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Dietary Intake of Selected Vitamins for the United States Population: 1999–2000

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Abstract

This report presents dietary intake estimates for selected B-vitamins, carotenes, and vitamins A, C, and E from the National Health and Nutrition Examination Survey, 1999–2000, for the U.S. population. Vitamin intakes are estimated from one 24-hour dietary recall interview. Population means, medians, and standard errors of the mean are weighted to produce national estimates, and are presented by sex and age groups. Assessment of dietary intakes is an important part of monitoring the nutritional status of the U.S. population.

Keywords: Vitamins • 24-hour dietary recall • National Health and Nutrition Examination Survey • dietary intake

Introduction

Vitamins play important roles in many functions in the human body and may act to reduce the risk of many common diseases. B vitamins serve as coenzymes or cofactors in numerous enzymatic reactions. Folate and vitamins B-6 and B-12 may play roles in normal cognitive functioning, especially among elderly adults (1–3), and indirect roles in reducing the risk of vascular disease by reducing blood levels of homocysteine (4–6). Increased folate intake has been associated with a reduced risk of neural tube defects (4). Vitamin A is important for normal vision, embryonic development, growth, and immune function (7). B-carotene and some of the carotenoids have provitamin A activity, meaning they can be converted to vitamin A in the body. High blood concentrations of B-carotene and other carotenoids obtained from foods may be associated with a lower risk of some cancers and cardiovascular disease, and vitamins C and E may prevent oxidative damage of many tissues and reduce the risk of some cancers and cardiovascular disease (8). B-carotene and other carotenoids and vitamins C and E also may play a role in reducing the risk of age-related cataracts and macular degeneration (8–10). This report provides mean and median dietary intakes for selected B-vitamins, carotenes, and vitamins A, C, and E for the U.S. population during 1999–2000.

The National Health and Nutrition Examination Surveys (NHANES) provide information on the health and nutritional status of the civilian, noninstitutionalized population of the United States residing in the 50 States and the District of Columbia. In 1999, the NHANES design shifted from periodic to continuous data collection. Each annual sample is nationally representative, but the 2-year samples are used to provide adequate sample sizes for subgroup analyses. NHANES 1999–2000 is the first of the 2-year data releases planned for the survey.

Methods

Data source

The sample covered all ages, but the following subgroups were oversampled to allow for more precise estimates for these groups: adolescents 12–19 years of age, persons 60 years of age and over, Mexican Americans, black or African American persons, low income persons, and pregnant women. More information on the NHANES 1999–2000 survey design and data collection methods, as well as public use microdata files, can be found at the NHANES website: http://www.cdc.gov/nchs/nhanes.htm.

A total of 12,160 persons were eligible for the survey in 1999–2000; nearly 76 percent (n=9,282) of these persons were examined in the mobile exam center. Among the examined

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persons, nearly 93 percent (n=8,604) had complete and reliable dietary recall data and were included in the analyses for these tables. A 20 percent random subsample had their dietary recall interview conducted by telephone as part of a methodologic study to consider the feasibility of conducting the 24-hour recall interview over the telephone. Although the means for the in-person recall sample generally were higher than the means for the telephone recall sample for the vitamins examined, the impact on estimates for the full sample was minor. Therefore the estimates in these tables are computed for the full NHANES 1999–2000 sample. There were some extreme vitamin intakes but these values were deemed plausible given the types of foods or amounts that the sample persons consumed and all values were included in the final analyses.

The estimates are based on one 24-hour dietary recall. Interviewers conducted the 24-hour recall using an automated data collection system developed by the survey contractor, Westat, Inc., for use in the NHANES 1999–2001. The intake information was coded to USDA's Survey Nutrient Database (versions 1994–96 and 1998) to produce the nutrient intake values.

Statistical analysis

Population means, medians, and standard errors of the mean were weighted to produce national estimates and are reported by sex and age groups in the accompanying table. The sample weights incorporate the differential probabilities of selection and include adjustments for oversampling of certain populations, noncoverage, and nonresponse. Standard errors were estimated using SUDAAN by means of the "delete 1 jackknife (JK1) method" in contrast to the Taylor Series Linearization method that was used in previous NHANES to estimate standard errors (11,12). The age categories are those that were recommended in the NHANES 1999–2000 Analytic Guidelines and are based on the survey sample domains (11). The relative standard error (RSE) is the statistical criterion used to determine the reliability of the estimates and is calculated as the ratio of the standard error of the mean to the mean multiplied by 100. The larger the RSE, the less reliable the estimates are. An RSE greater than 25 percent has been recommended to define estimates that are not reliable (13). In these tables, all of the RSEs are less than 20 percent. Therefore, all of the estimates are considered to be statistically reliable.

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Table 1. Dietary intake of selected vitamins by sex and age: United States, 1999–2000

Nutrient and age	Both sexes				Male				Female			
	Sample size	Mean	Standard error of the mean	Median	Sample size	Mean	Standard error of the mean	Median	Sample size	Mean	Standard error of the mean	Median
Thiamin (Vitamin B-1) (mg)												
All ages[1]	8,604	1.6	0.02	1.4	4,206	1.8	0.03	1.6	4,398	1.4	0.03	1.2
Under 6 years[1]	1,195	1.2	0.03	1.1	628	1.3	0.04	1.2	567	1.2	0.04	1.1
6–11 years	962	1.6	0.05	1.5	494	1.7	0.09	1.6	468	1.5	0.05	1.4
12–19 years	2,208	1.7	0.04	1.5	1,105	2.0	0.06	1.7	1,103	1.4	0.04	1.3
20–39 years	1,484	1.7	0.03	1.5	635	2.0	0.05	1.8	849	1.4	0.05	1.3
40–59 years	1,218	1.7	0.05	1.5	577	1.9	0.06	1.7	641	1.4	0.05	1.2
60 years and over	1,537	1.5	0.03	1.4	767	1.8	0.05	1.6	770	1.3	0.03	1.2
Riboflavin (Vitamin B-2) (mg)												
All ages[1]	8,604	2.0	0.03	1.7	4,206	2.2	0.04	2.0	4,398	1.7	0.04	1.5
Under 6 years[1]	1,195	1.8	0.04	1.6	628	1.9	0.06	1.8	567	1.6	0.06	1.5
6–11 years	962	2.0	0.07	1.9	494	2.1	0.11	1.9	468	1.9	0.06	1.8
12–19 years	2,208	2.1	0.05	1.8	1,105	2.4	0.08	2.2	1,103	1.7	0.05	1.6
20–39 years	1,484	2.0	0.04	1.8	635	2.3	0.07	2.0	849	1.7	0.07	1.5
40–59 years	1,218	2.0	0.05	1.8	577	2.3	0.07	2.1	641	1.7	0.06	1.5
60 years and over	1,537	1.8	0.04	1.6	767	2.1	0.06	1.8	770	1.6	0.05	1.5
Niacin (Vitamin B-3) (mg)												
All ages[1]	8,604	22.3	0.28	19.8	4,206	25.9	0.38	23.5	4,398	18.9	0.32	16.8
Under 6 years[1]	1,195	14.7	0.36	13.3	628	15.4	0.57	14.0	567	13.9	0.46	12.9
6–11 years	962	19.8	0.53	17.7	494	21.1	0.94	18.9	468	18.4	0.50	17.0
12–19 years	2,208	22.9	0.62	20.3	1,105	26.3	0.84	23.3	1,103	19.4	0.79	17.5
20–39 years	1,484	24.6	0.44	22.3	635	28.9	0.64	26.0	849	20.5	0.57	18.5
40–59 years	1,218	23.7	0.52	21.7	577	28.4	0.71	26.8	641	19.4	0.62	17.2
60 years and over	1,537	20.4	0.37	18.4	767	24.1	0.75	21.7	770	17.4	0.36	15.7
Folic acid (mcg)												
All ages[1]	8,604	361	6.9	314	4,206	405	8.2	356	4,398	319	7.7	280
Under 6 years[1]	1,195	255	6.1	231	628	267	8.8	242	567	243	9.3	219
6–11 years	962	339	12.1	304	494	364	19.7	324	468	312	10.3	284
12–19 years	2,208	372	10.2	323	1,105	421	15.0	363	1,103	323	10.3	285
20–39 years	1,484	380	9.5	329	635	435	12.0	378	849	327	12.6	291
40–59 years	1,218	381	10.7	338	577	431	13.1	394	641	335	13.8	291
60 years and over	1,537	346	7.8	309	767	387	13.2	351	770	312	8.5	275
Vitamin B-6 (mg)												
All ages[1]	8,604	1.8	0.03	1.5	4,206	2.0	0.03	1.8	4,398	1.6	0.04	1.3
Under 6 years[1]	1,195	1.3	0.03	1.2	628	1.4	0.04	1.2	567	1.2	0.05	1.1
6–11 years	962	1.6	0.04	1.4	494	1.6	0.07	1.4	468	1.5	0.06	1.3
12–19 years	2,208	1.8	0.09	1.5	1,105	2.0	0.08	1.8	1,103	1.6	0.14	1.3
20–39 years	1,484	1.9	0.04	1.6	635	2.2	0.06	2.0	849	1.6	0.05	1.4
40–59 years	1,218	1.9	0.05	1.6	577	2.1	0.06	2.0	641	1.6	0.06	1.3
60 years and over	1,537	1.8	0.04	1.6	767	2.1	0.07	1.8	770	1.5	0.04	1.4
Vitamin B-12 (mcg)												
All ages[1]	8,604	4.6	0.15	3.4	4,206	5.4	0.23	4.0	4,398	3.8	0.13	2.8
Under 6 years[1]	1,195	3.1	0.13	2.6	628	3.3	0.15	2.9	567	2.8	0.16	2.4
6–11 years	962	3.8	0.17	3.1	494	3.9	0.28	3.1	468	3.7	0.16	3.0
12–19 years	2,208	4.4	0.18	3.4	1,105	5.4	0.24	4.3	1,103	3.4	0.20	2.6
20–39 years	1,484	5.0	0.25	3.7	635	6.1	0.37	4.4	849	4.0	0.24	3.1
40–59 years	1,218	5.1	0.37	3.5	577	6.1	0.62	4.4	641	4.1	0.32	2.7
60 years and over	1,537	4.5	0.25	3.2	767	5.3	0.43	3.9	770	3.9	0.32	2.7
Vitamin A (RE)												
All ages[1]	8,604	938	26.8	627	4,206	961	27.7	651	4,398	916	36.4	594
Under 6 years[1]	1,195	757	36.1	579	628	750	36.5	578	567	766	57.1	581
6–11 years	962	861	44.3	642	494	883	64.7	642	468	837	54.4	638
12–19 years	2,208	830	43.0	566	1,105	891	58.3	653	1,103	768	49.6	466
20–39 years	1,484	920	43.6	598	635	878	40.6	618	849	961	74.4	574
40–59 years	1,218	1,027	43.9	643	577	1,115	80.2	667	641	945	52.8	590
60 years and over	1,537	1,050	45.8	704	767	1,117	61.5	759	770	997	58.5	670

See footnotes at end of table.

Table 1. Dietary intake of selected vitamins by sex and age: United States, 1999–2000—Con.

Nutrient and age	Both sexes				Male				Female			
	Sample size	Mean	Standard error of the mean	Median	Sample size	Mean	Standard error of the mean	Median	Sample size	Mean	Standard error of the mean	Median
Carotenes (RE)[2]												
All ages[1]	8,604	454	23.0	162	4,206	426	22.9	158	4,398	480	30.7	166
Under 6 years[1]	1,195	289	30.6	101	628	271	27.9	104	567	308	50.4	95
6–11 years	962	352	40.0	118	494	345	57.4	121	468	358	51.0	116
12–19 years	2,208	354	31.4	120	1,105	347	47.0	120	1,103	361	38.5	120
20–39 years	1,484	450	43.5	160	635	377	36.4	160	849	522	69.0	160
40–59 years	1,218	546	35.8	204	577	537	51.4	202	641	554	47.3	207
60 years and over	1,537	530	31.6	218	767	559	47.3	201	770	507	34.2	233
Vitamin C (mg)												
All ages[1]	8,604	97	2.8	68	4,206	103	3.0	70	4,398	91	3.3	66
Under 6 years[1]	1,195	103	4.1	82	628	101	5.8	82	567	104	5.5	83
6–11 years	962	87	4.2	66	494	93	6.8	66	468	81	4.4	67
12–19 years	2,208	98	4.7	61	1,105	101	6.1	60	1,103	95	5.6	64
20–39 years	1,484	93	4.0	58	635	102	4.5	64	849	85	5.9	52
40–59 years	1,218	98	4.9	67	577	107	6.0	71	641	91	5.3	63
60 years and over	1,537	104	4.6	84	767	110	7.5	85	770	99	3.8	81
Vitamin E (total alpha-tocopherol equivalents in mg)												
All ages[1]	8,604	8.8	0.14	7.0	4,206	9.6	0.19	7.9	4,398	8.0	0.17	6.4
Under 6 years[1]	1,195	6.3	0.22	5.2	628	6.4	0.27	5.5	567	6.1	0.33	4.8
6–11 years	962	7.5	0.26	6.5	494	8.2	0.44	7.0	468	6.7	0.23	5.7
12–19 years	2,208	8.4	0.23	6.9	1,105	9.2	0.42	7.8	1,103	7.6	0.32	6.2
20–39 years	1,484	9.3	0.27	7.4	635	10.4	0.47	8.3	849	8.2	0.32	6.6
40–59 years	1,218	9.8	0.29	7.8	577	10.4	0.44	9.4	641	9.1	0.41	6.8
60 years and over	1,537	8.3	0.27	6.8	767	9.2	0.45	7.7	770	7.6	0.24	6.0

[1]Excludes nursing infants and children.
[2]Carotenes consist of beta-carotene and other provitamin-A carotenoids.

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