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Colorado Department of Public Health and Environment

BRIEF

HEALTH STATISTICS SECTION

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Folic Acid and Prevention of Birth Defects

Results from the Behavioral Risk Factor Surveillance System, 1996 and 1998

Neural tube defects are serious birth defects of the spine and brain. Approximately 2,500 to 3,000 infants are born with neural tube defects each year in the United States. The B vitamin folic acid can reduce the occurrence of spina bifida and anencephaly by at least 50 percent when consumed daily before conception and during early pregnancy.[1] In 1992, the Public Health Service recommended that all women of childbearing age who are capable of becoming pregnant consume 400 micrograms of folic acid daily.[1] Folic acid is found in the diet in orange juice, beans, green leafy vegetables, and fortified cereals and grains. However, it is difficult to get the recommended amount of folic acid by diet alone. Women can receive the recommended amount by taking a multivitamin or folic acid supplement daily. The following surveys examined folic acid intake and knowledge of folic acid benefits in Colorado women ages 18-44 years.

Methodology

The Colorado Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing statewide survey of non-institutionalized adult Coloradans regarding their health behaviors, preventive health practices, and health care coverage. The BRFSS, initiated in 1990 as a joint project of the Colorado Department of Public Health and Environment and the Centers for Disease Control and Prevention, uses random-digit-dialing techniques to select respondents. In 1996 and in 1998, Colorado women ages 18-44 years were surveyed regarding their intake of vitamins or supplements, including multivitamins and supplements with folic acid. Respondents were also questioned on their knowledge about folic acid and its role in birth defect prevention. BRFSS data were weighted for the probability of selection and to reflect the age and gender distribution in Colorado. All analyses were completed using SUDAAN software to account for the complex survey design. Characteristics of the study population, daily folic acid use, and knowledge regarding folic acid and birth defects were examined. The estimated proportion of the population with these characteristics was obtained and 95 percent confidence intervals were calculated around these proportions.

Sample Characteristics

Among the 531 women interviewed in 1996 and the 524 women interviewed in 1998, the mean age was 32 and 33 years, respectively. The race/ethnicity composition of women surveyed was mostly white/non-Hispanic (76 percent in 1996 and 75 percent in 1998), followed by Hispanic (19 percent and 20 percent, respectively). Insufficient sample sizes prevented analysis by race/ethnicity for groups other than white/non-Hispanic and Hispanic. In both years, most women were either married or part of an unmarried couple and a small percent of women were pregnant. Small numbers also prevented analysis of responses from pregnant women as a separate group. Most of the women surveyed had a high school degree or an education level beyond high school (Table 1).

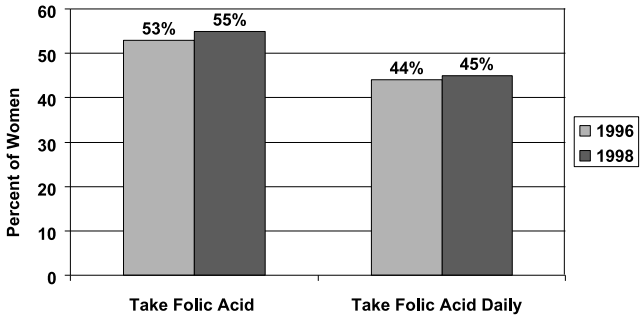
Table 1. Demographic characteristics of women in the sample: Colorado BRFSS, 1996 and 1998

	Percent	
	1996 n=531	1998 n=524
Age in years		
18-24	19	20
25-34	38	36
35-44	43	44
Race/Ethnicity		
White, non-Hispanic	76	75
Hispanic	19	20
Other	6	5
Marital status		
Married	62	64
Single	38	36
Education		
Less than high school	8	9
High school graduate	29	26
More than high school	63	65
Income		
Less than $ 25,000	30	29
$25,000-34,999	17	15
$35,000-49,999	27	23
$50,000 or more	26	33
Pregnant		
Yes	4	5
No	96	95

Folic Acid Use

In 1996 and 1998, most women in Colorado between the ages of 18 and 44 years took a vitamin or supplement (62 percent). About half, 53 percent in 1996 and 55 percent in 1998, of all women took a vitamin or supplement containing folic acid. However, the percent of women taking folic acid daily in 1996 was only 44 percent and had increased slightly in 1998 to 45 percent (Figure 1).

Figure 1. Percent of women ages 18-44 taking folic acid: Colorado BRFSS, 1996 and 1998



Daily use of folic acid ranged from 23 to 57 percent depending on age, race/ethnicity, marital status, education, and income. Women who were least likely to report taking folic acid daily were younger, Hispanic, those with less than a high school degree, and those with lower incomes. In 1996, the difference in folic acid use among women in the lowest and highest income categories was statistically significant. In 1998, women with more than a high school education were statistically significantly more likely to use folic acid than women with less than a high school education.

Differences in daily folic acid use by race/ethnicity, between white/non-Hispanic and Hispanic women, were only statistically significant within each year. When comparing 1996 to 1998, no statistically significant differences of daily folic acid use were found in any demographic category (See Table 2).

Table 2. Daily folic acid use among women ages 18-44 by selected demographic characteristics: Colorado BRFSS, 1996 and 1998

	1996 n=531		1998 n=524	
	Percent	95% C.I.*	Percent	95% C.I.*
Age in years				
18-24	34.6	(22.6-46.6)	36.3	(24.0-48.6)
25-34	45.0	(37.2-52.8)	50.0	(42.6-57.4)
35-44	47.0	(40.1-53.9)	44.7	(38.0-51.4)
Race/Ethnicity				
White, non-Hispanic	49.3	(43.8-54.8)	50.5	(45.4-55.6)
Hispanic	24.5	(14.5-34.5)	25.8	(16.2-35.4)
Marital status				
Married	47.4	(41.3-53.5)	44.5	(38.8-50.2)
Single	38.1	(30.7-45.5)	45.5	(38.1-52.9)
Education				
Less than high school	26.4	(11.1-41.7)	23.0	(9.9-36.1)
High school graduate	38.9	(30.7-47.1)	37.3	(27.7-46.9)
More than high school	48.3	(41.6-55.0)	51.0	(45.3-56.7)
Income				
Less than $ 25,000	37.3	(29.1-45.5)	37.0	(27.6-46.4)
$25,000-34,999	42.4	(31.4-53.4)	55.9	(43.6-68.2)
$35,000-49,999	46.7	(36.3-57.1)	45.6	(35.8-55.4)
$50,000 or more	57.1	(47.9-66.3)	47.9	(39.7-56.1)

*confidence interval

Knowledge of Folic Acid

Overall, 44 percent of women were aware of the benefits of folic acid in the prevention of birth defects in 1996 compared to 36 percent in 1998. In 1996, knowledge of the benefits of folic acid ranged from 22 to 56 percent depending on age, race/ethnicity, marital status, education, and income. Women who were white/non-Hispanic, married, had more than a high school education or incomes over $50,000 were more likely to know that folic acid use can prevent some birth defects.

However, significant differences were found in only two categories: education and income. Significant differences were found between those with more than a high school education (51 percent) and those who had a high school education (35 percent), or less than a high school education (22 percent) and between those with incomes below $25,000 (31 percent) and those with incomes over $50,000 (56 percent). In 1998, the difference in knowledge between high school graduates and those with more than a high school education was again significant as was the difference in knowledge between women in the lowest and highest income categories. The knowledge of high school graduates was significantly lower in 1998 compared to high school graduates in 1996 (18 percent vs. 34 percent). In addition, the difference in knowledge between white/non-Hispanic and Hispanic women was statistically significant in 1998 but not in 1996 (See Table 3).

Table 3. Knowledge among women ages 18-44 that folic acid can prevent some birth defects by selected demographic characteristics: Colorado BRFSS, 1996 and 1998

	1996 n=531		1998 n=524	
	Percent	95% C.I.*	Percent	95% C.I.*
All women	43.5	(38.4-48.6)	36.4	(31.7-41.1)
Age in years				
18-24	41.8	(27.3-56.3)	29.1	(18.1-40.1)
25-34	44.1	(36.3-51.9)	41.6	(34.0-49.2)
35-44	43.7	(37.0-50.4)	35.5	(28.8-42.2)
Race/Ethnicity				
White, non-Hispanic	46.6	(41.1-52.1)	42.0	(36.5-47.5)
Hispanic	35.3	(20.4-50.2)	22.7	(12.3-33.1)
Marital status				
Married	46.3	(40.2-52.4)	40.4	(34.7-46.1)
Single	38.9	(29.9-47.9)	29.1	(20.9-37.3)
Education				
Less than high school	21.7	(8.2-35.2)	33.2	(15.8-50.6)
High school graduate	34.1	(26.1-42.1)	17.7	(10.6-24.8)
More than high school	50.5	(43.8-57.2)	44.2	(38.5-49.9)
Income				
Less than $ 25,000	30.5	(22.9-38.1)	25.0	(16.8-33.2)
$25,000-34,999	42.4	(31.4-53.4)	37.1	(24.6-49.6)
$35,000-49,999	44.0	(33.6-54.4)	38.5	(28.9-48.1)
$50,000 or more	56.3	(46.7-65.9)	46.2	(38.0-54.4)

*confidence interval

Among women with knowledge that folic acid can prevent some birth defects, 54 and 51 percent reported taking folic acid daily in 1996 and 1998 respectively. Statistically, this represents no significant difference between years.

Discussion

The importance of folic acid in the reduction of birth defects has led to public health efforts to increase women's awareness of this fact and to increase the consumption of daily folic acid by women of childbearing age. A 1998 national survey found that only 32 percent of women ages 18-45 years took a vitamin supplement containing folic acid daily. Associations similar to those found in Colorado were found for age, education and income.[2] In Colorado, the BRFSS surveys indicated 44-45 percent of women ages 18-44 years were taking folic acid daily. Little change in knowledge or folic acid use was seen during the time period under study. The only significant finding was a drop in the knowledge of high school educated women; this finding may have been due to chance. The lack of change between 1996 and 1998 is not unexpected since significant efforts to educate health care providers and women in Colorado were not begun until 1999. Nationally, a major education initiative by the Centers for Disease Control and Prevention and the March of Dimes was also initiated in 1999. Future educational efforts should be directed to all women, but special efforts should be made to target those found to be least likely to be taking a vitamin or supplement with folic acid. This group includes those younger, less educated, and non-white women. The BRFSS survey will be conducted in 2000 to reassess changes in the knowledge and use of folic acid in Colorado women.

The Colorado Department of Public Health and Environment participates in a multi-agency Folic Acid Task Force whose members are working to increase the use of folic acid through public health education. Colorado Responds to Children with Special Needs, the public health program for monitoring and preventing birth defects in Colorado, also performs surveillance to determine the number of pregnancies affected by neural tube defects each year.

For more information about folic acid and birth defects contact *Colorado Reponds to Children with Special Needs* at 303-692-2663. For more information about the *Behavioral Risk Factor Surveillance System* contact the Health Statistics Section at 303-692-2160.

References

1. Centers for Disease Control. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. MMWR 1992;41 (no. RR- 14).

2. Centers for Disease Control and Prevention. Knowledge and use of folic acid by women of childbearing age: United States, 1995 and 1998. MMWR 1999;48:325-7.