**Online supplementary material**

**Supplemental Table 1.** Characteristics of adult respondents (weighted % and 95% CI) who provided a reliable 24-hour dietary recall, by US census region, NHANES 1988-94 to 2009-2010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | All regions | Northeast | Midwest | South | West |
| N | 43345 | 6659 | 8786 | 17342 | 10558 |
|  | Weighted % and 95% CI |
| **Survey cycle** |  |  |  |  |  |
| NHANES 1988-1994 | 29.4 (27.8, 31.2) | 33.8 (29.2, 38.9) | 29.2 (24.6, 34.2) | 28.2 (25.0, 31.6) | 28.0 (20.4, 31.2) |
| NHANES 1999-2004 | 33.8 (32.0, 35.7) | 30.1 (23.3, 38.0) | 32.0 (24.1, 41.1) | 37.2 (32.6, 42.2) | 33.3 (25.5, 43.8) |
| NHANES 2005-2010 | 36.8 (34.9, 38.7) | 36.0 (30.0, 42.6) | 38.8 (32.0, 46.1) | 34.6 (31.0, 38.4) | 38.7 (30.9, 47.1) |
| **Urbanization of place of residence** |  |  |  |  |  |
| Large metropolitan | 29.5 (25.5, 33.9) | 23.0 (13.5, 36.4) | 20.2 (14.8, 26.8) | 27.1 (19.5, 36.2) | 49.0 (37.3, 60.8) |
| Fringe metropolitan | 18.9 (14.6, 24.2) | 32.5 (19.9, 48.2) | 16.0 (7.7, 23.3) | 19.8 (13.2, 28.5) | 9.6 (4.7, 18.4) |
| Medium-small metropolitan | 33.5 (28.2, 39.4) | 39.4 (27.2, 53.1) | 34.9 (22.7, 49.4) | 30.0 (22.6, 38.5) | 33.0 (22.0, 46.3) |
| Non-metropolitan | 18.1 (15.1, 21.5) | 5.0 (1.0, 21.5) | 29.0 (21.2, 38.2) | 23.2 (18.2, 29.2) | 8.4 (3.3, 19.8) |
| **Sex** |  |  |  |  |  |
|  Men  | 48.9 (48.4, 49.4) | 48.8 (47.8, 49.9) | 48.6 (47.5, 49.7) | 49.2 (48.2, 50.1) | 48.9 (47.7, 50.1) |
|  Women | 51.1 (50.6, 51.6) | 51.2 (50.1, 52.2) | 51.4 (50.3,52.3) | 50.9 (49.9,51.8) | 51.1 (49.9, 52.3) |
| **Race/ethnicity** |  |  |  |  |  |
| Non-Hispanic white | 73.0 (71.1, 74.9) | 79.7 (74.0, 84.5) | 84.5 (81.6, 87.0) | 66.3 (62.3, 70.1) | 65.7 (61.3, 69.9) |
| Non-Hispanic Black | 11.0 (10.1, 12.1) | 9.4 (6.8, 12.7) | 8.9 (7.1, 11.1) | 17.4 (15.4, 19.5) | 4.6 (3.6, 5.7) |
| Mexican-American | 6.8 (5.9, 7.7) | 0.8 (0.5, 1.4) | 2.6 (1.9, 3.6) | 7.1 (5.2, 9.6) | 15.6 (13.4, 18.1) |
| Other  | 9.2 (8.1, 10.3) | 10.1 (7.6, 13.2) | 4.0 (3.2, 5.0) | 9.2 (7.3, 11.4) | 14.1 (11.8, 16.7) |
| **Age-group, y** |  |  |  |  |  |
| 20-39 | 40.0 (39.0, 41.0) | 39.6 (37.7, 41.6) | 37.2 (35.0, 39.4) | 41.4 (39.5, 43.3) | 41.2 (38.7, 43.7) |
| 40-59  | 36.2 (35.5, 36.9) | 36.1 (34.8, 37.4) | 37.0 (35.7, 38.4) | 36.1 (34.7, 37.5) | 35.6 (33.8, 37.5) |
| >60  | 23.8 (22.9, 24.7) | 24.3 (22.6, 26.1) | 25.8 (24.2, 27.4) | 22.5 (21.1, 24.1) | 23.2 (20.9, 25.7) |
| **Education, y** |  |  |  |  |  |
| <12  | 21.1 (20.2, 22.1) | 19.1 (17.2, 21.1) | 17.7 (16.1, 19.5) | 24.9 (23.0, 26.8) | 20.4 (18.3, 22.6) |
| 12 | 27.8 (27.0, 28.6) | 29.0 (26.5, 31.7) | 30.9 (29.1, 32.7) | 28.2 (27.0, 29.5) | 22.7 (21.1, 24.5) |
| Some College  | 27.4 (26.7, 28.1) | 25.3 (23.7, 26.9) | 28.0 (26.6, 29.5) | 25.9 (24.8, 27.0) | 30.9 (29.3, 32.6) |
| >College  | 23.7 (22.5, 24.9) | 26.7 (23.8, 29.7) | 23.4 (20.9, 26.1) | 21.0 (19.1, 23.0) | 26.0 (23.5, 28.7) |
| **Poverty income ratio, %** |  |  |  |  |  |
| <130  | 18.8 (17.8, 20.0) | 16.6 (14.7, 18.8) | 16.8 (14.9, 19.0) | 22.2 (20.0, 24.6) | 17.5 (15.5, 19.6) |
| 130-349 | 36.2 (35.1, 37.3) | 35.2 (32.6, 37.8) | 37.5 (35.2. 39.9) | 36.9 (35.1, 38.8) | 34.4 (32.6, 36.2) |
| >350  | 38.3 (37.0, 39.8) | 39.0 (35.9, 42.2) | 39.9 (37.1, 42.7) | 34.9 (32.3, 37.6) | 41.6 (39.1, 44.2) |
| Missing  | 6.6 (6.1, 7.2) | 9.2 (7.6, 11.1) | 5.8 (4.9, 6.9) | 6.0 (5.1, 7.0) | 6.5 (5.5, 7.7) |
| **Month of MEC exam** |  |  |  |  |  |
| November.-April | 45.9 (41.7, 50.2) | 31.9 (26.5, 37.9) | 31.9 (25.5, 38.9) | 55.6 (47.1, 63.1) | 57.2 (45.3, 68.4) |
| May-October  | 54.1 (49.8, 58.3) | 68.1 (62.1, (73.5) | 68.1 (61.1, 74.5) | 44.4 (36.2, 52.9) | 42.8 (31.6, 54.7) |
| **Day of recalled intake** |  |  |  |  |  |
| Monday-Thursday | 55.5 (54.4, 56.5) | 53.7 (51.2, 56.3) | 55.9 (53.5, 58.4) | 54.7 (53.1, 56.3) | 57.5 (55.5, 59.5) |
| Friday-Sunday | 44.5 (43.5, 45.6) | 46.2 (43.7, 48.8) | 44.1 (41.6, 46.5) | 45.3 (43.7, 46.9) | 42.5 (40.5, 44.5) |
| **Body mass index, kg/m2** |  |  |  |  |  |
| <25  | 36.2 (35.3, 37.1) | 36.5 (34.1, 39.1) | 35.0 (32.9, 37.1) | 35.9 (34.5, 37.3) | 37.8 (35.8, 39.8) |
| 25-<30  | 33.1 (32.4, 33.9) | 34.0 (32.3, 35.7) | 33.1 (31.4, 34.8) | 32.3 (31.1, 33.5) | 34.0 (32.8, 35.3) |
| >30  | 29.6 (28.7, 30.5) | 28.6 (26.5, 30.7) | 31.0 (29.3, 32.9) | 30.7 (29.3, 32.2) | 27.0 (25.2, 29.0) |
| Missing  | 1.1 (0.9, 1.3) | 0.9 (0.7, 1.3) | 0.9 (0.6, 1.5) | 1.1 (0.9, 1.5) | 1.2 (0.8, 1.8) |
| **Self-reported chronic disease** | 32.2 (31.3, 33.1) | 31.6 (30.0, 33.1) | 33.0 (30.8, 35.2) | 33.4 (32.0, 34.8) | 30.0 (28.0, 32.0) |

**Supplemental Table 2.**  Weighted, unadjusted mean1 and 95% CI of age, BMI, biomarkers of nutrition and disease, by US census region, by survey year, US adults, NHANES 1988-1994 to 1999-2010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Serum Biomarker | All regions | Northeast | Midwest | South | West |
| Age, y |  |  |  |  |  |
| All surveys | 46.3 (45.8, 46.7) | 46.5 (45.7, 47.3) | 47.3 (46.4, 48.1) | 45.6 (45.0, 46.3) | 45.9 (44.9, 47.0) |
| 1988-1994 | 45.1 (44.2, 46.1) | 45.4 (43.6, 47.2) | 46.0 (44.1, 47.9) | 44.3 (42.9, 46.1) | 45.3 (42.6, 48.1) |
| 1999-2004 | 46.1 (45.5, 46.7) | 46.3 (44.7, 48.0) | 47.2 (46.1, 48.4) | 45.2 (44.3, 46.1) | 46.4 (44.7, 48.1) |
| 2005-2010 | 47.3 (46.7, 48.0) | 47.9 (46.9, 48.9) | 48.3 (46.8, 49.9) | 47.2 (46.0, 48.4) | 46.0 (44.4, 47.6) |
| BMI, kg/m2 |  |  |  |  |  |
| All surveys | 27.8 (27.7, 27.9) | 27.7 (27.3, 28.3) | 28.0 (27.8, 28.2) | 28.0 (27.8, 28.2) | 27.4 (27.1, 27.6) |
| 1988-1994 | 26.6 (26.4, 26.8) | 26.5 (25.8, 27.1) | 26.7 (26.0, 27.3) | 26.6 (26.4, 28.9) | 26.4 (26.0, 26.9) |
| 1999-2004 | 28.1 (27.9, 28.3) | 28.1 (27.3, 29.0) | 28.5 (28.1, 28.9) | 28.0 (27.7, 28.2) | 27.7 (27.3, 28.1) |
| 2005-2010 | 28.6 (28.4, 28.8) | 28.5 (28.0, 29.0) | 28.8 (28.5, 29.1) | 29.2 (28.8, 29.6) | 27.8 (27.3, 28.3) |
| Total cholesterol, mg/dL |  |  |  |  |  |
| All surveys | 201 (201, 202) | 202 (200, 204) | 201 (199, 202) | 201 (200, 202) | 202 (200, 203) |
| 1988-1994 | 204 (203, 206) | 207 (202, 212) | 204 (201, 207) | 204 (201, 207) | 203 (200, 206) |
| 1999-2004 | 203 (202, 204) | 202 (198, 206) | 202 (201, 204) | 203 (201, 204) | 204 (200, 207) |
| 2005-2010 | 197 (196, 198) | 196 (193, 199) | 197 (195, 198) | 197 (195, 198) | 199 (197, 201) |
| HDL cholesterol, mg/dL |  |  |  |  |  |
| All surveys | 51.9 (51.5, 52.2) | 52.6 (51.9, 55.3) | 51.4 (50.5, 52.3) | 51.0 (50.5, 51.5) | 53.2 (52.6, 53.9) |
| 1988-1994 | 50.5 (49.8, 51.2) | 51.3 (50.0, 52.6) | 49.5 (47.3, 51.7) | 49.4 (48.4, 50.3) | 52.9 (51.5, 54.3) |
| 1999-2004 | 51.9 (51.3, 52.5) | 53.3 (49.6, 54.7) | 51.4 (49.6, 53.2) | 51.2 (50.4, 52.1) | 52.5 (51.4, 53.6) |
| 2005-2010 | 53.0 (52.5, 53.5) | 53.4 (51.8, 54.1) | 52.9 (51.7, 54.1) | 52.1 (51.3, 52.9) | 54.2 (53.2, 55.1) |
| C-reactive protein, mg/dL |  |  |  |  |  |
| All surveys | 0.18 (0.18, 0.19) | 0.17 (0.15, 0.18) | 0.18 (0.17, 0.19) | 0.20, 0.19, 0.21) | 0.16 (0.15, 0.17) |
| 1999-2002 | 0.19 (0.18, 0.20) | 0.18 (0.13, 0.22) | 0.19 (0.18, 0.21) | 0.20 (0.18, 0.21) | 0.19 (0.17, 0.21) |
| 2003-2006 | 0.19 (0.18, 0.20) | 0.18 (0.16, 0.21) | 0.18 (0.16, 0.21) | 0.22 (0.22, 0.24) | 0.16 (0.14, 0.18) |
| 2007-2010 | 0.17 (0.16, 0.18) | 0.15 (0.14, 0.16) | 0.17 (0.14, 0.19) | 0.20 (0.18, 0.22) | 0.14 (0.12, 0.15) |
| Serum folate, nmol/L |  |  |  |  |  |
| All surveys | 29.5 (28.9, 30.2) | 29.7 (27.6, 31.8) | 29.5 (27.8, 31.2) | 27.9 (26.5, 29.3) | 32.3 (29.6, 35.1) |
| 1988-1994 | 15.4 (14.5, 16.2) | 16.0 (13.6, 18.3) | 15.9 (14.2, 17.6) | 13.6 (12.3, 14.9) | 17.4 (15.4, 19.5) |
| 1999-2004 | 41.3 (40.3, 42.2) | 43.5 (41.4, 45.7) | 40.4 (37.9, 42.9) | 39.2 (38.1, 40.3) | 44.3 (42.8, 45.8) |
| 2005-2010 | 37.8 (36.9, 38.6) | 39.5 (38.0, 41.0) | 37.5 (35.5, 39.4) | 36.1 (34,8, 37.4) | 39.4 (37.3, 41.4) |
| RBC folate, nmol/L |  |  |  |  |  |
| All surveys | 997 (984, 1010) | 982 (947, 1017) | 1013 (978, 1049) | 952 (929, 975) | 1069 (1051, 1093) |
| 1988-1994 | 738 (720, 757) | 725 (690, 760) | 769 (734, 804) | 687 (660, 714) | 808 (762, 854) |
| 1999-2004 | 1157 (1132, 1181) | 1187 (1127, 1247) | 1142 (1094, 1191) | 1104 (1072, 1136) | 1248 (1214, 1282) |
| 2005-2010 | 1117 (1096, 1137) | 1127 (1085, 1168) | 1137 (1078, 1196) | 1072 (1051, 1093) | 1154 (1093, 1215) |
| Vitamin B-12, pmol/L |  |  |  |  |  |
| All surveys | 337 (333, 341) | 333 (320, 345) | 330 (323, 337) | 333 (326, 341) | 353 (344, 361) |
| 1988-1994 | 319 (310, 327) | 323 (183, 464) | 310 (243, 376) | 314 (292, 335) | 334 (317, 352) |
| 1999-2002 | 338 (334, 342) | 334 (322, 346) | 329 (320, 338) | 336 (330, 342) | 353 (345, 362) |
| 2003-2006 | 344 (335, 352) | 337 (304, 371) | 340 (332, 349) | 340 (323, 356) | 360 (343, 377) |
| Vitamin B-6, nmol/L (2005-10) | 50.3 (48.6, 51.9) | 52.6 (50.0, 55.2) | 50.3 (46.4, 54.2) | 45.5 (43.1, 47.9) | 56.1 (53.0, 59.3) |
| Vitamin C, umol/L (2003-06) | 53.8 (52.2, 55.4) | 55.6 (52.2, 59.4) | 51.7 (47.1, 56.4) | 50.9 (49.1, 52.7) | 59.3 (57.1, 61.7) |
| Vitamin D, nmol/L |  |  |  |  |  |
| All surveys | 58.6 (57.6, 59.5) | 61.5 (58.7, 64.4) | 63.6 (61.8, 65.4) | 54.5 (52.7, 56.3) | 57.4 (55.5, 59.3) |
| 1988-1994 | 57.6 (56.4, 58.9) | 61.4 (59.2, 63.6) | 61.4 (57.8, 65.1) | 54.8 (54.6, 57.0) | 54.6 (51.3, 57.8) |
| 2001-2004 | 57.8 (55.7, 59.8) | 59.0 (49.6, 68.3) | 63.4 (58.3, 68.5) | 53.2 (49.4, 57.1) | 58.7 (56.3, 61.2) |
| 2005-2010 | 60.3 (58.8, 61.7) | 64.3 (61.4, 67.1) | 65.7 (63.6, 67.8) | 55.6 (52.4, 58.9) | 58.4 (54.1, 62.7) |
| Vitamin E, umol/L |  |  |  |  |  |
| All surveys | 27.2 (26.9, 27.5) | 27.4 (26.7, 28.2) | 26.9 (26.3, 27.5) | 26.5 (26.1, 26.8) | 28.6 (27.8, 29.4) |
| 1988-1994 | 25.3 (24.9, 25.7) | 25.9 (24.8, 27.1) | 24.9 (24.0, 25.9) | 24.3 (23.9, 24.8) | 26.6 (26.0, 27.1) |
| 2001-2004 | 27.9 (27.3, 28.4) | 28.6 (26.9, 30.3) | 27.4 (26.2, 28.7) | 26.8 (26.2, 27.4) | 29.6 (28.4, 30.8) |
| 2005-2010 | 28.4 (27.9, 28.9) | 28.1 (26.6, 29.6) | 28.3 (27.5, 29.1) | 28.0 (27.3, 28.7) | 29.3 (27.5, 31.2) |
| α-carotene, umol/L |  |  |  |  |  |
| All surveys | 0.06 (0.05, 0.06) | 0.06 (0.06, 0.07) | 0.05 (0.05, 0.06) | 0.05 (0.05, 0.05) | 0.07 (0.06, 0.07) |
| 1988-1994 | 0.07 (0.06, 0.07) | 0.07 (0.06, 0.08) | 0.06 (0.05, 0.06) | 0.06 (0.06, 0.06) | 0.08 (0.07, 0.09) |
| 2001-2006 | 0.05 (0.05, 0.05) | 0.05 (0.04, 0.06) | 0.05 (0.04, 0.06) | 0.04 (0.04, 0.05) | 0.06 (0.05, 0.07) |
| β-carotene, umol/L |  |  |  |  |  |
| All surveys | 0.26 (0.25, 0.27) | 0.27 (0.25, 0.29) | 0.24 (0.23, 0.26) | 0.24 (0.23, 0.25) | 0.29 (0.28, 0.30)  |
| 1988-1994 | 0.28 (0.27, 0.28) | 0.29 (0.27, 0.31) | 0.25 (0.23, 0.27) | 0.26 (0.25, 0.28) | 0.32 (0.30, 0.35) |
| 2001-2006 | 0.24 (0.23, 0.25) | 0.25 (0.22, 0.28) | 0.24 (0.21, 0.26) | 0.22 (0.21, 0.24) | 0.27 (0.25, 0.29) |
| β-cryptoxanthin, umol/L |  |  |  |  |  |
| All surveys | 0.13 (0.13, 0.14) | 0.13 (0.12, 0.13) | 0.12 (0.12, 0.13) | 0.12 (0.12, 0.13) | 0.16 (0.15, 0.17) |
| 1988-1994 | 0.14 (0.13, 0.14) | 0.13 (0.12, 0.14) | 0.13 (0.12, 0.14) | 0.13 (0.12, 0.13) | 0.17 (0.15, 0.19) |
| 2001-2006 | 0.13 (0.12, 0.13) | 0.12 (0.11, 0.13) | 0.12 (0.11, 0.13) | 0.12 (0.11, 0.13) | 0.15 (0.14, 0.16) |
| Lutein-zeaxanthin, umol/L |  |  |  |  |  |
| All surveys | 0.29 (0.28, 0.29) | 0.31 (0.29, 0.32) | 0.27 (0.25, 0.28) | 0.28 (0.27, 0.29) | 0.30 (0.29, 0.32) |
| 1988-1994 | 0.34 (0.33, 0.35) | 0.36 (0.33, 0.39) | 0.32 (0.30, 0.33) | 0.33 (0.32, 0.34) | 0.38 (0.35, 0.41) |
| 2001-2006 | 0.25 (0.24, 0.25) | 0.26 (0.24, 0.28) | 0.23 (0.22, 0.25) | 0.24 (0.23, 0.25) | 0.26 (0.24, 0.27) |
| Total Lycopene, umol/L |  |  |  |  |  |
| All surveys | 0.38 (0.37, 0.38) | 0.40 (0.38, 0.41) | 0.39 (0.38, 0.41) | 0.36 (0.36, 0.37) | 0.36 (0.34, 0.38) |
| 1988-1994 | 0.38 (0.37, 0.39) | 0.40 (0.39, 0.41) | 0.40 (0.37, 0.42) | 0.37 (0.35, 0.38) | 0.35 (0.32, 0.39) |
| 2001-2006 | 0.37 (0.37, 0.38) | 0.39 (0.37, 0.42) | 0.39 (0.37, 0.41) | 0.36 (0.35, 0.37) | 0.37 (0.35, 0.38) |

1Back-transformed geometric mean for all biomarkers except serum total and HDL cholesterol and vitamin C.

**Supplemental Table 3.** Covariate-adjusted1 predicted marginal2 and 95% CI of serum beta carotene concentration, averaged over surveys (NHANES 1988-94, 2001-2006), by US census region, by age group3, US adults 1988-94 to 1999-2010

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Northeast** | **Midwest** | **South** | **West** | **P value RegionXSurvey** | **P value****Region** |
| Beta-carotene, umol/L(n=27,203) | 0.26 (0.25, 0.28) | 0.25 (0.23, 0.26) | 0.25 (0.24, 0.26) | 0.28 (0.26, 0.29) | 0.2 | 0.0002 |
| RegionXsurveyXage=0.0002 |  |  |  |  |  |  |
| 20-39 (n=9855) | 0.22 (0.21, 0.23) | 0.20 (0.19, 0.21) | 0.20 (0.20, 0.21) | 0.23 (0.22, 0.24) | 0.1 | 0.001 |
| 40-59 (n=8103) | 0.28 (0.26, 0.30) | 0.25 (0.23, 0.27) | 0.25 (0.24, 0.27) | 0.29 (0.27, 0.31) | 0.8 | 0.001 |
| >60 (n=9245) | 0.35 (0.34, 0.37) | 0.33 (0.31, 0.35) | 0.34 (0.32, 0.36) | 0.35 (0.33, 0.38) | <0.0001 | 0.4 |

1All estimates are adjusted geometric means and 95% CIs from covariate-adjusted linear regression models with each biomarker as a continuous outcome. In each age-stratified model, the independent variables were region (Northeast, Midwest, South, and West), survey year (19881994, 2001-2006), sex, race/ethnicity (Non-Hispanic Black, Non-Hispanic White, Mexican-American, and others), urban/rural residence (large metropolitan, small-medium metropolitan, fringe metropolitan, non-metropolitan), poverty income ratio, % (<130, 130-349, >349, missing), education, y (<12, 12, some college, >college), age, y (continuous), body mass index, kg/m2 (<25, 25-29.9, >29.9, missing), reported supplement use (y/n), serum cotinine (continuous), period of MEC exam (May-Oct, Nov-April), hours of fasting before phlebotomy (continuous), serum total cholesterol (continuous), and self-reported chronic disease (yes, no).

2 Back-transformed geometric mean.

2The 3-way interaction of region\*survey\*agegroup was significant. P=0.0002, hence we show the associations stratified by age group.

**Supplemental Table 4.** Weighted, unadjusted predicted marginal and 95% CI of intake of dietary energy, macronutrients, and micronutrients, by US census region, by survey year, US adults, NHANES 1988-1994 to 1999-2010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Dietary variable | All regionsN=43345 | North EastN=6659 | MidwestN=8786 | SouthN=17342 | WestN=10558 |
| Energy intake, Kcal |  |  |  |  |  |
| All surveys | 2177 (2158, 2196) | 2176 (2127, 2224) | 2185 (2157, 2212) | 2169 (2138, 2200) | 2183 (2138, 2228) |
| 1988-1994 | 2187 (2147, 2227) | 2158 (2090, 2227) | 2207 (2134, 2280) | 2201 (2133, 2269) | 2170 (2067, 2274) |
| 1999-2004 | 2201 (2171, 2227) | 2212 (2108, 2315) | 2213 (2175, 2252) | 2196 (2149, 2243) | 2187 (2128, 2247) |
| 2005-2010 | 2148 (2116, 2180) | 2162 (2083, 2241) | 2144 (2116, 2172) | 2114 (2064, 2165) | 2188 (2117, 2259) |
| Energy from carbohydrates , % |  |  |  |  |  |
| All surveys | 49.6 (49.3, 49.8) | 50.0 (49.3, 50.6) | 49.2 (48.6, 49.8) | 49.6 (49.2, 50.0) | 49.7 (49.1, 50.2) |
| 1988-1994 | 49.7 (49.1, 50.3) | 50.1 (48.9, 52.2) | 49.5 (48.0, 51.1) | 49.4 (48.4, 50.5) | 49.5 (48.4, 50.6) |
| 1999-2004 | 50.1 (49.7, 50.5) | 50.4 (49.6, 51.2) | 49.7 (48.7, 50.6) | 50.3 (49.6, 50.9) | 50.2 (49.1, 51.2) |
| 2005-2010 | 49.0 (48.6, 49.4) | 49.1 (48.1, 50.1) | 48.5 (47.7, 49.4) | 49.0 (48.4, 49.6) | 49.4 (48.4, 50.4) |
| Energy from Protein, % |  |  |  |  |  |
| All surveys | 15.5 (15.5, 15.6) | 15.7 (15.5, 15.9) | 15.4 (15.2, 15.6) | 15.4 (15.3, 15.6) | 15.7 (15.5, 15.9) |
| 1988-1994 | 15.4 (15.2, 15.6) | 15.7 (15.1, 16.2) | 15.2 (15.0, 15.3) | 15.2 (14.9, 15.6) | 15.7 (15.4, 16.0) |
| 1999-2004 | 15.3 (15.1, 15.4) | 15.5 (15.2, 15.8) | 15.1 (14.8, 15.4) | 15.3 (15.0, 15.6) | 15.4 (15.0, 15.7) |
| 2005-2010 | 15.9 (15.7, 16.0) | 15.9 (15.5, 16.3) | 15.7 (15.3, 16.2) | 15.8 (15.6, 16.0) | 16.0 (15.8, 16.2) |
| Energy from Fat, % |  |  |  |  |  |
| All surveys | 33.4 (33.2, 33.6) | 32.7 (32.3, 33.1) | 33.8 (33.4, 34.3) | 33.5 (33.2, 33.9) | 33.1 (32.8, 33.5) |
| 1988-1994 | 33.5 (33.1, 34.0) | 32.4 (31.8, 33.0) | 33.8 (32.6, 35.2) | 34.2 (33.4, 35.1) | 33.1 (32.4, 33.7) |
| 1999-2004 | 33.3 (32.9, 33.6) | 32.9 (32.2, 33.7) | 33.8 (33.0, 34.7) | 33.0 (32.4, 33.6) | 33.4 (32.8, 34.0) |
| 2005-2010 | 33.4 (33.1, 33.6) | 32.9 (32.1, 33.7) | 33.8 (33.3, 34.3) | 33.6 (33.2, 34.0) | 33.0 (32.3, 33.7) |
| Energy from saturated fat, % |  |  |  |  |  |
| All surveys | 11.0 (10.9, 11.1) | 11.0 (10.8, 11.2) | 11.3 (11.1,11.5) | 10.9 (10.8, 11.1) | 10.9 (10.7, 11.1) |
| 1988-1994 | 11.2 (11.0, 11.4) | 11.0 (10.5, 11.5) | 11.4 (11.0, 11.9) | 11.3 (11.0, 11.6) | 11.0 (10.7, 11.4) |
| 1999-2004 | 10.8 (10.7, 11.0) | 10.9 (10.6, 11.1) | 11.1 (10.7, 11.5) | 10.6 (10.5, 11.0) | 10.8 (10.5, 11.1) |
| 2005-2010 | 11.0 (10.9,11.1) | 11.0 (10.6, 11.4) | 11.3 (11.1, 11.4) | 10.8 (10.7, 11.0) | 10.8 (10.5, 11.2) |
| Alcohol, g |  |  |  |  |  |
| All surveys | 10.9 (10.3, 11.5) | 11.0 (9.8, 12.2) | 11.5 (10.2, 12.2) | 10.5 (9.5, 11.6) | 10.8 (9.5, 12.0) |
| 1988-1994 | 10.7 (9.5, 11.9) | 10.0 (7.5, 12.6) | 11.9 (9.4, 14.5) | 9.8 (7.8, 11.8) | 11.7 (8.6, 14.7) |
| 1999-2004 | 10.8 (9.8, 11.8) | 10.3 (8.6, 12.0) | 10.9 (8.6, 13.2) | 11.2 (9.2, 13.3) | 10.2 (8.2, 12.1) |
| 2005-2010 | 11.1 (10.3, 12.0) | 12.5 (10.8, 14.2) | 11.7 (9.8, 13.5) | 10.4 (8.9, 11.8) | 10.6 (9.0, 12.2) |
| Fiber, g |  |  |  |  |  |
| All surveys | 16.2 (16.0, 16.5) | 16.1 (15.6, 16.6) | 15.8 (15.4, 16.2) | 15.4 (15.1, 15.7) | 18.2 (17.6, 18.7) |
| 1988-1994 | 16.7 (16.5, 17.0) | 16.3 (15.4, 17.2) | 16.5 (16.0, 17.1) | 16.1 (15.7, 16.4) | 18.5 (18.0, 19.0) |
| 1999-2004 | 15.8 (15.3, 16.2) | 15.8 (14.8, 16.8) | 15.4 (14.4, 16.3) | 15.2 (14.7, 15.7) | 17.2 (16.1, 18.3) |
| 2005-2010 | 16.3 (15.8, 16.7) | 16.2 (15.5, 16.9) | 15.5 (14.9, 16.1) | 15.1 (14.6, 15.7) | 18.7 (18.0, 19.5) |
| Vit A, ug RAE  |  |  |  |  |  |
| All surveys | 747 (730, 763) | 827 (796, 857) | 724 (697, 751) | 697 (669, 725) | 785 (731, 840) |
| 1988-1994 | 1045 (1013, 1077) | 1095 (1049, 1141) | 999 (949, 1049) | 985 (927, 1042) | 1145 (1078, 1213) |
| 1999-2004 | 617 (593, 642)  | 682 (616, 748) | 602 (564, 640) | 591 (550, 631) | 633 (588, 677) |
| 2005-2010 | 627 (423, 450) | 477 (432, 522) | 452 (430, 474) | 401 (378, 425) | 439 (409, 470) |
| Retinol, ug  |  |  |  |  |  |
| All surveys | 454 (443, 466) | 490 (461, 519) | 459 (443, 475) | 431 (410, 451) | 456 (424, 488) |
| 1988-1994 | 499 (476, 522) | 525 (485, 565) | 490 (456, 525) | 478 (441, 515) | 515 (442, 589) |
| 1999-2004 | 426 (401, 451) | 456 (370, 542) | 431 (399, 462) | 416 (368, 465) | 417 (381, 452) |
| 2005-2010 | 437 (423, 450) | 477 (432, 522) | 452 (430, 474) | 401 (378, 425) | 439 (409, 470) |
| Vitamin E, mg α-tocopherol  |  |  |  |  |  |
| All surveys | 7.57 (7.44, 7.71) | 7.83 (7.49, 8.56) | 7.45 (7.22, 7.67) | 7.24 (7.05, 7.44) | 8.63 (7.70, 8.35) |
| 1988-1994 | 7.99 (7.68, 8.30) | 7.93 (7.31, 8.56) | 7.74 (7.21, 8.27) | 7.90 (7.43, 8.38) | 8.46 (7.63,9.28) |
| 1999-2004 | 7.09 (6.93, 7.26) | 7.33 (6.77, 7.88) | 7.20 (6.82, 7.58) | 6.74 (6.53, 6.95( | 7.45 (7.09, 7.81) |
| 2005-2010 | 7.68 (7.48, 4.89) | 8.16 (7.63, 8.70) | 7.44 (7.13, 7.70) | 7.25 (6.95, 7.55) | 8.22 (7.87, 8.56) |
| Vitamin C, mg |  |  |  |  |  |
| All surveys | 94 (92, 97) | 101 (95, 106) | 89 (85, 93) | 88 (84, 92) | 105 (100, 109) |
| 1988-1994 | 105 (102, 109) | 109 (103, 116) | 105 (96, 115) | 96 (90, 101) | 117 (110, 125) |
|  1999-2004 | 93 (88, 98) | 100 (85, 114) | 87 (81, 94) | 88 (80, 95) | 104 (94, 114) |
| 2005-2010 | 86 (83, 90) | 94 (87, 101) | 78 (72, 85) | 82 (75, 88) | 96 (92, 99) |
| Vitamin B-6, mg  |  |  |  |  |  |
| All surveys | 1.94 (1.92, 1.97) | 1.99 (1.94, 2.04) | 1.95 (1.91, 1.99) | 1.86 (1.82, 1.90) | 2.02 (1.96, 2.07) |
| 1988-1994 | 1.90 (1.86, 1.93) | 1.89 (1.84, 1.95) | 1.92 (1.85, 1.99) | 1.84 (1.77, 1.91) | 1.97 (1.90, 2.04) |
| 1999-2004 | 1.87 (1.82, 1.91) | 1.97 (1.83, 2.10) | 1.87 (1.79, 1.94) | 1.81 (1.74, 1.88) | 1.91 (1.83, 1.93) |
| 2005-2010 | 2.04 (2.0, 2.08) | 2.10 (2.04, 2.16) | 2.04 (1.97, 2.10) | 1.94 (1.89, 1.99) | 2.15 (2.05, 2.25) |
| Folate, ug  |  |  |  |  |  |
| All surveys | 369 (364, 375) | 383 (366, 400) | 362 (351, 373) | 354 (347, 362) | 390 (376, 404) |
| 1988-1994 | 287 (281, 293) | 284 (272, 296) | 282 (274, 290) | 280 (272, 289) | 305 (289, 322) |
| 1999-2004 | 399 (388, 410) | 430 (399, 462) | 389 (365, 413) | 382 (366, 398) | 418 (395, 441) |
| 2005-2010 | 408 (399, 416) | 437 (414, 460) | 401 (386, 415) | 385 (374, 396) | 426 (411, 441) |
| Vitamin B-12, ug  |  |  |  |  |  |
| All surveys | 5.30 (5.17, 5.43) | 5.79 (5.36, 6.23) | 5.19 (5.02, 5.36) | 5.08 (4.91, 5.26) | 5.36 (5.08, 5.64) |
| 1988-1994 | 5.27 (4.98, 5.56) | 5.56 (4.62, 6.50) | 4.85 (4.60, 5.10) | 5.15 (4.88, 5.42) | 5.64 (4.85, 5.51) |
| 1999-2004 | 5.18 (4.93, 5.43) | 5.69 (4.83, 6.56) | 5.18 (4.81, 5.55) | 4.98 (4.63, 5.33) | 5.16 (4.81, 5.51) |
| 2005-2010 | 5.44 (5.31, 5.57) | 6.10 (5.72, 6.48) | 5.45 (5.20, 6.48) | 5.45 (5.20, 5.69) | 5.33 (5.07, 5.58) |
| Sodium, mg |  |  |  |  |  |
| All surveys | 3506 (3471, 3543) | 3509 (3414, 3604) | 3520 (3461, 3579) | 3498 (3436, 3560) | 3504 (3426, 3582) |
| 1988-1994 | 3545 (3465, 3625) | 3463 (3309, 3617) | 3581 (3464, 3698) | 3610 (3444, 3775) | 3481 (3261, 3702) |
| 1999-2004 | 3457 (3401, 3513) | 3518 (3285, 3752) | 3470 (3380, 3560) | 3368 (3385, 3551) | 3377 (3279, 3476) |
| 2005-2010 | 3521 (3465, 3578) | 3544 (3391, 3698) | 3515 (3405, 3624) | 3439 (3345, 3534) | 3629 (3518, 3739) |
| Potassium, mg  |  |  |  |  |  |
| All surveys | 2779 (2752, 2806) | 2829 (2776, 2883) | 2795 (2739, 2851) | 2674 (2635, 2713) | 2888 (2834, 2942) |
| 1988-1994 | 2878 (2832, 2924) | 2892 (2823, 2960) | 2923 (2808, 3037) | 2791 (2718, 2864) | 2954 (2859, 3049) |
| 1999-2004 | 2753 (2705, 2800) | 2829 (2683, 2975) | 2763 (2676, 2850) | 2659 (2593, 2724) | 2853 (2776, 2929) |
| 2005-2010 | 2724 (2699, 2768) | 2772 (2706, 2838) | 2725 (2643, 2807) | 2594 (2531, 2658) | 2871 (2774, 2968) |
| Calcium, mg  |  |  |  |  |  |
| All surveys | 890 (878, 902) | 924 (888, 960) | 912 (891, 934) | 834 (817, 850) | 927 (899, 955) |
| 1988-1994 | 829 (806, 851) | 860 (820, 900) | 849 (801, 897) | 780 (750, 846) | 852 (787, 918) |
| 1999-2004 | 860 (840, 880) | 887 (821, 962) | 876 (841, 911) | 821 (795, 846) | 893 (852, 934) |
| 2005-2010 | 966 (946, 987) | 1016 (961, 1070) | 990 (957, 1023) | 891 (862, 921) | 1010 (973, 1048) |
| Magnesium. mg |  |  |  |  |  |
| All surveys | 296 (293, 300) | 300 (292, 308) | 293 (287, 299) | 284 (279, 288) | 316 (309, 324) |
| 1988-1994 | 304 (299, 309) | 302 (290, 314) | 305 (292, 317) | 292 (285, 299) | 322 (309, 335) |
| 1999-2004 | 283 (277, 289) | 290 (270, 311) | 280 (269, 291) | 277 (268, 284) | 295 (284, 306) |
| 2005-2010 | 302 (296, 308) | 305 (291, 319) | 296 (285, 306) | 285 (277, 293) | 331 (320, 341) |
| Iron, mg |  |  |  |  |  |
| All surveys | 15.6 (15.4, 15.7) | 16.1 (15.5, 16.7) | 15.5 (15.1, 15.8) | 15.1 (14.8, 15.3) | 16.0 (15.6, 16.4) |
| 1988-1994 | 15.6 (15.3, 15.9) | 15.9 (14.9, 16.9) | 15.5 (15.0, 16.1) | 15.0 (14.8, 15.3) | 16.3 (15.3, 17.3) |
| 1999-2004 | 15.6 (15.3, 15.9) | 16.3 (15.1, 17.6) | 15.6 (14.9, 16.3) | 15.2 914.7, 15.7) | 15.8 (15.1, 16.5) |
| 2005-2010 | 15.5 (15.2, 15.8) | 16.2 (15.0, 17.3) | 15.3 (14.8, 15.8) | 15.0 (14.5, 15.4) | 16.0 (15.6, 16.5) |

**Supplemental Table 5.** Weighted, unadjusted estimates (predicted marginal and 95% CI), food group serving equivalents, and selected measures of diet quality and composition, by US census region, by survey year: US adults, NHANES 1988-1994 to 1999-2010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| All regions | All Regions | Northeast | Midwest | South | West |
| Total vegetable, cup equivalents |  |  |  |  |  |
| All surveys | 1.64 (1.61, 1.66) | 1.69 (1.65, 1.74) | 1.65 (1.60, 1.69) | 1.55 (1.51, 1.59) | 1.72 (1.67, 1.77) |
| 1988-1994 | 1.73 (1.70, 1.76) | 1.75 (1.70, 1.81) | 1.76 (1.67, 1.84) | 1.70 (1.64, 1.77) | 1.72 (1.64, 1.80) |
| 1999-2004 | 1.62 (1.58, 1.66) | 1.69 (1.62, 1.77) | 1.66 (1.60, 1.71) | 1.51 (1.45, 1.56) | 1.73 (1.64, 1.82) |
| 2005-2010 | 1.58 (1.54, 1.62) | 1.64 (1.55, 1.72) | 1.56 (1.46, 1.65) | 1.47 (1.40, 1.53) | 1.72 (1.64, 1.79) |
| Dark green vegetables, cup equivalents |  |  |  |  |  |
| All surveys | 0.12 (0.11, 0.13) | 0.14 (0.12, 0.16) | 0.09 (0.09, 0.11) | 0.11 (0.11, 0.12) | 0.15 (0.13, 0.17) |
| 1988-1994 | 0.11 (0.10, 0.13) | 0.11 (0.10, 0.13) | 0.08 (0.05, 0.11) | 0.12 (0.10, 0.14) | 0.14 (0.11, 0.18) |
| 1999-2004 | 0.11 (0.10, 0.12) | 0.14 (0.09, 0.19) | 0.08 (0.06, 0.10) | 0.11 (0.10, 0.12) | 0.13 (0.10, 0.16) |
| 2005-2010 | 0.13 (0.12, 0.15) | 0.15 (0.12, 0.18) | 0.11 (0.09, 0.14) | 0.12 (0.11, 0.13) | 0.16 (0.13, 0.20) |
| Total fruits, cup equivalents |  |  |  |  |  |
| All surveys | 0.99 (0.96, 1.02) | 1.14 (1.07, 1.20) | 0.98 (0.91, 1.04) | 0.84 (0.80, 0.89) | 1.11 (1.05, 1.17) |
| 1988-1994 | 0.96 (0.91, 1.00) | 1.06 (0.98, 1.14) | 1.03 (0.92, 1.14) | 0.79 (0.72, 0.86) | 1.04 (0.96, 1.12) |
| 1999-2004 | 1.01 (0.94, 1.08) | 1.15 (0.96, 1.34) | 0.96 (0.83, 1.09) | 0.88 (0.79, 0.98) | 1.19 (1.05, 1.32) |
| 2005- 2010` | 0.99 (0.95, 1.03) | 1.19 (1.11, 1.29) | 0.94 (0.87, 1.02) | 0.84 (0.76, 0.93) | 1.10 (1.02,1.18) |
| Whole fruit, cup equivalents |  |  |  |  |  |
| All surveys | 0.62 (0.60, 0.64) | 0.72 (0.68, 0.75) | 0.67 (0.62, 0.71) | 0.49 (0.46, 0.52) | 0.70 (0.66, 0.74) |
| 1988-1994 | 0.60 (0.56, 0.63) | 0.62 (0.58, 0.66) | 0.70 (0.61, 0.78) | 0.46 (0.41, 0.51) | 0.67 (0.60, 0.74) |
| 1999-2004 | 0.60 (0.56,0.64) | 0.70 (0.60, 0.80) | 0.63 (0.54, 0.72) | 0.49 (0.43, 0.55) | 0.68 (0.61, 0.76) |
| 2005-2010 | 0.66 (0.64, 0.69) | 0.81 (0.76, 0.87) | 0.68 (0.62 0.73) | 0.52 (0.47, 0.57) | 0.74 (0.68, 0.81) |
| Total dairy, cup equivalents |  |  |  |  |  |
| All surveys | 1.60 (1.56, 1.63) | 1.69 (1.161, 1.77) | 1.69 (1.64, 1.75) | 1.44 (1.40, 1.49) | 1.66 (1.57, 1.74) |
| 1988-1994 | 1.52 (1.46, 1.58) | 1.65 (1.58, 1.72) | 1.60 (1.49, 1.72) | 1.38 (1.29, 1.47) | 1.52 (1.33, 1.71) |
| 1999-2004 | 1.60 (1.55, 1.66) | 1.67 (1.46, 1.88) | 1.67 (1.57, 1.77) | 1.48 (1.41, 1.55) | 1.69 (1.57, 1.81) |
| 2005-2010 | 1.65 (1.60, 1.70) | 1.75 (1.62, 1.87) | 1.78 (1.68, 1.88) | 1.45 (1.37, 1.52) | 1.72 (1.59, 1.85) |
| Total grains, oz equivalents |  |  |  |  |  |
| All surveys | 6.7 (6.6. 6.8) | 6.9 (6.6, 7.1) | 6.5 (6.4, 6.6) | 6.6 (6.5, 6.7) | 6.9 (6.7. 7.1) |
| 1988-1994 | 6.9 (6.7, 7.0) | 7.2 (6.6, 7.8) | 6.8 (6.5, 7,1) | 6.8 (6.5, 6.8) | 6.9 (6.6, 7.3) |
| 1999-2004 | 6.7 (6.5, 6.8) | 7.0 (6.5, 7.5) | 6.5 (6.2, 6.7) | 6.6 (6.5, 6.8) | 6.8 (6.3, 7.2) |
| 2005-2010 | 6.5 (6.4, 6.6) | 6.5 (6.0, 6.9) | 6.3 (6.1, 6.5) | 6.3 (6.1, 6.5) | 7.1 (6.7, 7.4) |
| Whole grains, oz. equivalents |  |  |  |  |  |
| All surveys | 0.74 (0.71, 0.77) | 0.76 (0.71, 0.82) | 0.79 (0.73, 0.85) | 0.64 (0.61, 0.67) | 0.84 (.078, 0.90) |
| 1988-1994 | 0.85 (0.80, 0.90) | 0.79 (0.75, 0.83) | 0.95 (0.83, 1.07) | 0.75 (0.68, 0.82) | 0.97 (0.86, 0.76) |
| 1999-2004 | 0.63 (0.59, 0.66) | 0.68 (0.56, 0.80) | 0.65 (0.57, 0.75) | 0.57 (0.53, 0.61) | 0.68 (0.60, 0.76) |
| 2005-2010 | 0.76 (0.71, 0.80) | 0.80 (0.69, 0.91) | 0.78 (0.70, 0.86) | 0.62 (0.57, 0.67) | 0.88 (0.79, 0.98) |
| Total meat, oz.equivalents |  |  |  |  |  |
| All surveys | 6.06 (5.97,6.15) | 6.01 (5.82, 6.20) | 5.95 (5.77, 6.14) | 6.23 (6.05,6.41) | 5.94 (5.77, 6.11) |
| 1988-1994 | 6.02 (5.80, 6.23) | 5.82 (5.30, 6.30) | 5.87 (5.58, 6.16) | 6.26 (5.80, 6.72) | 5.98 (5.65, 6.31) |
| 1999-2004 | 5.93 (5.81, 6.05) | 5.95 (5.72, 6.17) | 5.90 (5.61, 6.20) | 6.09 (5.85, 6.34) | 5.64 (5.38, 5.91) |
| 2005-2010 | 6.21 (6.07, 6.36) | 6.23 (6.07, 6.39) | 6.06 (5.71, 6.42) | 6.36 (6.12, 6.59) | 6.16 (5.87, 6.46) |
| Amount of all foods and beverages, g |  |  |  |  |  |
| All surveys | 2513 (2488, 2538) | 2511 (2499, 2573) | 2609 (2564, 2653) | 2472 (2431, 2513) | 2477 (2415, 2539) |
| 1988-1994 | 2520 (2474, 2575) | 2460 (2395, 2524) | 2657 (2578, 2736) | 2460 (2392, 2527) | 2523 (2374, 2673) |
| 1999-2004 | 2536 (2497, 2575) | 2521 (2410, 2631) | 2626 (2525, 2727) | 2503 (2452, 2555) | 2511 (2424, 2598) |
| 2005-2010 | 2487 (2441, 2532) | 2550 (2425, 2675) | 2558 (2507, 2609) | 2449 (2358, 2539) | 2414 (2326, 2503) |
| Number of unique foods from the five food groups  |  |  |  |  |  |
| All surveys | 8.8 (8.7, 8.9) | 9.2 (9.0, 9.4) | 8.8 (8.6, 9.0) | 8.5 (8.4, 8.6) | 9.1(8.9, 9.3) |
| 1988-1994 | 8.9 (8.8, 9.1) | 9.2 (8.9, 9.5) | 8.9 (8.7, 9.0) | 8.7 (8.5, 8.9) | 9.1 (8.7, 9.6) |
| 1999-2004 | 8.9 (8.7, 9.0) | 9.2 (8.8, 9.6) | 8.9 (8.6, 9.2) | 8.6 (8.3, 8.9) | 9.1 (8.8, 9.4) |
| 2005-2010 | 8.7 (8.5, 8.8) | 9.2 (8.8, 9.5) | 8.6 (8.2, 9.0) | 8.2 (8.1, 8.4) | 9.1 (8.9, 9.3) |
| Number of all unique food and beverages |  |  |  |  |  |
| All surveys | 14.1 (14.0, 14.2) | 14.7 (14.4,15.0) | 14.1 (13.9, 14.3) | 13.6 (13.4, 13.8) | 14.3 (14.1, 14.6) |
| 1988-1994 | 14.3 (14.1, 14.5) | 14.8 (14.2, 15.3) | 14.4 (14.1, 14.6) | 14.0 (13.7, 14.2) | 14.3 (13.7, 14.9) |
| 1999-2004 | 14.1 (13.9, 14.3) | 14.6 (14.0, 15.1) | 14.2 (13.8, 14.6) | 13.7 (13.3, 14.1) | 14.4 (14.1, 14.7) |
| 2005-2010 | 13.9 (13.7, 14.1) | 14.7 (14.1, 15.2) | 13.8 (13.4, 14.3) | 13.3 (13.0, 13.5) | 14.3 (13.9, 14.7) |
| Energy density of foods only, kcal/g |  |  |  |  |  |
| All surveys | 1.94 (1.93, 1.95) | 1.89 (1.86, 1.92) | 1.99 (1.96, 2.01) | 1.99 (1.96, 2.01) | 1.85 (1.83, 1.88) |
| 1988-1994 | 1.91 (1.89, 1.94) | 1.87 (1.83, 1.91) | 1.96 (1.93, 2.0) | 1.97 (1.93, 2.0) | 1.82 (1.76, 1.88) |
| 1999-2004 | 1.96 (1.94, 1.99) | 1.93 (1.86, 1.99) | 2.0 (1.95, 2.05) | 1.99 (1.96, 2.03) | 1.90 (1.86, 1.94) |
| 2005-2010 | 1.94 (1.92, 1.96) | 1.88 (1.83, 1.93) | 2.0 (1.96, 2.04) | 1.99 (1.96, 2.03) | 1.85 (1.81, 1.88) |
| Added sugar, tsp equivalents |  |  |  |  |  |
| All surveys | 19.8 (19.4, 20.2) | 18.7(17.8, 19.5) | 20.6 (19.8, 21.5) | 20.9 (20.3, 21.5) | 18.0 (17.0, 19.0) |
| 1988-1994 | 19.3 (18.6, 20.1) | 18.2 (17.2, 19.2) | 20.8 (19.7, 22.0) | 20. 2 (19.4, 20.9) | 17.5 (14.6, 20.4) |
| 1999-2004 | 21.8 (21.0, 22.5) | 19.9 (17.9, 21.9) | 23.0 (21.4, 24.6) | 22.8 (21.7, 23.9) | 20.1 (19.0, 21.2) |
| 2005-2010 | 18.4 (17.7, 19.0) | 18.1 (16.9, 19.3) | 18.6 (17.1, 20.1) | 19.5 (18.5, 20.5) | 16.7 (15.7, 17.7) |
| Fiber g/100 g CHO |  |  |  |  |  |
| All surveys | 6.5 (6.4, 6.6) | 6.4 (6.3, 6.5) | 6.4 (6.2, 6.5) | 6.2 (6.1, 6.3) | 7.1 (7.0, 7.3) |
| 1988-1994 | 6.6 (6.5, 6.7) | 6.3 (6.2, 6.5) | 6.5 (6.3, 6.7) | 6.4 (6.2, 6.5) | 7.4 (7.1, 7.7) |
| 1999-2004 | 6.2 (6.0, 6.3) | 6.1 (5.8, 6.4) | 6.0 (5.8, 6.3) | 6.0 (5.8, 6.1) | 6.7 (6.5, 6.9) |
| 2005-2010 | 6.7 (6.5, 6.8) | 6.6 (6.4, 6.8) | 6.5 (6.2, 6.8) | 6.3 (6.1, 6.5) | 7.4 (7.0, 7.7) |
| Fiber g/1000 kcals |  |  |  |  |  |
| All surveys | 7.9 (7.8, 8.0) | 7.9 (7.7, 8.0) | 7.7 (7.5, 7.9) | 7.5 (7.4, 7.7) | 8.7 (8.5, 9.0) |
| 1988-1994 | 8.1 (8.0, 8.3) | 8.0 (7.7, 8.3) | 8.0 (7.7, 8.3) | 7.8 (7.6, 8.0) | 9.0 (8.7, 9.4) |
| 1999-2004 | 7.5 (7.4, 7.7) | 7.6 (7.3, 7.9) | 7.3 (6.9, 7.8) | 7.3 (7.1, 7.5) | 8.2 (7.8, 8.6) |
| 2005-2010 | 8.0 (7.9, 8.2) | 8.0 (7.6, 8.3) | 7.7 (7.5, 8.0) | 7.6 (7.3, 7.9) | 9.0 (8.6, 9.4) |
| % of 24-h energy from beverages |  |  |  |  |  |
| All surveys | 19.7 (19.4, 20.0) | 19.2 (18.5, 19.9) | 19.4 (18.7, 20.2) | 20.3 (19.8, 20.8) | 19.3 (18.6, 19.9) |
| 1988-1994 | 19.3 (18.6, 19.9) | 19.1 (17.5, 20.8) | 19.3 (17.4, 21.2) | 19.7 (18.7, 20.8) | 18.6 (17.9, 19.4) |
| 1999-2004 | 20.8 (20.3, 21.2) | 19.4 (18.2, 20.6) | 20.6 (19.5, 21.7) | 21.5 (20.7, 22.3) | 20.6 (19.1, 22.1) |
| 2005-2010 | 19.0 (18.5, 19.4) | 19.0 (18.2, 19.9) | 18.6 (17.3, 19.9) | 19.5 (18.8, 20.3) | 18.5 (17.4, 19.6) |
| Discretionary solid fat, g |  |  |  |  |  |
| All surveys | 46 (45, 46) | 45 (43, 46) | 47 (45, 48) | 46 (45, 47) | 44 (43, 46) |
| 1988-1994 | 50 (49, 52) | 48 (47, 50) | 51 (49, 54) | 52 (49, 55) | 48 (44, 52) |
| 1999-2004 | 48 (47, 49) | 50 (44, 51) | 49 (47, 51) | 48 (47, 49) | 47 (45, 49) |
| 2005-2010 | 40 (39, 41) | 39 (36, 42) | 41 (40, 42) | 40 (38, 41) | 39 (37, 42) |
| Energy from solid fat, added sugars and alcohol, kcal |  |  |  |  |  |
| All surveys | 759 (749, 770) | 732 (708, 755) | 783(764, 802) | 784 (766, 803) | 716 (6.89, 7.44) |
| 1988-1994 | 794 (771, 816) | 751 (726, 776) | 834 (808, 860) | 822 (783, 803) | 744 (671, 817) |
| 1999-2004 | 813 (796, 830) | 775 (720, 830) | 840 (805, 876) | 836 (809, 862) | 772 (743, 802) |
| 2005-2010 | 683 (667, 699) | 677 (639, 715) | 698 (675, 722) | 698 (670, 728) | 648 (612, 684) |

**Supplemental Table 6.** Weighted, unadjusted estimates (predicted marginal and 95% CI) of eating patterns, by US census region, by survey year: US adults, NHANES 1988-1994 to 1999-2010

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | All regions | North East | Midwest | South | West |
| Ate breakfast |  |  |  |  |  |
| All surveys | 82 (81, 83) | 85 (83, 87) | 80 (79, 82) | 80 (79, 81) | 84 (83, 86) |
| 1988-1994 | 81 (79, 82) | 85 (82, 87) | 79 (76, 82) | 79 (76, 82) | 81 (78, 85) |
| 1999-2004 | 80 (79, 81) | 84 (80, 88) | 79 (76, 82) | 77 (76, 79) | 84 (82, 86) |
| 2005-2010 | 84 (84, 85) | 86 (84, 89) | 83 (80, 85) | 83 (82, 85) | 87 (85, 88) |
| Length of the eating period1, hours |  |  |  |  |  |
| All surveys | 12.3 (12.3, 12.4) | 12.6 (12.4, 12.8) | 12.5 (12.5, 12.6) | 12.2 (12.1, 12.3) | 12.2 (12.1, 12.3) |
| 1988-1994 | 12.5 (12.4, 12.6) | 12.6 (12.1, 13.0) | 12.8 (12.6, 13.0) | 12.4 (12.3, 12.5) | 12.3 (12.0, 12.5) |
| 1999-2004 | 12.3 (12.2, 12.4) | 12.6 (12.3, 12.9) | 12.5 (12.3, 12.6) | 12.0 (11.9, 12.2) | 12.2 (12.0, 12.4) |
| 2005-2010 | 12.3 (12.2, 12.4) | 12.6 (12.2, 12.9) | 12.4 (12.2, 12.6) | 12.1 (12.0, 12.2) | 12.2, 12.0, 12.4) |
| Number of non-main meal2 eating occasions |  |  |  |  |  |
| All surveys | 2.2 (2.2, 2.3) | 2.3 (2.2, 2.4) | 2.3 (2.3, 2.4) | 2.1 (2.0, 2.1) | 2.2 (2.1, 2.3) |
| 1988-1994 | 2.2 (2.2, 2.3) | 2.3 (2.0, 2.6) | 2.5 (2.4, 2.6) | 2.1 (2.0, 2.2) | 2.2 (2.0, 2.4) |
| 1999-2004 | 2.2 (2.1, 2.2) | 2.3 (2.2, 2.4) | 2.3 (2.2, 2.4) | 2.1 (2.0, 2.2) | 2.2 (2.1, 2.3) |
| 2005-2010 | 2.2 (2.2, 2.3) | 2.4 (2.2, 2.5) | 2.3 (2.2, 2.4) | 2.1 (2.0, 2.1) | 2.2 (2.1, 2.3) |
| No. of main meal3 eating occasions |  |  |  |  |  |
| All surveys | 2.7 (2.7, 2.7) | 2.7 (2.7, 2.8) | 2.7 (2.7, 2.8) | 2.7 (2.6, 2.7) | 2.7 (2.7, 2.8) |
| 1988-1994 | 2.6 (2.6, 2.7) | 2.7 (2.6, 2.8) | 2.7 (2.6, 2.8) | 2.6 (2.6, 2.7) | 2.6 (2.5, 2.7) |
| 1999-2004 | 2.7 (2.7, 2.7) | 2.7 (2.6, 2.8) | 2.7 (2.6, 2.8) | 2.6 (2.6, 2.7) | 2.7 (2.7, 2.8) |
| 2005-2010 | 2.8 (2.7, 2.8) | 2.8 (2.7, 2.9) | 2.8 (2.7, 2.8) | 2.7 (2.7, 2.8) | 2.8 (2.8, 2.8) |
| Interval4 between eating episodes, hours |  |  |  |  |  |
| All surveys | 2.7 (2.7, 2.7) | 2.6 (2.6, 2.7) | 2.6 (2.6, 2.7) | 2.7 (2.7, 2.7) | 2.6 (2.6, 2.7) |
| 1988-1994 | 2.7 (2.7, 2.8) | 2.7 (2.6, 2.8) | 2.7 (2.6, 2.7) | 2.8 (2.8, 2.8) | 2.7 (2.7, 2.8) |
| 1999-2004 | 2.7 (2.6, 2.7) | 2.7 (2.6, 2.7) | 2.7 (2.6, 2.7) | 2.7 (2.7, 2.7) | 2.6 (2.6, 2.7) |
| 2005-2010 | 2.6 (2.6, 2.6) | 2.6 (2.5, 2.6) | 2.6 (2.6, 2.6) | 2.7 (2.7, 2.7) | 2.6 (2.5, 2.6) |

1Interval between the time of the first reported episode and the time of the last reported eating episode.

2Mention of breakfast, lunch, brunch, supper, and dinner or equivalents in Spanish.

3Mention of eating episodes not labeled as main-meal as described above.

4Length of the eating period/number of main meal and non-main meal eating episodes.