

Vegetable Consumption and Selected Nutrient Intakes of Women of Childbearing Age

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ABSTRACT

Objective: To examine intake of selected nutrients and vegetable consumption of women of childbearing age (WCBA) from 19–50 years of age, across race/ethnicities, and annual household incomes.

Design: Dietary data from the National Health and Nutrition Examination Survey 2009–2012 and the Food Pattern Equivalents Database 2009–2012.

Participants: The study sample included 3,058 WCBA who were non-Hispanic white (NHW), non-Hispanic black (NHB), Mexican American (MA), and of other races/ethnicities (ORE) with annual household incomes of < \$25,000, \$25,000–75,000 or > \$75,000.

Variables Measured: Average daily consumption of vegetables and mean intakes of nutrients of concern from foods, including potassium (K), dietary fiber (DF), calcium, magnesium, iron, vitamin C, and folates.

Analysis: The analysis compared mean vegetable consumption and nutrient intake from food to current recommendations across race/ethnicity and household income categories.

Results: On average, WCBA consumed 1.43 cup equivalents/d of total vegetables and NHB WCBA consumed fewer vegetables than did NHW ($P < .01$), MA ($P < .01$), and ORE ($P < .01$) WCBA. Mean consumption of starchy vegetables, including white potatoes (WP), by WCBA was also below the recommended 5–6 cups of starchy vegetables per week. Average intake of K was 2,364 mg, or about half of the recommended 4,700 mg. Mean DF intake, 15.4 g, was about 60% of the recommended 25 g. In general, NHB WCBA consumed fewer vegetables than did NHW ($P < 0.01$), MA ($P < 0.01$), and ORE ($P < 0.01$) WCBA. On average, WCBA in households with incomes < \$25,000 consumed fewer vegetables and had lower intakes of K, DF, calcium, and iron than did WCBA with household incomes > \$75,000 ($P < .05$).

Conclusions and Implications: These results showed that WCBA had low vegetable consumption, including starchy vegetables, compared with recommendations in the Dietary Guidelines for Americans, 2015–2020. Potassium and DF intakes were low among WCBA, but especially so for NHB WCBA and WCBA with limited financial resources. Government-sponsored food assistance programs should consider policies that encourage WCBA to consume more vegetables, including starchy vegetables, such as WP and lima beans that are rich in K and an important source of DF.

Key Words: vegetable, shortfall nutrients, low-income, women, ethnicity, NHANES (*J Nutr Educ Behav.* 2016; ■ :1-6.)

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INTRODUCTION

It is well known that a mother's health and dietary choices before and during pregnancy, particularly during the first trimester, influence the health of ba-

bies.^{1,2} According to the Academy of Nutrition and Dietetics,

Pregnancy is a critical period during which maternal nutrition and lifestyle choices are major influ-

ences on mother and child health. Inadequate levels of key nutrients during crucial periods of fetal development may lead to reprogramming within fetal tissues, predisposing the infant to chronic conditions in later life.³

Since 1980, the US Department of Health and Human Services and the US Department of Agriculture (USDA) jointly publish the Dietary Guidelines for Americans (DGAs) every 5 years.⁴ The DGAs encourage Americans to focus on eating a healthful diet and are the basis for USDA's multi-billion dollar nutrition assistance programs, including the *Special Supplemental Nutrition Program for Women, Infants, and Children*

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(WIC) that serves more than 8 million at-risk, low-income, pregnant, breast-feeding, and postpartum women, infants, and young children aged < 5 years.⁵

For most women of childbearing age (WCBA), and regardless of the eating pattern (healthy US-style, Mediterranean-style, and healthy vegetarian eating patterns), the 2015–2020 DGAs recommend about 2.5–3 cups of vegetables each day, including 5–6 cups of starchy vegetables per week.⁶ Among adults, including WCBA, dietary intakes of vitamins A, C, and E, calcium, magnesium, potassium (K), and dietary fiber (DF) are low enough to be of concern.⁷ Specific recommendations for iron and folic acid intake were developed for WCBA because research showed that these are critical nutrients during pregnancy and WCBA tend to have inadequate iron and folic acid intakes.⁸

In 2007, the Health and Medicine Division (HMD) of the National Academies of Sciences, Engineering, and Medicine published a report that recommended that the USDA encourage greater fruit and vegetable consumption by issuing a cash value voucher to WIC participants for the purchase of fruits and vegetables, except for white potatoes (WP).⁸ The rationale of the HMD committee was that WIC participants ate enough WP, but that recommendation was based on 10-year-old data from the Continuing Survey of Food Intake by Individuals 1994–1996 and 1998 and the 2005 DGAs. The USDA implemented the HMD's recommendation through regulations that prohibited WIC participants from using the cash value voucher to buy any type of WP, including fresh WP, in the grocery store. Nevertheless, WIC participants were allowed to use the cash value voucher to purchase WP at a farmers' market.

In 2014, the USDA sponsored another HMD review of the WIC food package with an expedited review of WP in the WIC program. The HMD committee published a letter report to the USDA on February 3, 2015, recommending that WP be included in the WIC program like any other vegetable.⁹ The recommendation was based on the finding that

overall, the nutrient profile of white potatoes is similar to that of

other starchy vegetables that are currently permitted for purchase with the cash value voucher. Because white potatoes are so widely consumed, they contribute useful quantities of potassium and fiber to Americans' diets.⁹

The objective of this study was to examine vegetable consumption, and specifically WP consumption, of WCBA across race/ethnicity and household income, compared against the DGAs. Average intakes of select nutrients from foods, including K, DF, calcium, magnesium, iron, vitamin C, and folates, were compared against the Dietary Reference Intakes to better understand current vegetable and nutrient gaps for this subpopulation.

METHODS

This study examined nutrient intakes from foods and vegetable consumption of WCBA aged 19–50 years using dietary data from the National Health and Nutrition Examination Survey (NHANES) 2009–2010 and 2011–2012 and the Food Pattern Equivalents Database (FPED) 2009–2010 and 2011–2012. The National Center for Health Statistics of the Centers for Disease Control and Prevention conducts NHANES and survey data are released in 2-year cycles. All NHANES data collections receive approval from the National Center for Health Statistics Research Ethics Review Board. These data are publicly available and represent all non-institutionalized persons living in the US. This analysis used data from the first day of the 24-hour dietary recall (24HR) and the total nutrient intake files. Dietary intake was measured using a multi-pass 24HR instrument that has been thoroughly tested for accuracy. Methods of collecting these data are explained on the USDA's Web site.¹⁰ Only day 1 dietary recall data were used because, according to the NHANES documentation,

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.¹¹

In addition, day 1 dietary recall data were collected in person whereas

day 2 data were collected on a much smaller subsample by phone interview. Dietary data from NHANES 2011–2012 were the most recent data available to the public; these data were not available for the HMD report.

The FPED converts foods and beverages in the Food and Nutrient Database for Dietary Studies to cup equivalents of fruit, vegetables, and dairy; ounce equivalents of grains and protein foods; teaspoon equivalents of added sugars; gram equivalents of solid fats and oils; and number of alcoholic drinks.^{12,13} For purposes of this study, vegetables included all foods and food combinations coded as primarily vegetables (codes 7100-0100-79999999) in the Food and Nutrient Databases for Dietary Studies 2009–2010 and 2011–2012.¹⁴ White potatoes included the following: baked, boiled, fried, hash-browned, home-fried, mashed, roasted, salad, scalloped, stuffed, with sauce, and potato chips. Oven-baked and deep-fried french-fried potatoes were combined and included in the total WP means. This analysis did not include dietary supplements.

The analysis used appropriate survey weights to calculate average daily nutrient intakes from foods and consumption of total vegetables, WP, and other starchy vegetables (sweet corn, green peas, and lima beans) for females aged 19–50 years.¹⁵ Mean intakes of select nutrients of concern for this population, including K, DF, calcium, magnesium, iron, vitamin C, and folates, were calculated from foods and beverages. The FPED was used to convert grams of vegetables and vegetable combinations, including WP, to cup equivalents.

This study used an analysis of NHANES 2009–2010 and 2011–2012 dietary data by the USDA Agricultural Research Service as the basis for the design.¹⁶ Means of vegetable consumption and nutrient intake were compared across race/ethnicity, which included WCBA who were non-Hispanic black (NHB), non-Hispanic white (NHW), Mexican American (MA), and of other race/ethnicity (ORE), and household income categories < \$25,000, \$25,000–75,000, and > \$75,000. Group means were estimated in STATA 8 using the `svyreg` procedure to adjust for the

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