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Dry Bean Intake of Women Ages 19-45*

Julie M. Eihusen and Julie A. Albrecht

Abstract

Dry beans are considered an excellent source of folate. A mail-out survey was conducted to measure the dry bean intake of women between the ages of 19 and 45 years and to estimate the amount of folate from beans in the diet. One hundred and seventy-six women reported on the frequency with which they consume foods made with dry beans and the types of dry beans they have previously consumed. The average number of servings of food made with beans per month was 18.5, and the most commonly eaten food made with dry beans was refried beans, averaging 2 times per month. It was estimated that women, 19-45, consume approximately 21.67 mcg of folate from foods made with beans each day, making up a small portion of the recommended daily intake of 400 mcg per day. Most respondents reported having eaten kidney beans, and approximately two-thirds of the respondents said they had consumed pinto beans, lima beans, and small red beans. Taste and nutrition were the top reasons participants included dry beans in their diet, although taste was also cited by 22% of the participants as the reason they chose not to consume dry beans.

KEYWORDS: Dry beans, folate, women

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1. Introduction

Due to the increased awareness of folate, health care professionals have been anxious to find ample dietary sources. Dry beans are among the top natural food sources for folate, as they contain between 66 and 182 mcg/0.5 cup, compared to orange juice with 99 mcg/8 ounces, spinach with 102 mcg/0.5 cup, asparagus with 88 mcg/0.5 cup and liver with 218 mcg/3.5 ounces (USDA, 2002, Nebraska Dry Bean Commission, 2001, American Dry Bean Board, 2001)). In 1998, the USDA mandated folate fortification of all commercially produced grain products. Since then, neural tube defects have decreased by 23% (Mathews et al. 2002). Further evidence of the importance of the need for high folate consumption has been shown, as neural tube defects are most prevalent during seasons where fresh vegetables are unavailable (Bailey, 1995). Typically, women who are on long term high vegetable diets have greater folate levels (Koebnick and Heins, 2001).

Dry beans are among the best plant folate sources available (USDA, 2002). Dry beans include Baby Lima, Black, Blackeye, Cranberry, Garbanzo, Great Northern, Dark Red Kidney, Light Red Kidney, Large Lima, Navy, Pink, Pinto, Small Red and Yellow-eye beans. These varieties come in colors ranging from white to deep red and are grown throughout the U.S. In fact, the U.S. grows 1.0-1.4 million metric tons each year, about half of which are consumed in the U.S.. Navy beans are most commonly used to make pork and beans, and Blackeye peas are vital to many Southern dishes. Other beans are used to make salads, soups and other creative and healthy items.

Leterme (2002) summarized the recommendations of various health organizations for legume (pulse) consumption. Reasons for including legumes in the diet were: 1) protein source for vegetarians, 2) fiber source, and 3) soluble fiber source. In addition, the recommendations state that diets that include legumes reduce the risks for cancer, coronary heart disease, diabetes and obesity. Mangels et al. (2003) provided data on the contribution of protein, iron, zinc, calcium, vitamins D and B-12, riboflavin and linolenic acid from foods in a vegetarian diet which included numerous types of beans. These authors did not address the folate contribution of beans or other foods included in a vegetarian diet.

Data from the Continuing Survey of Food Intake of Individuals (CSFII) were analyzed to determine legume intake of Americans (Lucier, et al., 2000). On any given day, 14% of Americans eat a cooked dry bean; pinto, navy and kidney beans were those most consumed. Approximately one-third of the beans were consumed by Hispanics or in areas where large Hispanic populations live, such as California, Texas and Florida. Men were more likely to consume legumes than women with the exception of garbanzo beans which were more likely to be consumed by women.

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The purpose of this study was to determine the dry bean intake of women of childbearing years, and the reasons why women incorporate dry beans in their diet. It is hypothesized that most women do not fully realize the nutritional benefits of dry beans and are, therefore, consuming small amounts of this folate rich food.

2. Methods

To determine the frequency of bean consumption in women of childbearing years, a survey was sent via the postal service. Five hundred women in Nebraska, ages nineteen to forty-five years, were randomly selected from a mailing list available from InfoUSA (Omaha, NE). Prior to conducting the mail out survey, it was reviewed by faculty and students in the Department of Nutrition and Health Sciences and use of human subject approval was received. The survey specifically asked questions concerning the types of beans previously eaten, the types of foods in which beans as an ingredient are frequently consumed, diet habits, and demographic information. A cover letter stating the project's significance accompanied the survey. Two weeks after the first mailing was sent out, a postcard reminder was sent asking participants to return the survey. Participants, who still failed to return the survey, were sent another copy four weeks from the date of the first mailing.

All responses given in the food frequency were first converted to months to determine the average number of times per month that women consumed a food made with beans. Folate values for each item listed in the food frequency were found using the United States Department of Agriculture database (USDA, 2002). The average folate value from foods made with beans was then determined using the Food Processor Program (ESHA Research, 2000). The average daily amount of folate consumed through foods containing beans was compared for multivitamin and non-multivitamin users (SAS, 2000). Some foods found in the food frequency were not listed in either database. Thus, folate values were estimated by substituting foods with similar ingredients or estimating the amount of beans in the recipe. Estimated food folate values and their sources are found in Table 1.

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Table 1. Food Sources and Estimated Folate Values

Food	Food name in database or name of substitution	Source	Estimated Folate (mcg)
Chili with beans, 1 cup	chili with beans-canned, 1 cup	ESHA (11)	58
White chili with beans, 1 cup	chili with beans, canned, 1 cup	ESHA (11)	58
Soup or stew with beans, 1 cup	The average folate value for canned and condensed vegetable, minestrone and black bean soup - made with equal parts water, 1 cup	USDA (10)	29
Three Bean Salad, ½ cup	Three Bean Salad, ½ cup	ESHA (11)	26
Tossed Salad with 2 tbsp bean topping	Garbanzo beans, 2 tbsp	ESHA (11)	35
Pasta salad with beans, ½ cup	Vegetable Pasta Salad, ½ cup	USDA (10)	83
Mexican Salad with beans, 1 cup	Taco salad, 1 cup	USDA (10)	56
Refried Beans, ½ cup	Refried Beans -canned, ½ cup	ESHA (11)	14
Burrito, 1 medium	Bean burrito, 1 piece	USDA (10)	43
Bean Dip, 2 tbsp	Refried Beans, canned, 1.5 tbsp	ESHA (11)	2.6
Tostada with bean filling, 1 medium	Tostada with beans, 1	USDA (10)	43
Taco with bean filling, 1 medium	Tostada with beans, 1	USDA (10)	43
Enchilada with bean filling, 1 medium	Enchilada, 1 medium	USDA (10)	34
Baked beans, ½ cup	Baked Beans, canned, ½ cup	USDA (10)	30
Pork and Beans, ½ cup	Baked Beans, canned with pork, ½ cup	USDA (10)	29
Mixed vegetables with lima beans, ½ cup	Mixed vegetables, frozen-cooked, ½ cup	USDA (10)	17
Rice and Beans, 1 cup	Red Mexican Beans, Dry Cooked Mashed, ½ cup	ESHA (11)	94

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3. Results

One hundred and seventy-six surveys were returned with a return rate of 35%. The majority of the study participants reported their ethnicity as being European-American, however, almost a third checked the *Other* category and some simply stated their ethnic background as American (Table 2).

Table 2. Demographics of Participants

Population of Area of Residence (n=176)	**Percentage**
Less than 1000	12.0
1000-10,000	20.5
10,000-50,000	21.0
50,000-100,000	12.7
Over 100,000	33.8
Ethnicity (n=172)	
Hispanic	5.2
Asian/Pacific Islander	0.7
American Indian	0.7
European-American	61.4
African-American	3.9
Other	28.1
Age (n=176)	
19-24	3.8
30-34	18.5
25-29	12.7
35-39	26.1
40-45	38.9
Multivitamin Usage (n=175)	
Yes	60.3
No	39.7
Typical Diet (n=173)	
Vegan	0.7
Vegetarian including milk and/or eggs	2.7
All plant and animal products excluding red meat	7.1

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Approximately 60% of the respondents reported using a multivitamin, and a vast majority, 89.6% of the respondents, claimed to eat both plant and animal products. Almost two-thirds of the participants purchased their dry beans in the canned form.

Many women specified taste and nutrition as their primary reasons for cooking with beans (Table 3).

Table 3. Reasons Why Women Include Beans in Their Diet (n=164)

Taste	30.3%
Tradition	8.3%
Nutritional Value	15.9%
Taste and Tradition	2.1%
Taste and Nutritional Value	23.5%
Taste, Nutritional Value and Tradition	4.1%
Other	13.8%
Taste and Other	0.7%
Nutritional Value and Other	0.7%
Taste, Nutritional Value, Tradition and Other	0.7%

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Several reasons were specified as to why women choose not to eat dry beans (Table 4).

Table 4. Reasons Why Women Don't Include Dry Beans in Their Diet

Gas, digestion	14.6%
Cooking time	20.0%
Availability	5.5%
Taste	21.8%
Gas, digestion and Cooking Time	9.1%
Gas, digestion and Taste	3.6%
Cooking Time, Availability and Taste	1.8%
Other	14.6%
Cooking Time and Other	3.6%
Taste and Other	5.5%

Twenty percent of the respondents reported the cooking time as a major factor in why they choose not to consume beans, and almost 22% said taste was their primary reason for not cooking with dry beans. Other respondents stated that they, or their family members, didn't like beans. Furthermore, while some respondents claimed to eat beans because of their nutritional value, one woman could not eat beans because of her specific renal diet.

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The average number of times per month that women 19-45 consumed foods made with beans was calculated (Table 5).

Table 5. The Number of Times Per Month that Women Consume Foods Made with Beans

Food	Times Consumed Per Month
Chili with beans, 1 cup	1.314
White chili with beans, 1 cup	0.139
Soup or Stew with beans, 1 cup	1.686
Three Bean Salad, ½ cup	0.444
Tossed Salad with 2 tbsp. bean topping	0.547
Pasta Salad with beans, ½ cup	0.759
Mexican Salad with beans, 1 cup	0.956
Refried Beans, ½ cup	2.096
Burrito, 1 medium	1.503
Bean Dip, 2 tbsp	0.953
Tostada with bean filling, 1 medium	0.729
Taco with bean filling, 1 medium	1.504
Enchilada with bean filling, 1 medium	1.024
Baked Beans, ½ cup	1.176
Pork and Beans, ½ cup	1.412
Mixed Vegetables with lima beans, ½ cup	0.789
Rice and Beans, 1 cup	1.239

While chili was consumed at the rate of 0.139 cups/month, refried beans were eaten approximately 2.096 times/month. Other popular foods made with beans were soup and stew, burritos and tacos. It is possible that overestimation of foods consumed may have taken place, as the average number of servings of foods made with beans per month was 18.456. A number of participants reported that they never consume foods made with beans.

Estimated monthly and daily folate values were extrapolated from the food frequency data using the information found in Table 1. Women consumed approximately 650 mcg of folate per month from foods made with beans (Table 5). Thus, participants consumed approximately 22 mcg of folate from foods made with beans each day.

The folate intake scores from beans using the food frequency data were compared among multivitamin and non-multivitamin users. Multivitamin users consumed 549.6 ± 69.5 mcg folate from foods made with beans compared with 744.7 ± 85.7 mcg/month for women who did not use a multivitamin. These differences were not statistically significant.

Finally, respondents supplied information as to whether or not they had ever consumed certain varieties of American grown dry beans (Table 6).

Table 6. Previously Eaten Beans Consumed by Participants

Type of Dry Bean	Has Previously Eaten (%)	Has Not Eaten (%)
Red Kidney Bean	94.9	5.2
Pinto Bean	65.2	34.8
Great Northern Bean	54.8	45.2
Garbanzo Bean/Chickpea	50.3	49.7
Lima Bean	67.1	32.9
Small Red Bean	69.0	31.0
Pink Bean	6.5	93.6
Cranberry Bean	3.9	96.1
Black Bean	49.7	50.3
Navy Bean	54.8	45.3
Blackeye Pea/Cowpea	32.9	67.1

Almost all study participants reported having consumed kidney beans. Approximately two-thirds of the participants claimed that they had eaten pinto beans, lima beans and small red beans. Many women stated that they had never consumed pink beans or cranberry beans.

4. Discussion

Dry beans are an excellent source of folate, a vital nutrient especially needed by women during their childbearing years. Women incorporate dry beans in their diets mainly because of the taste and known nutritional benefits (Table 3). Participants who checked "other," wrote in responses which related more to the next question on why they did not eat beans (Table 4). However, many women dislike beans and rarely choose to include them in their diet. They cite taste and cooking time as primary reasons why beans are not eaten more regularly. Gas and digestion were listed by some as reasons to not include them in the diet. For the best results, beans should be soaked before cooking. Methods include the hot soak, overnight soak, and the quick soak. The hot soak method is preferred, as it soaks each bean for a long period of time, enabling the flatulence causing sugars to dissolve. Beans supposedly retain all of their nutrients during each soaking method (Anon 1999).

It is interesting to note however, that while many women reported rarely consuming beans, these same women reported consuming dishes, such as chili, which contain beans (Table 5).

The average amount of folate consumed per month from foods made with beans is quite low (Table 5). Women of childbearing years need at least 400 mcg folate/day. From the average times beans are consumed per month (Table 5), the folate content was calculated. The average folate intake from foods made with beans was 1.67 mcg/day, which is approximately 5% of the DRI. The folate values may be somewhat misleading also. Foods such as pasta salad and burritos not only contain beans, which are high in folate, but fortified grain products also high in folate. These fortified grain products would raise the overall folate values. Thus, the 83.4 mcg of folate in vegetable pasta salad may reflect more on the pasta's fortification, then from the beans found in the salad. Women, ages 19-45, have ample opportunity to increase their dry bean intake, and thereby, increase the amount of folate they consume.

Most women of childbearing years reported having consumed kidney beans, small red beans, pinto beans and lima beans (Table 6). It would not be surprising if more women actually consumed pinto beans, since they are commonly used to make enchiladas, Mexican salad, refried beans and burritos and they may not recognize the type of bean in these foods. Likewise, Great Northern beans and navy beans are used to make popular dishes such as baked beans and pork and beans. However, only 54.8% of the respondents reported having consumed Great Northern beans and/or navy beans. Perhaps greater availability and more recipes that include these dry bean varieties would increase the overall number of dry bean servings women consume.

5. Conclusions

This study provided information on the folate intake of women from dry bean consumption. It also provided reasons why women were consuming or were not consuming dry beans. Through this information, nutrition educators may be able to implement programs aimed to increase dry bean consumption, and raise awareness concerning folate, its food sources, and the preventative effects of folate against neural tube defects. Dry bean boards and food companies may also use this information to better market their products and provide consumers with additional dry bean information concerning important nutrients, new recipes, cooking methods, and more convenient dry bean products.

References

American Dry Bean Board (2001) Be'an Smart About Beans. www.americanbean.org.

Anon. (1999) Study reveals no loss of nutrients from hot dry beans. *Hispanic Times Magazine* 20(3):38.

Bailey L., ed. (1995) Folate in Health and Disease. New York: Marcel Dekker, Inc.

ESHA Research (2000) Food Processor, version 8. ESHA Research, Salen, Ore.

Koebnick C., Heins U. (2001) Folate status during pregnancy in women is improved by long term high vegetable intake compared with the average Western diet. *Journal of Nutrition.* 131(3): 733-739.

Leterme, P. (2002) Recommendations by health organizations for pulse consumption. *British J. of Nutr.* 88(3), S239-S243.

Lucier, G. Kin, B-H, Allshouse, J. and Kantor, L.S. (2000). Factors affecting dry bean consumption in the United States. Economic Research Service. Vegetables and Specialties S&O/VGS-280/, pp. 26-35.

Mangels, A. R., Messina, V. and Melina V. (2003) Position of the American Dietetic Association and Deietitians of Canada: Vetetarian diets. *J. Am. Diet. Assoc.* 102(6):748-765.

Mathews, T.J., Honeine, M.A. and Erickson, J.D. (2002). Spina bifida and Anencephalay Prevalence – United States, 1991 – 2001. MMWR 51 (RR13):9-11.

Nebraska Dry Bean Commission (2001) www.nebraskadrybean.com .

SAS Institute, Inc. (2000) SAS on-line Doc, version 8. Cary, NC: SAS Institute.

USDA, United States Department of Agriculture (2002). Nutrient Database for Standard Reference. Available from: http://www.nal.usda.gov/finic/foodcomp . Accessed September 15, 2006.