

Indicator:	Fruit and Vegetable Consumption (F1)
Domain:	Nutrition and Physical Activity
Sub-domain:	Fruit and Vegetable Consumption
Demographic group:	Women aged 18–44 years.
Data resource:	Behavioral Risk Factor Surveillance System (BRFSS) http://www.cdc.gov/BRFSS/
Data availability:	Rotating core item in the BRFSS - available in all states in odd years.
Numerator:	Women aged 18–44 years who reported eating fruits and vegetables ≥ 5 times per day.
Denominator:	Women aged 18–44 years who reported eating fruits and vegetables any number of times per day, including zero (excluding unknowns and refusals)
Measures of frequency:	Crude annual prevalence and 95% confidence interval, weighted using the BRFSS methodology (to compensate for unequal probabilities of selection. and adjust for non-response and telephone non-coverage)
Period of case definition:	Current.
Significance:	Eating a diet rich in fruit and vegetables is important for women of reproductive age for both weight management, prevention of chronic disease, and intake of essential vitamins and minerals. ^{1,2} Furthermore, maternal nutritional status is an important determinant of placental and fetal growth, and clinical studies have shown a positive association between a healthy diet prior to conception and during pregnancy and improved birth outcomes. ³⁻⁵ The Clinical Work Group of the Select Panel on Preconception Care recommends that women of reproductive age should be counseled to consume a well-balanced diet including fruits and vegetables, iron and calcium-rich foods, protein-containing foods, as well as 400 µg of folic acid daily. ⁶
Limitations of indicator:	Participants were not given a definition of serving size leading to a possible overestimation or underestimation of persons meeting national fruit and vegetable consumption objectives. The indicator does not convey the average number of daily servings of fruits and

vegetables consumed. Studies have demonstrated a dose-response effect associated with increased consumption of fruits and vegetables, not a threshold effect of 5 servings/day.⁷ Although the retest consistency of participant responses has been validated in multiple populations, estimates of fruit and vegetable intake from abbreviated food questionnaires such as the BRFSS fruit and vegetable module, are lower than other methods of dietary assessment.^{8,9} Therefore, reliability and validity of the BRFSS fruit and vegetable consumption items is considered to be moderate. Analysis for this indicator requires use of a calculated variable named _FV5SRV. Details on the calculation of this variable can be found at http://ftp.cdc.gov/pub/data/brfss/calcvar_07.rtf.

**Related Healthy People
2010 Objective(s):**

19–5. Increase the proportion of persons aged 2 years and older who consume at least two daily servings of fruit. Target: 75%.

19-6. Increase the proportion of persons aged 2 years and older who consume at least three daily servings of vegetables, with at least one-third being dark green or orange vegetables. Target: 50%.

References:

1. US Department of Health and Human Services, US Department of Agriculture. Dietary guidelines for Americans, 2005. 6th ed. Washington, DC: US Government Printing Office; 2005. Available at <http://www.health.gov/dietaryguidelines>.
2. Rolls BJ, Ello-Martin JA, Tohill BC. What can Intervention Studies Tell us about the Relationship between Fruit and Vegetable Consumption and Weight Management? *Nutr Rev* 2004; 62: 1--17.
3. Fowles ER. What's a pregnant woman to eat? A review of current USDA dietary guidelines and MyPyramid. *J Perinat Educ* 2006; 15:28-33.
4. Cuco G, Arija V, Iranzo R, Vila J, Prieto MT, Fernandez-Ballart J. Association of maternal protein intake before conception and throughout pregnancy with birth weight. *Acta Obstet Gynecol Scand* 2006; 85:413-21.
5. Vujkovic M, Ocke MC, van der Spek PJ, Yazdanpanah N, Steegers EA, Steegers-Theunissen RP. Maternal Western dietary patterns and the risk of developing a cleft lip with or without a cleft palate. *Obstet Gynecol* 2007; 110:378-84.
6. Gardiner P, Nelson L, Shellhaas C, Dunlop A, Long R, Andrist S, Jack B, The Clinical Content of Preconception Care: Nutrition and Dietary Supplements. *Am J Obstet Gynecol* 2008; 199 (6 Suppl B):S345-356.

7. Centers for Disease Control and Prevention. Fruit and vegetable consumption among adults—United States, 2005. MMWR 2007 Mar 16; 56(10): 213-217. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5610a2.htm>
8. Serdula M, Coates R, Byers T, et al. Evaluation of a Brief Telephone Questionnaire to Estimate Fruit and Vegetable Consumption in Diverse Study Populations. Epidemiology 1993; 4:445-63.
9. Nelson DE, Holtzman D, Bolen J, Stanwyck CA, Mack KA. Reliability and Validity of Measures from the Behavioral Risk Factor Surveillance System (BRFSS). Soc Prev Med 2001; 46 (Suppl 1):S03-S42.

Indicator:	Overweight and Obesity (F2)
Domain:	Nutrition and Physical Activity
Sub-domain:	Obesity and Overweight
Demographic Group:	Women aged 18-44 years.
Data resource:	Behavioral Risk Factor Surveillance System (BRFSS) http://www.cdc.gov/BRFSS/
Data availability:	Core item – available in all BRFSS states annually.
Numerator:	<p>Overweight: Women aged 18-44 years who have a body mass index (BMI) of 25 kg/m² or greater but less than 30 kg/m². BMI is calculated from self-reported weight and height.</p> <p>Obesity: Women aged 18-44 years who have a BMI greater than or equal to 30 kg/m². BMI is calculated from self-reported weight and height.</p>
Denominator:	Women aged 18-44 years for whom BMI can be calculated using their self-reported weight and height.
Measures of frequency:	Crude annual prevalence and 95% confidence interval, weighted using the BRFSS methodology (to compensate for unequal probabilities of selection. and adjust for non-response and telephone non-coverage)
Period of case definition:	Current.
Significance:	<p>In the non-pregnant state, obesity contributes to numerous adverse health conditions including type II diabetes, hypertension, heart disease, a variety of cancers, and infertility.¹⁻⁴ Obesity is also associated with a host of unfavorable perinatal health outcomes including neural tube defects, labor and delivery complications, fetal and neonatal death, and maternal complications such as gestational diabetes and preeclampsia.⁵⁻⁹ While health risks are better established for obese persons, overweight is a predictor of subsequent obesity.³ Therefore, several professional health organizations and councils, in addition to the Clinical Work Group of the Select Panel on Preconception Care workgroup recommends that all women have their BMI calculated at least annually.¹⁰ Furthermore, women with a BMI of 25 kg/m² or greater should be counseled about their own health risks as well as those that may</p>

occur related to pregnancy. And, overweight and obese women should be provided with healthy strategies to achieve a healthier body weight, especially prior to any future pregnancies.

Limitations of indicator: Height and weight are self-reported by the participant but are not verified using medical records data. Self-reported weight and height in the BRFSS have both been demonstrated to be highly reliable and valid.¹¹ However, women have been shown to underreport weight, which may lead to an underestimation of BMI.¹² Analysis for this indicator requires use of a calculated variable named _BMI4CAT. Details on the calculation of this variable can be found at http://ftp.cdc.gov/pub/data/brfss/calcvar_07.rtf.

Related Healthy People

2010 Objective(s): 19-1. Increase the proportion of adults who are at a healthy weight. Target: 60%.

19-2. Reduce the proportion of adults who are obese. Target: 15%.

References:

1. Institute of Medicine. Influence of pregnancy weight on maternal child health: a workshop report. Washington, DC: National Academy Press; 2007.
2. Sarwer DB, Allison KC, Gibbons LM, Markowitz JT, Nelson DB. Pregnancy and obesity: a review and agenda for future research. J Womens Health (Larchmt) 2006; 15:720-33.
3. McTigue KM, Harris R, Hemphill B, et al. Screening and interventions for obesity in adults: summary of the evidence for the US Preventive Services Task Force. Ann Intern Med 2003; 139:933-49.
4. Dixit A, Girling JC. Obesity and pregnancy. J Obstet Gynaecol 2008; 28:14-23.
5. Rich-Edwards JW, Goldman MB, Willett WC, et al. Adolescent body mass index and infertility caused by ovulatory disorder. Am J Obstet Gynecol 1994;171:171-7.
6. Watkins ML, Rasmussen SA, Honein MA, Botto LD, Moore CA. Maternal obesity and risk for birth defects. Pediatrics 2003;111:1152-8.
7. Cedergren MI. Maternal morbid obesity and the risk of adverse pregnancy outcome. Obstet Gynecol 2004;103:219-24.
8. Cnattingius S, Bergstrom R, Lipworth L, Kramer MS. Prepregnancy weight and the risk of adverse pregnancy outcomes. N Engl J Med 1998;338:147-52.
9. Baeten JM, Bukusi EA, Lambe M. Pregnancy complications and outcomes among overweight and obese nulliparous women. Am J Public Health 2001;91:436-40.

10. Gardiner PM, Nelson L, Shellhaas CS, et al. The clinical content of preconception care: nutrition and dietary supplements. *Am J Obstet Gynecol* 2008; 199 (6 Suppl B): S345-S356.
11. Nelson DE, Holtzman D, Bolen J, Stanwyck CA, Mack KA. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). *Soc Prev Med* 2001; 46 Suppl 1:S3-S42.
12. Gillum RF, Sempos CT. Ethnic variation in validation of classification of overweight and obesity using self-reported weight and height in American women and men: the Third National Health and Nutrition Examination Survey. *Nutr J* 2005; 4:27.

Indicator:	Pre-pregnancy Overweight and Obesity (F3)
Domain:	Nutrition and Physical Activity
Sub-domain:	Overweight and Obesity
Demographic group:	Women aged 18-44 having a live birth.
Data resource:	National Vital Statistics System (NVSS) http://www.cdc.gov/nchs/nvss.htm
Data availability:	Birth Certificate data are available for women who have a live birth in all states.
Numerator:	<p>Overweight: Women aged 18-44 years who had a prepregnancy body mass index (BMI) of 25 kg/m² or greater but less than 30 kg/m². BMI is calculated from self-reported weight and height.</p> <p>Obesity: Women aged 18-44 years who had a prepregnancy BMI greater than or equal to 30 kg/m². BMI is calculated from self-reported weight and height.</p>
Denominator:	Women aged 18-44 years for whom BMI can be calculated using their self-reported weight and height.
Measures of frequency:	Crude annual prevalence and 95% confidence interval, weighted using the BRFSS methodology (to compensate for unequal probabilities of selection. and adjust for non-response and telephone non-coverage)
Period of case definition:	Immediately before the pregnancy resulting in the most recent live birth.
Significance:	In the non-pregnant state, obesity contributes to numerous adverse health conditions including type II diabetes, hypertension, heart disease, a variety of cancers, and infertility. ¹⁻⁴ Obesity is also associated with a host of unfavorable perinatal health outcomes including neural tube defects, labor and delivery complications, fetal and neonatal death, and maternal complications such as gestational diabetes and preeclampsia. ⁵⁻⁹ While health risks are better established for obese persons, overweight is a predictor of subsequent obesity. ³ In addition to steadily increasing obesity rates in the general U.S. population, a notable increase toward higher prepregnancy BMI in the U.S. has been demonstrated. ¹⁰ Therefore, several professional health organizations and councils,

in addition to the Clinical Work Group of the Select Panel on Preconception Care workgroup recommends that all women have their BMI calculated at least annually.¹¹ Furthermore, women with a BMI of 25 kg/m² or greater should be counseled about their own health risks as well as those that may occur related to pregnancy. And, overweight and obese women should be provided with healthy strategies to achieve a healthier body weight, especially prior to any future pregnancies.

Limitations of indicator: Maternal weight and height as recorded on the birth certificate are based on either maternal recall or prenatal records.¹² Unpublished data demonstrates that birth certificate data underestimate the prevalence of obesity although the data have a satisfactory reliability and validity for surveillance and research purposes (Unpublished data from Florida birth certificates, 2005).

Related Healthy People
2010 Objective(s):

19-1. Increase the proportion of adults who are at a healthy weight. Target: 60%.

19-2. Reduce the proportion of adults who are obese. Target: 15%.

References:

13. Institute of Medicine. Influence of pregnancy weight on maternal child health: a workshop report. Washington, DC: National Academy Press; 2007.
14. Sarwer DB, Allison KC, Gibbons LM, Markowitz JT, Nelson DB. Pregnancy and obesity: a review and agenda for future research. *J Womens Health (Larchmt)* 2006; 15:720-33.
15. McTigue KM, Harris R, Hemphill B, et al. Screening and interventions for obesity in adults: summary of the evidence for the US Preventive Services Task Force. *Ann Intern Med* 2003; 139:933-49.
16. Dixit A, Girling JC. Obesity and pregnancy. *J Obstet Gynaecol* 2008; 28:14-23.
17. Rich-Edwards JW, Goldman MB, Willett WC, et al. Adolescent body mass index and infertility caused by ovulatory disorder. *Am J Obstet Gynecol* 1994;171:171-7.
18. Watkins ML, Rasmussen SA, Honein MA, Botto LD, Moore CA. Maternal obesity and risk for birth defects. *Pediatrics* 2003;111:1152-8.
19. Cedergren MI. Maternal morbid obesity and the risk of adverse pregnancy outcome. *Obstet Gynecol* 2004;103:219-24.
20. Cnattingius S, Bergstrom R, Lipworth L, Kramer MS. Prepregnancy weight and the risk of adverse pregnancy outcomes. *N Engl J Med* 1998;338:147-52.
21. Baeten JM, Bukusi EA, Lambe M. Pregnancy complications and outcomes among overweight and obese nulliparous women. *Am J Public Health* 2001;91:436-40.

22. Yeh J, Shelton JA. Increasing prepregnancy body mass index: Analysis of trends and contributing variables. *Am J Obstet Gynecol* 2005; 193:1994-98.
23. Gardiner PM, Nelson L, Shellhaas CS, et al. The clinical content of preconception care: nutrition and dietary supplements. *Am J Obstet Gynecol* 2008; 199 (6 Suppl B): S345-S356.
24. National Center for Health Statistics. 2003 revisions of the U.S. standard certificates of live birth and death and the fetal death report [online]. Available at: http://www.cdc.gov/nchs/vital_certs_rev.htm. Accessed March 2, 2009.

Indicator:	Folic Acid Supplementation (F4)
Domain:	Nutrition and Physical Activity
Sub-domain:	Folic Acid Supplementation
Demographic Group:	Women aged 18-44 having a live birth.
Data resource:	Pregnancy Risk Assessment Monitoring System (PRAMS) http://www.cdc.gov/PRAMS/
Data Availability:	Core item – available in all PRAMS states annually
Numerator:	Respondents aged 18-44 years who reported taking a multivitamin, prenatal vitamin or folic acid vitamin every day of the week during the month before they got pregnant with their most recent live born infant.
Denominator:	Respondents aged 18-44 years who reported that they took a multivitamin, prenatal vitamin or folic acid vitamin 1 to 3 days a week, 3 to 6 days a week, or everyday of the week during the month before they got pregnant with their most recent live born infant <u>or</u> that they did not take a multivitamin, prenatal vitamin or folic acid vitamin at all during the month before they got pregnant with their most recent live born infant (excluding unknowns and refusals).
Measures of frequency	Crude annual prevalence and 95% confidence interval, weighted using the PRAMS methodology (to compensate for unequal probabilities of selection and adjust for non-response and telephone non-coverage)
Period of case definition:	One month before the pregnancy resulting in the most recent live birth.
Significance	Neural tube defects (NTDs) affect 3,000 pregnancies in the US each year. ¹ Up to 70% of all NTDs can be prevented when women capable of becoming pregnant consume the recommended amount of folic acid prior to conception. ² The Clinical Work Group of the Select Panel on Preconception Care and other organizations recommend that all women of reproductive age take a folic acid containing multivitamin (400 µg daily). ^{3,4} These guidelines are particularly important since half of all pregnancies are unplanned. Data from the annual survey conducted for the March of Dimes by the Gallup organization indicate that only 40% of all US women

ages 18-45 consumed folic acid supplements daily in 2007 (March of Dimes, unpublished data, 2007).

Limitations of indicator

This indicator focuses solely on the use of folic acid supplements and does not consider consumption of folic acid-fortified foods as recommended in the Healthy People 2010 objectives. However, studies have identified folic acid supplements as an important source needed by most women to achieve the recommended amount of folic acid daily.⁵ Data are self-reported and may be subject to recall bias. However, studies assessing the validity of self-reported supplement intake show good correlation to the amount of supplements reported and measures of nutrients found in blood samples.⁶⁻⁸

Related Healthy People 2010 objective(s)

16-16a. Consumption of at least 400µg of folic acid each day from fortified foods or dietary supplements by nonpregnant women aged 15 to 44 years. Target: 80%.

References:

1. Division of Birth Defects, National Center for Birth Defects and Developmental Disabilities, Centers for Disease Control and Prevention. Use of supplements containing folic acid among women of childbearing age—United States. Available at www.cdc.gov/ncbddd/folicacid/data.html.
2. Milunsky A, Jick H, Jick SS, et al. Multivitamin/folic acid supplementation in early pregnancy reduces the prevalence of neural tube defects. *JAMA* 1989; 262:2847-2852.
3. Institute of Medicine. Dietary reference intake for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin, and choline. Washington, DC. National Academy Press, 1998.
4. Gardiner PM, Nelson L, Shellhaas CS, et al. The clinical content of preconception care: nutrition and dietary supplements. *Am J Obstet Gynecol* 2008; 199 (6 Suppl B): S345-S356.
5. Yang QH, Carter HK, Mulinare J, Berry RJ, Friedman JM, Erickson JD. Race-ethnicity differences in folic acid intake in women of childbearing age in the United States after folic acid fortification: Findings from the National Health and Nutrition Examination Survey, 2001-2002. *Am J Clin Nutr* 2007; 85:1409-1416.
6. Burton A, Wilson S, and Gillies AJ. Folic acid: Is self reported use of supplements accurate? *J Epidemiol. Community Health* 2001; 55: 841-842.
7. Yen J, Zoumas-Morse C, Pakiz B, Rock CL. Folate intake assessment: Validation of a new approach. *J Am Diet Assoc* 2003; 103: 991-1000.
8. Satia-Abouta I J, Patterson RE, King IB, et al. Reliability and validity of self-report of vitamin and mineral supplement use in the Vitamins and Lifestyle Study. *Am J Epidemiol* 2003; 157: 944-954.

Indicator:	Recommended Physical Activity (F5)
Domain:	Nutrition and Physical Activity
Sub-domain:	Adequate Physical Activity
Demographic group:	Women aged 18-44 years.
Data resource:	Behavioral Risk Factor Surveillance System (BRFSS) http://www.cdc.gov/BRFSS/
Data availability:	Rotating core item – available in all states in odd years
Numerator:	Women aged 18-44 years who reported doing enough moderate and/or vigorous physical activity in a usual week to meet the recommended levels of physical activity.
Denominator:	Women aged 18-44 years who reported doing enough moderate and/or vigorous physical activity in a usual week to meet the recommended levels of physical activity <u>and</u> those who reported not doing enough moderate or vigorous physical activity in a usual week to meet the recommended levels of physical activity (excluding unknowns and refusals).
Measures of frequency:	Crude annual prevalence and 95% confidence interval; weighted using the BRFSS methodology (to compensate for unequal probabilities of selection and adjust for non-response and telephone non-coverage).
Period of case definition:	Current.
Significance:	Physical inactivity and unhealthy eating contribute to obesity and a number of chronic diseases, including some cancers, cardiovascular disease, and diabetes. Adequate physical activity and maintaining a healthy weight are important for women of reproductive age due to adverse perinatal outcomes associated with maternal obesity which include neural tube defects, stillbirth, preterm delivery, gestational diabetes, hypertension, thromboembolic disorders, macrosomia, low Apgar scores, postpartum anemia, and cesarean delivery. ¹ The Clinical Work Group of the Select Panel on Preconception Care recommends that all women should be assessed for participation in weight-bearing and aerobic exercise, and offered recommendations for participating in physical activities that are appropriate to their physical abilities. ²

Limitations of indicator: Guidelines for adequate physical activity have changed over time and BRFSS items are periodically modified accordingly.^{3,4} The current version of the physical activity items was put into use in 2001.

The BRFSS physical activity items elicit self-reported data and are subject to recall bias. The indicator assesses moderate and vigorous leisure time, household, and transportation activities, but does not capture information on occupational activities that may qualify as moderate or vigorous activities. At present, little is known about the reliability and validity of the BRFSS items used to assess adequate physical activity. Analysis of this indicator requires use of a created variable named _RFDRWM3. Details on the calculation of this variable can be found at http://ftp.cdc.gov/pub/data/brfss/calcvar_07.rtf.

Related Healthy People
2010 Objective(s):

22-1. Reduce the proportion of adults who engage in no leisure-time physical activity. Target: 20%.

22-2. Increase the proportion of adults who engage regularly, preferably daily, in moderate physical activity for at least 30 minutes per day. Target: 30%.

References:

1. Gardiner P, Nelson L, Shellhaas C, et al. The clinical content of preconception care: nutrition and dietary supplements. *Am J Obstet Gynecol* 2008; 199 (6 Suppl B):S345-356.
2. Moos MK, Dunlop A, Jack B, et al. Healthier women, healthier reproductive outcomes: recommendations for the routine care of all women of reproductive age. *Am J Obstet Gynecol* 2008; 199 (6 Suppl B):S280-S289.
3. U.S. Department of Health and Human Services. The 1990 health objectives for the nation: a midcourse review. U.S. Department of Health and Human Services, Public Health Service, Office of Disease Prevention and Health Promotion, 1986.
4. Pate RR, Pratt M, Blair SN, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995; 273:402-7.