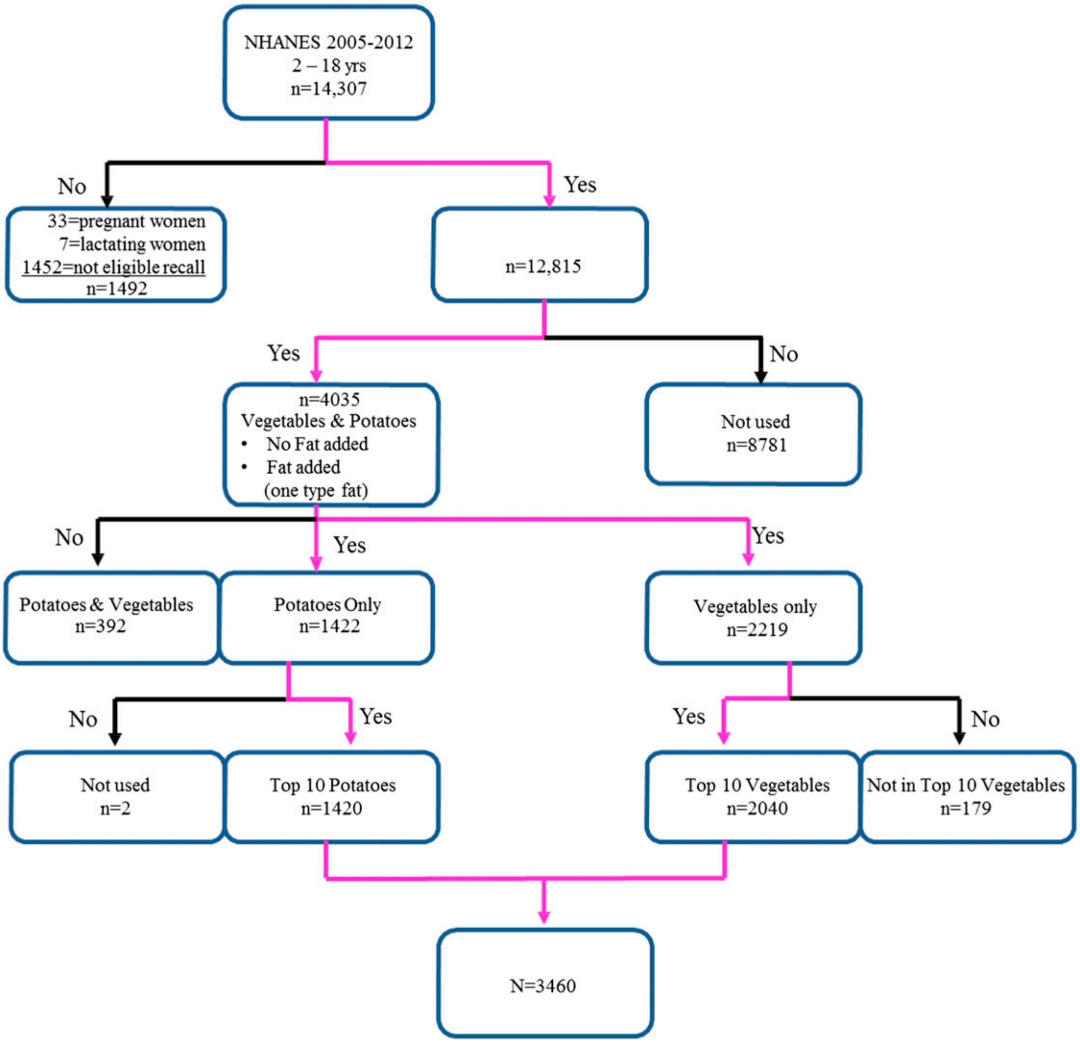

FIGURE 1 Schematic diagram that depicts inclusion/ exclusion to obtain final sample.

than potatoes in a 24-h period. Respondents consuming both potatoes and other vegetables in a 24-h period were excluded from the analysis.

Step 3: Vegetable and potato clusters were created by grouping food items of similar preparation form and calculating the total amount consumed (in cup equivalents) after combination. For example, to represent the intake of broccoli in the sample of vegetable consumers, 13 food codes were aggregated into a single cluster (**Table 1**). Likewise, salads reported by vegetable consumers, as either noncombination (single code) or combinations of >2 survey codes (e.g., raw lettuce, raw tomato, and raw carrots), were included in the salad cluster (**Table 2**). For potato consumers, **Table 3** shows the 7 codes included as part of the baked potato cluster.

Step 4: Vegetable/potato composites (VC/PC) were created on the basis of the top 10 vegetable/potato clusters, determined by the percentage of contribution of the clusters to the VC and PC (% of total cup equivalent consumed). The percentage of contribution of each cluster to total consumption of VC/PC was calculated and then ranked. The resulting percentages represented the rank order in which they were consumed. For example, the salad cluster was the most commonly consumed and contributed 38% to the VC and the french fry cluster contributed 65% to the PC (**Tables 4 and 5**).

Step 5: An average nutrient profile for each of the top 10 vegetable (**Table 6**) and potato (**Table 7**) clusters was calculated and then weighted on the basis of the percentage of contribution of the cluster to the composites.

Step 6: A total average nutrient profile for both the VC and PC was determined on the basis of the weighted nutrient profiles of the

TABLE 1 Demographic characteristics of children aged 2–18 y (n = 3460) participating in NHANES 2005–2012[1]

Demographic characteristics of sample	Potato consumers (n = 1420)	Vegetable consumers (n = 2040)	P
Sex, %			0.44
Male	49.9 ± 2.2	47.9 ± 1.6	
Female	50.1 ± 2.2	52.1 ± 1.6	
Race/ethnicity, %			0.001
Mexican/other Hispanic	18.7 ± 2.2	13.9 ± 1.4	
Non-Hispanic white	58.8 ± 3.3	61.6 ± 2.8	
Non-Hispanic black	18.2 ± 2.2	16.6 ± 1.7	
Other/mixed race	4.4 ± 0.7	7.8 ± 1.2	
Poverty income ratio, %			0.49
<131% of poverty level	31.3 ± 2.7	31.0 ± 2.1	
131–185% of poverty level	14.3 ± 1.6	12.0 ± 1.3	
>185% of poverty level	54.4 ± 2.6	57.1 ± 2.5	
Age, y	10.5 ± 0.3	9.0 ± 0.2	<0.0001

[1] Values are means ± SEs.

TABLE 2 Daily nutrient intake in children aged 2–18 y with PC Compared with VC replacements[1]

	Model 1[2]			Model 2[2]				
	Total	PCR	Mean % of PCR	Total	VCR	Mean % of VCR	P^3	P^4
Energy, kcal	1978 ± 22.1[1]	109.1 ± 2.5	5.9 ± 0.1	1896 ± 21.6	26.6 ± 0.6	1.6 ± 0.04	0.004	<0.0001
Protein, g	68.1 ± 0.9	1.3 ± 0.03	2.3 ± 0.1	67.5 ± 0.9	0.7 ± 0.02	1.3 ± 0.04	0.60	<0.0001
Carbohydrate, g	260 ± 3.0	14 ± 0.3	5.8 ± 0.1	249.6 ± 2.9	3.6 ± 0.1	1.7 ± 0.04	0.007	<0.0001
Total sugars, g	131.6 ± 1.8	0.3 ± 0.01	0.3 ± 0.02	132.5 ± 1.8	1.1 ± 0.03	1.1 ± 0.1	0.73	<0.0001
Dietary fiber, g	11.9 ± 0.2	1.3 ± 0.03	12.7 ± 0.3	11.4 ± 0.2	0.8 ± 0.02	8.8 ± 0.2	0.04	<0.0001
Total fat, g	75.7 ± 1	5.4 ± 0.1	7.9 ± 0.2	71.6 ± 1	1.3 ± 0.03	2.1 ± 0.1	0.002	<0.0001
SFAs, g	25.3 ± 0.4	1 ± 0.03	4.8 ± 0.1	24.5 ± 0.4	0.2 ± 0.01	1.2 ± 0.04	0.12	<0.0001
MUFAs, g	27.6 ± 0.4	2.7 ± 0.1	10.5 ± 0.3	25.3 ± 0.4	0.4 ± 0.01	1.8 ± 0.05	<0.0001	<0.0001
PUFAs, g	16.5 ± 0.3	1.4 ± 0.04	10.2 ± 0.3	15.6 ± 0.3	0.6 ± 0.01	4.9 ± 0.1	0.02	<0.0001
Vitamin A, µg RAE	471 ± 9	0.4 ± 0.04	0.2 ± 0.03	518.5 ± 9	48 ± 1.1	13.4 ± 0.4	<0.0001	<0.0001
Thiamin, mg	1.4 ± 0.02	0.1 ± 0.00	5.4 ± 0.2	1.4 ± 0.02	0.02 ± 0.00	2.0 ± 0.1	0.12	<0.0001
Niacin, mg	21.4 ± 0.3	1 ± 0.02	5.4 ± 0.1	20.6 ± 0.3	0.2 ± 0.01	1.4 ± 0.04	0.07	<0.0001
Vitamin B-6, mg	1.7 ± 0.03	0.1 ± 0.00	9.8 ± 0.3	1.6 ± 0.03	0.04 ± 0.00	3.4 ± 0.1	0.007	<0.0001
Food folate, µg	141.9 ± 2.2	10.7 ± 0.2	9.3 ± 0.2	144.8 ± 2.2	13.6 ± 0.3	11.2 ± 0.3	0.34	<0.0001
Vitamin C, mg	82.2 ± 2.4	2.3 ± 0.1	8 ± 0.4	84.5 ± 2.4	4.6 ± 0.1	13.9 ± 0.5	0.48	<0.0001
Vitamin K, µg	47.7 ± 1.4	3.9 ± 0.1	11.2 ± 0.3	60.8 ± 1.5	17.1 ± 0.4	31.3 ± 0.5	<0.0001	<0.0001
Calcium, mg	922.9 ± 14.04	6 ± 0.2	1 ± 0.1	927 ± 14.1	10.1 ± 0.2	1.6 ± 0.1	0.83	<0.0001
Phosphorus, mg	1203 ± 14.7	46.8 ± 1.0	4.6 ± 0.1	1173 ± 14.6	16.4 ± 0.4	1.7 ± 0.1	0.13	<0.0001
Magnesium, mg	216.6 ± 2.6	12.6 ± 0.3	6.5 ± 0.2	210.2 ± 2.6	6.3 ± 0.1	3.5 ± 0.1	0.07	<0.0001
Iron, mg	13.1 ± 0.2	0.4 ± 0.01	3.8 ± 0.1	13 ± 0.2	0.2 ± 0.01	2.3 ± 0.1	0.52	<0.0001
Zinc, mg	9.9 ± 0.2	0.2 ± 0.01	2.9 ± 0.1	9.8 ± 0.2	0.1 ± 0.00	1.7 ± 0.1	0.68	<0.0001
Sodium, mg	3076 ± 40.4	98.4 ± 2.3	3.7 ± 0.1	3062 ± 40.3	84.9 ± 1.9	3.2 ± 0.1	0.8	<0.0001
Potassium, mg	2,155 ± 24.1	208.6 ± 4.7	10.5 ± 0.2	2,016 ± 23.5	69.7 ± 1.6	4 ± 0.1	<0.0001	<0.0001

[1] Values are means ± SEs. Significant differences were adjusted for age, sex, race/ethnicity with $P < 0.002$ (=0.05/23). PC, potato composite; PCR, potato composite replacement (1 cup equivalent); RAE, retinol activity equivalent; VC, vegetable composite; VCR, vegetable composite replacement (1 cup equivalent).
[2] Model 1 is nutrient profile with PC replacing original potato; model 2 is nutrient profile with VC replacing PC.
[3] Determined by model 1 PCR total compared with model 2 VCR total.
[4] Determined by model 1 PCR compared with model 2 VCR (1 cup equivalent).

clusters in the 2 composites. On the basis of a previous study (37), the general formula used was: sum (nutrient contribution of each food cluster × likelihood of the food cluster being eaten)$_n$ = nutrient profile of food composite.

Vegetable and potato nutrient replacement models

The nutrient profile of 1 cup equivalent PC in the first replacement model was intended to represent the nutrient contributions expected from consuming potatoes that satisfied the selection criteria of being consumed with no fat or only one type of fat added.

Likewise, the nutrient profile of 1 cup equivalent vegetable replacement model was intended to represent the nutrient contributions expected from consuming vegetables other than potato that satisfied the selection criteria of being consumed raw or cooked, with no fat or only 1 type of fat added.

In the context of this study, the nutrient consequences of replacing potatoes with other vegetables commonly consumed by children 2–18 y were derived from comparing mean daily nutrient totals before and after replacing 1 cup equivalent PC (replacement model 1) with 1 cup equivalent VC (replacement model 2).

Statistical analyses

Eight-year sample weights were used (38, 39). Statistical analyses were performed with SAS version 9.4 (SAS Institute, Inc). The ANOVA was conducted to evaluate the differences in the nutrient contribution of the PC before and after replacing with the VC, adjusting for sex, age, and race/ethnic groups. A Bonferroni correction was applied to the analyses; $P < 0.002$ was considered statistically significant. Data are presented in the tables as means ± SEs.

Results

Sample demographic characteristics. Demographic characteristics of the sample of children 2–18 y (n = 3460) are included in Table 1. Approximately 59% of the sample was vegetable consumers and 41% of the sample was potato consumers on the basis of eligibility criteria used in this study. Among the 2 consumer groups, there were important race/ethnic and age differences; thus, they were included as covariates in the analyses.

Mean nutrient intakes (1 cup equivalent). The replacement of the PC with the VC resulted in a significant ($P < 0.002$) decrease in mean intake of energy, protein, carbohydrate, total fat (SFAs, PUFAs, and MUFAs), dietary fiber, thiamin, niacin, vitamin B-6, phosphorus, magnesium, iron, zinc, sodium, and potassium. In contrast, the replacement resulted in a significant ($P < 0.002$) increase in mean intakes

TABLE 3 Creating a vegetable cluster[1]

Description
Broccoli, cooked, from fresh, fat added in cooking with butter, NFS
Broccoli, cooked, from fresh, fat not added in cooking
Broccoli, cooked, from fresh, NS as to fat added in cooking
Broccoli, cooked, from fresh, with cheese sauce
Broccoli, cooked, from frozen, fat added in cooking with butter, NFS
Broccoli, cooked, from frozen, fat not added in cooking
Broccoli, cooked, from frozen, NS as to fat added in cooking
Broccoli, cooked, from frozen, with cheese sauce
Broccoli, cooked, from frozen, with cream sauce
Broccoli, cooked, NS as to form, fat added in cooking
Broccoli, cooked, NS as to form, fat not added in cooking
Broccoli, cooked, NS as to form, NS as to fat added in cooking
Broccoli, cooked, NS as to form, with cheese sauce

[1] NFS, not further specified; NS, not specified.

TABLE 4 Creating a salad cluster

Salad cluster
Example 1
Endive, chicory, escarole, or romaine lettuce, raw
Spinach, raw
Tomatoes, raw
Mushrooms, raw
Onions, mature, raw
Italian dressing, made with vinegar and oil
Example 2
Carrots, raw
Tomatoes, raw
Cucumber, raw
Lettuce, raw
Creamy dressing, made with sour cream and/or buttermilk and oil
Example 3
Tomatoes, raw
Lettuce, raw
Creamy dressing, made with sour cream and/or buttermilk and oil
Example 4
Carrots, raw
Tomatoes, raw
Cucumber, raw
Lettuce, raw
Thousand Island dressing
Example 5
Mixed salad greens, raw
Onions, mature, raw
Caesar dressing, low-calorie
Example 6
Carrots, raw
Cabbage, red, raw
Lettuce, raw
Thousand Island dressing, reduced calorie, fat-free, cholesterol-free
Lettuce, raw
Thousand Island dressing, reduced calorie, fat-free, cholesterol-free

of total sugars; food folate; vitamins A, K, and C; and calcium (Table 2).

Mean total nutrient intake. On the basis of replacement of 1 cup equivalent PC with 1 cup equivalent VC, the mean total nutrient intake for the 24-h period is shown in Table 2. Significant ($P < 0.002$) differences were found in higher intakes of MUFAs and potassium and with lower intakes of vitamins A and K. No significant differences were found in total mean intakes of energy, carbohydrates, dietary fiber, protein, total sugars, total fat, SFAs, PUFAs, niacin, food folate, vitamins C and B-6, thiamin, calcium, phosphorus, magnesium, iron, zinc, and sodium. Mean percentage of energy from total fat (34%) did not exceed current recommendations for either composite; yet, both composites exceeded dietary recommendations for total SFAs (12%). The percentage of contribution of the PC to total nutrient intake was 6% for total energy, 8% for total fat, 5% for SFAs, 13% for dietary fiber, 4% for sodium, and 11% for potassium.

Discussion

With the use of NHANES 2005–2012 data, this study assessed the nutritional implications of replacing a PC with a composite of vegetables commonly consumed by children aged 2–18 y. On the basis of a 1 cup equivalent, the results were not surprising. Potatoes are a good source of vitamins B-6 and C, potassium, phosphorus, niacin, and dietary fiber (16). As one would expect when 1 cup equivalent PC was replaced with the same amount of the VC, there was a significant decrease in the mean intake of vitamin B-6, potassium, phosphorus, and dietary fiber and an increase in food folate and vitamins A, K, and C. Both composites (on the basis of 1 cup equivalent) contributed a variety of nutrients in the diet. For nutrients to limit, a 1 cup equivalent PC had higher amounts of total energy, total fat (SFAs, MUFAs, PUFAs), and sodium than the same amount of VC. This is not surprising because potatoes are commonly prepared in ways that add energy, fat, and sodium (18).

Interestingly, when total daily nutrient intakes were examined, there were few differences between intakes with the use of the PC or the VC. Total intakes of MUFAs and potassium were lower, and total intakes of vitamins A and K were higher when the PC was replaced with the VC. A major assumption of this study was that the 1 cup equivalent of either the PC or the VC would be consumed by children aged 2–18 y; thus, the replacement analyses was hypothetical and not necessarily what would happen in the real world. In the real world, plate waste of vegetables is high (14, 40–42). One study found that 40% of students did not select the vegetable items served (40). Of students who did, 31% threw the

TABLE 5 Creating a potato cluster[1]

Description
White potato, baked, peel not eaten
White potato, baked, peel eaten, fat not added in cooking
White potato skins, with adhering flesh, baked
White potato, baked, peel eaten, NS as to fat added in cooking
White potato, baked, peel eaten, fat added in cooking
White potato, stuffed, baked, peel not eaten, stuffed with butter or margarine
White potato, stuffed, baked, peel eaten, stuffed with butter or margarine

[1] NS, not specified.

TABLE 6 Top 10 vegetable clusters and contribution to the vegetable composite

Rank	Description of vegetable clusters	Top 10 total cup equivalent consumed, %
1	Salads, raw, no FA/1 FA	38.4
2	Corn, cooked, no FA/1 FA	19.1
3	Beans, string, cooked, no FA/1 FA	15.6
4	Broccoli, cooked, no FA/1 FA	9.5
5	Carrots, cooked, no FA/1 FA	4.7
6	Peas and carrots, cooked, no FA/1 FA	4.6
7	Mixed vegetables, no FA/1 FA	2.5
8	Cabbage, green, cooked, no FA/1 FA	2.3
9	Sweet potato, baked, peel not eaten, no FA/1 FA	1.8
10	Spinach, cooked, no FA/1 FA	1.5

TABLE 7 Top 10 potato clusters and % contribution to the potato composite[1]

Rank	Description of potato clusters	Top 10 total cup equivalent consumed, %
1	White potato, french fries, NS as to from fresh or frozen	65.6
2	White potato, mashed, NFS	11.8
3	White potato, baked, no FA/1 FA	7.7
4	White potato, hash brown, NS as to from fresh, frozen, or dry mix	6.6
5	White potato, boiled, no FA/1 FA	3.2
6	White potato, puffs	2.4
7	White potato, from complete dry mix, mashed, made with water	0.9
8	White potato, roasted, no FA/1 FA	0.7
9	White potato, stuffed, baked, peel not eaten, stuffed with butter or margarine	0.5
10	Potato salad	0.5

[1] NS, not specified; NFS, not further specified.

vegetables away (40). Given that the most commonly consumed vegetable by children is potatoes (43) and that plate waste is higher for other vegetables (40–42, 44), one could assume that children would consume more of the PC than they would the VC, resulting in much higher intakes of shortfall nutrients once plate waste was taken into account.

Potatoes are often left out of the vegetable category in food guidance because of their purported association with providing fat and sodium in the diet. Yet, potatoes are a good source of nutrients. The data from this study are similar to other studies (8–10). Potatoes as consumed provide only 9–12% of total energy; 8–15% of total fat; 6% of SFAs; ≥10% of dietary fiber, vitamin B-6, and potassium; and ≥5% of thiamin, niacin, vitamin K, phosphorus, and magnesium. Data show that potatoes provide nutrients within energy requirements and, when consumed in moderate amounts, with adjustments in how potatoes are prepared can be part of a healthful diet.

A unique strength of this study was that, to our knowledge, it is the first ever published to look at the potential unintended (nutrient) consequences of replacing potatoes with other vegetables in children's diets. This is an important question, given the potential movement to limit potatoes served on school menus (23), in analyses of NHANES when looking at the impact of vegetables (excluding potatoes) on nutrient intake, diet quality, and health outcomes (27), and the pending IOM review (currently open for public comment) on reinstating potatoes as a WIC-eligible vegetable (26) after being banned from the WIC program in 2005 (25). A major assumption made in this study needs to be recognized. We assumed that all children aged 2–18 y consumed 1 cup equivalent (1 serving) PC or VC regardless of age. This was a hypothetical modeling study that was not based on actual consumption. As with any study, there are limitations. Although the data were from a nationally representative sample, the sample used in this study was dramatically reduced because of the inclusion/exclusion criteria that were used to try and reduce residual confounding and to produce the best homogeneous sample possible. The data were cross-sectional; thus, only associations and not causality were inferred. Finally, the analyses were limited to the food codes for potatoes and vegetables commonly consumed by children aged 2–18 y, which included only 1 type of fat added, and the amount of fat consumed was not considered. Despite the assumptions and limitations, this study provides valuable information to the scientific literature that addresses an area of some controversy and new information that may be useful in generating future hypotheses to be tested.

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