

REPRODUCTIVE HEALTH ISSUES

Irene Alton

SIGNIFICANCE

Good nutrition status prior to and during pregnancy is associated with healthier infant outcomes. Since most adolescent pregnancies are unintended, and adolescents may begin prenatal care after the first trimester, the opportunity for preconceptional and early pregnancy nutrition counseling is frequently lost. This chapter will summarize nutrition issues specific to pregnancy, such as gestational weight gain concerns, pregnancy-related iron deficiency anemia, and preconceptional or interconceptional nutrition concerns. Information on other nutrition issues that may occur during pregnancy, such as eating disorders or vegetarian dietary patterns, can be found in other chapters of this book.

PRECONCEPTIONAL NUTRITION ISSUES

Correction of nutrition problems and promotion of healthful food choices in all female adolescents receiving routine health care may result in improved maternal and fetal outcomes if pregnancy occurs. Nutrition counseling is especially important for adolescents seeking contraceptive services, those who are sexually active but inconsistent or non-users of reliable contraception, and those presenting with a negative pregnancy test.

Preconception conditions that may increase nutritional risk in pregnancy are listed in Table 1. It should be noted that these nutritional conditions are also of concern among postpartum teens, since almost one-quarter of teens who give birth will experience one or more additional pregnancies during adolescence.¹

TABLE 1
Preconception Conditions Increasing Nutritional Risk In Pregnancy

Low BMI (<15th percentile)	Vegan or macrobiotic eating style
Obesity	Substance use
Anemia	Poor quality diets
Diabetes mellitus	Inadequate folic acid intake
Eating disorders	Inadequate food access
Unhealthy weight control practices	Depo-Provera® use
Meal skipping	

Contraceptive Use

Depo-Provera® (medroxyprogesterone acetate), a long-acting, progestin-only injectable contraceptive, offers advantages for adolescents who are inconsistent users of contraceptives. However, it may also be associated with nutritional risks.

- Depo-Provera® suppresses ovarian production of estradiol, leading to estrogen insufficiency.² Since estrogen protects against bone loss, a decrease in bone density and inhibition of normal increases in bone mineralization may occur in adolescents who use this form of contraception.
- Studies have demonstrated a significant (9-12%) decrease in bone density in adolescents who used Depo-Provera® for two years or longer, compared to those who used other or no hormonal contraceptives.³
- In adult women who used Depo-Provera® for five years or longer, increased bone density was demonstrated after discontinuation of use.⁴ The potential for adolescents, particularly those under 15 years of age, to recover bone loss and achieve normal bone mineralization after long-term Depo-Provera® use is not currently known.
- Weight gain is a common side effect and a major reason for discontinuing Depo-Provera® use among adolescents.
- Depo-Provera® may cause an increase in appetite and weight gain through direct stimulation of the central hunger center, by binding glucocorticoid receptors (which may lead to steroid-like effects) and interfering with insulin action and serotonin metabolism.²
- Average weight gains of approximately 9 pounds after 11 months, and 20 pounds after 17 months of Depo-Provera® use have been reported in adolescents.²

Dietary Inadequacies

The increased nutritional demands of adolescent growth and development may not be adequately supported by the dietary habits common among this age group. Inadequate intakes of calcium, iron, zinc, and folic acid have been documented among teenage girls.⁵

- Adolescents of low socioeconomic status may be at highest risk for both dietary inadequacies and pregnancy.
- Adolescents may begin pregnancy with depleted nutrient reserves, placing them and their developing fetuses at risk for suboptimal health and development.
- Adequate folate status at the time of conception and during early gestation has been shown to reduce the incidence of neural tube defects by 50%.⁶
- The US Public Health Service has advised that all women of childbearing age who are capable of becoming pregnant consume 400 mcg of folic acid daily.⁷ The DRI for folic acid for women during pregnancy is 600 mcg per day.
- The most reliable sources of folic acid are highly fortified breakfast cereals and vitamin supplements.

PREGNANCY

Despite a recent decline in adolescent pregnancy rates,⁸ unintended pregnancies in this age group continue to be a significant concern. Higher rates of gestational hypertension, anemia, prematurity, low birth weight, and neonatal mortality have been observed among teens, particularly in those under 15 years of age, when compared to pregnancies in adults.⁹

- Both adolescence and pregnancy are periods of increased nutritional demand and risk. There is accumulating evidence that the developing fetus and still-growing adolescent compete for nutrients that may be in inadequate supply.^{10,11}
- Decreased placental blood flow and lower fetal micronutrient levels have been demonstrated in pregnancies of growing adolescents.⁹
- Measurements of knee height (as opposed to standard height) suggest that one-half of adolescents continue linear and pelvic growth for several years after menarche.⁹
- Young, growing adolescents appear to transfer less of their gestational weight gain to their developing fetuses than do older adolescents and adults, despite adequate weight gain and body fat accumulation.^{10,11}

Dietary Intake

Pregnant adolescents have eating behaviors similar to other adolescents, which may increase the risk for adverse pregnancy outcomes. These include skipping breakfast and other meals, snacking on foods high in fat or sugar and of low nutritional value, high consumption of carbonated and other sweetened beverages, low intake of milk and dairy products, and frequent use of fast foods. The desire to have a healthy baby, however, can motivate many adolescents to improve their eating habits.

- Infrequent eating (fewer than 3 meals and 2 snacks per day) as well as prolonged periods without food intake, as can occur with breakfast-skipping, have been associated with a higher risk of preterm delivery.^{12,13}
- High intakes of energy, sucrose, and fat have recently been associated with higher rates of preeclampsia.¹⁴
- Nutrients frequently lacking in the diets of pregnant adolescents include calcium, iron, zinc, folic acid, and vitamins A, C, E and B₆.¹⁵
- Low intakes of calcium may compromise bone mineralization and increase the risk for osteopenia, and later in life, osteoporosis.¹⁶ In addition, inadequate calcium status may increase the risk of preterm delivery and preeclampsia in adolescents.⁹
- Low dietary folate intakes have been associated with higher rates of preterm birth as well as an increased risk for neural tube defects.¹⁷

Weight Gain

Gestational weight gain (both the total amount and the rate at which it is gained) are important influences on fetal growth, infant birth weight, and length of gestation.¹⁵ Low birth weight (<2500 g) and prematurity (≤36 weeks) are major determinants of perinatal mortality and morbidity.¹⁵ In addition, inadequate fetal growth has been associated with long term health risks, including type 2 diabetes mellitus, hypertension, cardiovascular disease, and obesity.¹⁸

- Inadequate weight gain during pregnancy, particularly in those who begin pregnancy underweight, is associated with higher rates of prematurity and the delivery of low birth weight and small-for-gestational-age infants.¹⁵

- Despite an adequate total weight gain, a low rate of gain in early pregnancy (<9.5 lbs by 24 weeks) has been shown to nearly double the risk of delivering a small-for-gestational-age infant. Weight gains less than 0.9 lb per week after 24 weeks gestation have been associated with higher rates of preterm delivery.¹⁹
- Gestational weight gain appears to have a greater impact on fetal growth in young adolescents, who require higher weight gains than older adolescents or adults to deliver an infant of optimal size (3000-4000 g).^{10,20}
- A higher median weight gain and rate of gain has been observed in adolescents compared to adults (30.8-33 lbs vs 27.5 lbs).²¹
- Excessive gestational weight gain (>40 lbs) does not enhance fetal growth or length of gestation, but may increase the risk for postpartum weight retention and increased abdominal fat deposition, and may contribute to the development of obesity.²¹
- Weight gain recommendations must balance optimal growth and development of the adolescent and fetus with the prevention of obesity and its associated health risks after delivery.
- The Institute of Medicine recommendations for total weight gain and rate of gain, based on prepregnant body mass index (BMI), are listed in Table 2. Prepregnancy BMI can be calculated using the Center for Disease Control and Prevention Growth Charts (<http://www.cdc.gov/growthcharts/>). Although gains at the higher end of the range have been suggested for young adolescents, others have questioned this, citing the difficulty in clinically detecting continued growth and the concern of preventing obesity.

TABLE 2
Weight Gain Recommendations for Pregnancy*

Prepregnant BMI	Total (lb)	Trimester 1 (lb)	Trimesters 2 & 3 (lbs/week)
Underweight	28-40	5	1.0+
Normal weight	25-35	3	1.0+
Overweight	15-25	2	0.66+
Obese	≥15	1.5	0.5+

*Based on prepregnant Body Mass Index percentile.

Source: Institute of Medicine. Nutrition during pregnancy: part I, weight gain: part II, nutrient supplements. Washington, DC: National Academy Press; 1990.

Nausea and Vomiting

Nausea and vomiting during pregnancy may range from mild to moderate symptoms occurring early in pregnancy to severe hyperemesis gravidarum. Nausea and vomiting may be associated with a lowered risk of miscarriage, stillbirth, perinatal mortality, preterm delivery, low birth weight, and fetal growth retardation.^{22,23}

- Symptoms of nausea and vomiting usually begin around the 8th week of pregnancy, peak at 10-16 weeks, and resolve by the 20th week.²² Nausea and vomiting may occur in 50-90% of pregnancies.²²

- Nausea and vomiting may be more common in first pregnancies, younger women, and those who experienced nausea with oral contraceptives.²² Onset is often in the morning with improvement during the day, although symptoms may occur at any time.²²
- Hyperemesis occurs in up to 2% of pregnancies.²⁴ Hyperemesis may be more common in those with first pregnancies, high prepregnant weight or multiple gestations.²²
- Hyperemesis is associated with dehydration, metabolic and electrolyte disturbances, and weight loss.^{22,25} Onset of hyperemesis is between the 4th to 10th week, usually resolving by the 20th week of gestation.²²
- Vomiting beyond 20 weeks is not common and may be related to other causes such as gastroenteritis or cholelithiasis.²²
- Chronic nausea and vomiting continued into the second and third trimester have been associated with inadequate weight gain and a significant decrease in infant birth weight in an adolescent population.²⁶
- Hyperemesis may involve dehydration and fluid volume deficits, starvation ketoacidosis, metabolic alkalosis, hypokalemia, nutritional deficiencies, protein and energy malnutrition, and significant weight loss.^{22,24}
- Hyperemesis has been shown to result in dietary intakes of less than 50% of the Recommended Dietary Allowances and lowered blood levels of thiamin, riboflavin, and vitamins B₆ and A.²⁷
- Hyperemesis with loss of more than 5% of body weight and electrolyte disturbances has been associated with lowered birth weight, fetal growth retardation and anomalies.²⁴

Heartburn

Heartburn is a common discomfort, occurring in 30-70% of all pregnancies. It can be present at any time, but occurs more frequently and is most severe during the third trimester.²⁸ Heartburn prior to pregnancy, higher parity, and young maternal age may increase the risk for heartburn. Prepregnancy weight, gestational weight gain or race have not been associated with heartburn frequency or severity.²⁸

- Symptoms are worse after a large meal since gastric distention increases lower esophageal sphincter relaxation. Dietary fat increases reflux in the immediate postprandial period. Other factors that increase reflux include esophageal irritants or those that lower the lower esophageal sphincter pressure, such as acidic foods and beverages, spicy foods, alcohol, coffee, chocolate, spearmint, peppermint, and lying down or bending over after eating.²²
- Significant heartburn can interfere with eating and result in inadequate nutrient intake and insufficient weight gain.

Constipation

Constipation involves infrequent (two or less per week) bowel movements or hard, difficult to pass stools.^{28,29} Constipation has been reported in approximately one-third of all pregnancies, primarily during the first or third trimesters.²⁹

- Increased levels of estrogen and progesterone and lower levels of motilin may decrease smooth muscle tone, slowing motility and transit time in the small bowel and/or colon.²⁹
- Delayed transit time may result in more absorption of fluid and electrolytes, resulting in stool dehydration.²⁹
- Additional factors such as decreased fluid or fiber intake, iron supplementation, decreased physical activity, and psychosocial stress may also contribute to constipation.²⁹
- Mechanical obstruction and slower intestinal transit can occur from pressure on the rectosigmoid by the enlarging uterus or pressure in the anal canal by large hemorrhoids.²⁹
- Potential complications of constipation in pregnancy include backache, fecal impaction or hemorrhoids.²⁹

Substance Use

In the 1999 Youth Risk Behavior Surveillance (YRBS), nearly one-fifth of adolescents smoked regularly, one-third binge drank and almost one-fourth used marijuana at least once during the previous month.³⁰ Alarming, about 10% had used cocaine and 16% had used other illicit drugs.³⁰

- Adverse effects of substance use on nutrition status include appetite suppression, decreased nutrient intake and bioavailability, increased nutrient losses, impaired nutrient metabolism, higher nutrient requirements, nutrient deficiencies, and weight loss.
- Since adolescents may engage in multiple risk-taking behaviors, such as substance use and early sexual activity,³¹ adolescent pregnancy may be complicated by tobacco, alcohol, or illicit drug use, particularly in early gestation before an unintended pregnancy may be apparent.
- Substance use prior to pregnancy may be a predictor of use during pregnancy.³²
- Substance use during the first 8 weeks of pregnancy can adversely affect embryonic development and result in organ damage and congenital malformations.
- Risks associated with substance use in adolescent pregnancy include higher rates of obstetrical complications, compromised nutritional status, inadequate weight gain, parenting difficulties, and higher rates of child abuse and neglect.

Iron Deficiency Anemia

Iron deficiency anemia is seen in approximately 11% of adolescents during the first trimester, and 16% during the second trimester of pregnancy.³³ Hemoglobin levels diagnostic of anemia in pregnancy are listed in Table 3. It should be noted that hemoglobin levels indicative of iron deficiency during pregnancy differ from those used to screen non-pregnant females, due to the effects of increased blood volume and other physiological changes that occur.

Pregnancy-related physiological changes in blood volume, increased iron requirements, low or absent iron stores, and marginal dietary iron intakes common in adolescent females contribute to the high prevalence of anemia. Potential consequences of iron deficiency anemia in pregnancy are summarized in Table 4.

TABLE 3
Cutoff Values for Anemia in Pregnancy

Trimester	Hemoglobin (g/dL)	Hematocrit (%)
First	11.0	33.0
Second	10.5	32.0
Third	11.0	33.0

Altitude above 3,000 feet raises the cutpoint for anemia because of lower oxygen partial pressure, a reduction in oxygen saturation of blood and an increase in red cell production.

Altitude (feet)	Hemoglobin (g/dL)	Hematocrit (%)
3,000-4,000	+0.2	+0.5
4,000-5,000	+0.3	+1.0
5,000-6,000	+0.5	+1.5
6,000-7,000	+0.7	+2.0
7,000-8,000	+1.0	+3.0
8,000-9,000	+1.3	+4.0

Cigarette smoking also raises the cutpoint for anemia since carboxyhemoglobin formed from carbon monoxide during cigarette smoking has no oxygen carrying capacity. The effect of cigarette smoking and altitude on anemia cutpoints is additive.

Number of cigarettes/day	Hemoglobin (g/dL)	Hematocrit (%)
10-19	+0.3	+1.0
20-39	+0.5	+1.5
40+	+0.7	+2.0

Source: Centers for Disease Control and Prevention. Recommendations to prevent and control iron deficiency in the United States. MMWR 1998;47:1-29.

TABLE 4
Potential Consequences of Iron Deficiency Anemia in Pregnancy

Prematurity	Postpartum hemorrhage/decreased tolerance of blood loss at delivery
Low birth weight	Slower wound healing
Lower gestational weight gain	Delayed recovery of postpartum iron status
Depressed maternal immune status	Decreased infant iron stores at birth
Decreased maternal well-being	Decreased maternal interaction with infant
Maternal cardiovascular stress	
Increased risk of maternal urinary tract infections/pylelonephritis	

Compiled from: Allen LH. Pregnancy and iron deficiency: unresolved issues. Nutr Rev 1997;55(4):91-101; Viteri FE. The consequences of iron deficiency and anemia in pregnancy. Adv Exp Med Biol 1994;352:127-139.

POSTPARTUM NUTRITION ISSUES

Lactation

Increased awareness of the short and long term maternal and infant benefits of breastfeeding has resulted in more adolescents in the US choosing to breastfeed. Currently, approximately one-half of adolescents initiate breastfeeding at delivery.³⁴

- Breast milk production is associated with increased energy and nutrient requirements.
- The diets of lactating adolescents may be low in vitamins and minerals.

- Regardless of the quality of the mother’s diet, breast milk quality is usually maintained. The content of some nutrients, such as folate and calcium, may be maintained at the expense of the adolescent’s stores. However, chronically low intakes of vitamins may result in decreased vitamin levels in breast milk.³⁵
- It is possible that the nutrient needs of young, still-growing adolescents and those for breast milk production may be competitive.⁹
- There is some evidence that breast milk volume may be lower in adolescents, compared to adult lactating women.³⁶

NUTRITION INTERVENTION DURING PREGNANCY

- Determine prepregnant body mass index and recommended total weight gain and rate. Discuss the importance of gestational weight gain and its components with the adolescent and her partner.
- Monitor weight gain throughout pregnancy by graphing it on a prenatal weight gain grid and provide the adolescent with a personal copy with her goal weight gain range highlighted.
- Assess dietary intake (see Chapter 4).
- Encourage frequent meals and snacks of high nutrient content, consistent with the Food Guide Pyramid (see Chapter 6).
- Intervene when the adolescent’s weight gain deviates from the expected pattern. Evaluation and management of inadequate and excessive gestational weight gain is summarized in Tables 5 and 6. Food choices to enhance or slow weight gain are listed in Tables 7 and 8.

TABLE 5
Inadequate Gestational Weight Gain

Definition: < 2 lbs per month after the first trimester

Evaluation

Measurement error	Homelessness
Excessive gain at previous visit (e.g., edema)	Pica
Disordered eating	Substance use
Restrictive eating/dieting/meal skipping	Nausea, vomiting or heartburn
Psychosocial stress	Inadequate sleep and rest
Social isolation	High level of physical activity
Lack of partner or family support	Physically demanding job
Depression	Gestational diabetes
Denial/rejection of pregnancy	Urinary ketones
Inadequate food access	

Management

5-6 nutrient dense meals and snacks	Manage physical discomforts
Adequate rest and sleep	Refer to food assistance programs
Decreased physical activity	Psychosocial counseling
Stress management/relaxation techniques	Food journal

Source: Institute of Medicine. Nutrition during pregnancy: part I, weight gain: part II, nutrient supplements. Washington, DC: National Academy Press; 1990.

TABLE 6	
Excessive Gestational Weight Gain	
Definition: >6 lbs per month	
Evaluation	
Measurement error	Twin or triplet pregnancy
Weight loss at previous visit	Depression
Edema	Binge eating
Smoking cessation	Psychosocial stress
Alcohol use	Social isolation
Infrequent, large meals	Emotionally based eating
High fat and/or sugar intake	Pica
Physical inactivity	
Management	
Sensitive, supportive, non-shaming manner	Alternatives to emotionally-based eating
Moderate physical activity	Increased water and dietary fiber sources
Positive reinforcement for smoking cessation	Psychosocial counseling
Small, frequent meals (avoiding excess hunger and fullness)	Stress management/relaxation techniques
Decreased fat and sugar intake	Continue to gain weight at expected rate – avoid weight loss or stabilization
Healthy snack and fast food choices	Food journal
Refer to food assistance programs	Limit portions to average serving size
Source: Institute of Medicine. Nutrition during pregnancy: part I, weight gain: part II, nutrient supplements. Washington, DC: National Academy Press, 1990.	

TABLE 7	
Food Choices to Increase Weight Gain	
Waffles, pancakes, French toast	Instant breakfast drinks, supplements (e.g., Boost®, Ensure®)
Macaroni and cheese, pasta salads	Pudding, custard, rice pudding, flan
Baked potato with cheese, peas, corn, potato salad, coleslaw	Peanut butter toast, nuts, sunflower or pumpkin seeds
Fruit and yogurt shakes, smoothies, bananas, canned fruit	Grilled cheese, tuna or egg salad sandwiches
Dried fruits	Deviled eggs, cheese omelet
Shakes and malts, ice cream, sundaes, flavored milks	Beans and rice, tacos, lasagna, pizza
	Split pea, lentil or cream soups
	Oatmeal or peanut butter cookies
Reprinted with permission from: Alton I. Weight gain: issues and management. In: Story M, Stang J. eds. Nutrition and the pregnant adolescent: a practical reference guide. Minneapolis, MN: Center for Leadership, Education and Training in Maternal and Child Nutrition, University of Minnesota, 2000; p. 86.	

TABLE 8
Food Choices to Slow Weight Gain

Whole grain bread, low fat crackers, pocket bread, unsweetened cereals	Light margarine or butter, low fat or fat free salad dressings, mayonnaise, sour cream; cooking oil spray
Fresh fruit, unsweetened fruit juice (limit to 1-2 cups per day), raw vegetables with salsa/low fat dip, salads with low fat dressing	Baked chips, pretzels, frozen yogurt, low fat ice cream, snack size candy bars, juice bars
Baked "fries"	Water, mineral water, diet carbonated beverages (in moderation)
Skim or 1% milk, low fat or fat free yogurt, low fat cheeses	Angel food cake, graham crackers, frozen yogurt
Baked, grilled, broiled, stewed or poached lean meats, fish, poultry	

Reprinted with permission from: Alton I. Weight gain: issues and management. In: Story M, Stang J. eds. Nutrition and the pregnant adolescent: a practical reference guide. Minneapolis, MN: Center for Leadership, Education and Training in Maternal and Child Nutrition, University of Minnesota, 2000; p. 86.

- Suggest easily prepared or carry-with breakfasts (see Table 9).
- Make recommendations to manage nausea, heartburn, or constipation (Table 10).
- Advise the avoidance of alcohol, tobacco, and drugs, and limited intake of caffeine (e.g., 2 or fewer servings per day).
- Suggest fast food choices that can help meet nutritional needs without excessive calories or fat.
- Encourage an adequate intake of folic acid, iron, and calcium from foods and/or supplements.
- Recommend a low dose multivitamin and mineral supplement for adolescents who are unable to improve their diets to meet pregnancy needs, who are vegans, those with a multiple gestation, those who smoke more than 20 cigarettes per day or those who abuse alcohol or drugs.¹⁸ Chewable vitamins are available for adolescents unwilling to swallow pills.
- Supplemental calcium (600 mg elemental) is recommended if the adolescent is unable to consume adequate dietary calcium.³⁷ This dosage can be achieved with 1500 mg calcium carbonate.
- Refer eligible adolescents to the WIC Program (Special Supplemental Nutrition Program for Women, Infants and Children).
- Promote and encourage breastfeeding in pregnant adolescents.
- Discuss perceived barriers to breastfeeding, such as discomfort, embarrassment, and compatibility of breastfeeding with returning to school or work.
- Provide breastfeeding education and support.
- Encourage regular meals and snacks consistent with the daily food guide for lactating adolescents, and fluid intake to thirst.

- Discuss the importance of a healthy lifestyle, including smoking cessation, the avoidance or minimal intake of alcohol (e.g., one drink per occasion) and limited caffeine intake (e.g., two servings/day).
- Discourage rapid weight loss and unsafe weight loss practices such as diet pills or restricted diets. If needed, encourage gradual weight loss through regular meals and snacks emphasizing low/nonfat dairy products; lean meats, poultry and fish; fruits, vegetables and whole grains; limited intake of foods and beverages high in sugar or fat; and moderate exercise.

TABLE 9
Quickly-Prepared/Portable Breakfasts

Yogurt and fruit smoothie	Tortilla with melted cheese
Orange Julius®	Peanut butter toast and chocolate milk
Peanut butter, banana and milk shake	Bagel with cheese or peanut butter
Instant breakfast	Trail mix
Cereal, yogurt and fruit	Cereal or granola bars
Cereal, milk and fruit	Energy bar
Instant hot cereal	Oatmeal cookies
Cold pizza	Hard boiled eggs
Leftover chicken	String cheese and fruit
Sandwich	Pudding
Cottage cheese and fruit	

TABLE 10
Recommendations For the Management of Nausea, Heartburn and Constipation in Pregnancy

Nausea

Eat a dry, carbohydrate-rich food (e.g., breakfast cereal, popcorn, pretzels, crackers) before getting out of bed.

Avoid brushing teeth (which may initiate the gag reflex) early in the morning.

Eat small meals high in carbohydrate (e.g., pasta, rice, toast) every 2-3 hours throughout the day.

Avoid long periods without eating since an empty stomach may increase nausea.

Separate the intake of liquids and solids by about one hour.

Avoid offensive odors such as cooking smells, cigarette smoke and perfume. A scented candle may mask bothersome odors that can't be avoided.

Avoid cigarette smoking, alcohol and caffeine.

Eat fruit ices, popsicles, sherbet, lemon drops.

Drink caffeine-free carbonated beverages or lemonade.

Chew peppermint gum.

Smell a fresh cut lemon.

Choose alternative protein sources if meat is bothersome (e.g., peanut butter, cottage cheese, cheese).

Get adequate sleep and rest. Lie down during bouts of nausea.

Limit intake of highly seasoned and spiced foods and foods high in fat.

Get fresh air and moderate exercise (e.g., walking).

Delay the use of vitamin and iron supplements until symptoms improve. Children's chewable vitamins or highly-fortified breakfast cereals can be used as a vitamin source until supplements are tolerable.

Eat according to appetite and preferences.

Heartburn

Avoid lying down or bending over after eating.

Avoid eating 2-3 hours before bedtime.

Eat small meals frequently throughout the day.

Limit foods high in fat and avoid or limit esophageal irritants

Limit the intake of fluids with meals.

Avoid tobacco and alcohol.

Elevate the head of the bed 6 inches with wooden blocks or raise the head 6-10 inches with a foam rubber wedge under the mattress.

Wear loose-fitting, comfortable clothing.

Constipation

Increase fluid intake to two to three quarts per day. Hot or iced beverages in the morning are especially helpful.

Eat regular meals, especially breakfast.

Attempt defecation after meals when the gastrocolic reflex is strongest.

Increase dietary fiber to 25-35 g per day. High fiber sources include bran, bran cereals, prunes and other dried fruit, nuts and seeds, popcorn, dried beans and peas, fruits and vegetables (eat raw and include skins when possible), whole grains (e.g., whole wheat bread, oatmeal, grits, whole wheat pasta, brown rice).

Increase physical activity (e.g., walk, swim).

Practice Kegel exercises to increase voluntary pelvic floor muscle contractions.

Severe constipation may require medications: Stool bulking agents such as Metamucil® are not systemically absorbed and are considered safe in pregnancy. Stool softeners have also been widely used without reported side effects.

Stimulant laxatives are not recommended for regular use.

Mineral oil is not recommended since it can decrease the absorption of fat-soluble vitamins which may result in neonatal hypothermia and hemorrhage.

Castor oil is contraindicated in pregnancy since it may stimulate uterine contractions.

Compiled from: Bonapace ES, Jr., Fisher RS. Constipation and diarrhea in pregnancy. *Gastroenterol Clin North Am* 1998;27(1):197-211; Institute of Medicine. Nutrition during pregnancy and lactation: an implementation guide. Washington, DC: National Academy Press, 1992.

RESOURCES

Story M, Stang J. eds. Nutrition and the pregnant adolescent: a practical reference guide. Minneapolis, MN: Center for Leadership, Education and Training in Maternal and Child Nutrition, Division of Epidemiology, University of Minnesota; 2000. May be ordered or chapters downloaded. <http://www.epi.umn.edu/let/nmpabook.html>

Education, Training, Research Associates
Resource Center for Adolescent Pregnancy Prevention (ReCAPP)
P.O. Box 1830
Santa Cruz, CA 95061
831-438-4060
www.etr.org/recapp/index.htm

Association of Reproductive Health Professionals
2401 Pennsylvania Ave., N.W., Suite 350
Washington DC 20037-1718
www.arhp.org

National Institute of Nutrition
408 Queen Street 3rd floor
Ottawa, Ontario
K1R 5A7
Canada
613-235-3355
http://www.nin.ca/public_html/Consumer/pregnancy.html

REFERENCES

1. Hellerstedt WL. Trends in adolescent sexual behavior, contraceptive use, pregnancy, and pregnancy resolution. In: Story M, Stang J, eds. Nutrition and the pregnant adolescent. Minneapolis: Center for Leadership Education and Training in Maternal and Child Nutrition, University of Minnesota, 2000;1-15.
2. Zeev H, Cromer B. The use of long-acting contraceptives in adolescents. *Pediatr Clin North Am* 1999;46(4):719-732.
3. Cromer BA, Blair JM, Mahan JD, Zibners L, Naumovski Z. A prospective comparison of bone density in adolescent girls receiving depot medroxyprogesterone acetate (Depo-Provera), levonorgestrel (Norplant), or oral contraceptives. *J Pediatr* 1996;129(5):671-676.
4. Cundy T, Cornish J, Evans MC, Roberts H, Reid IR. Recovery of bone density in women who stop using medroxyprogesterone acetate. *Br Med J* 1994;308(6923):247-248.
5. Giddens JB, Krug SK, Tsang RC, Miodovnik GS, Prada JA. Pregnant adolescents and adult women have similarly low intakes of selected nutrients. *J Am Diet Assoc* 2000;100(11):1334-1340.
6. Czeisel AE, Dudas I. Prevention of the first occurrence of neural-tube defects by periconceptional vitamin supplementation. *N Engl J Med* 1992;327:1832-1835.
7. Recommendations for the use of folic acid to reduce the number of cases of spina bifida and other neural tube defects. *MMWR Morb Mortal Wkly Rep* 1992;41(RR-14):1-7.

8. Ventura SJ, Freedman MA. Teenage childbearing in the United States, 1960-1997. *Am J Prev Med* 2000;19(1 Suppl):18-25.
9. Lenders CM, McElrath TF, Scholl TO. Nutrition in adolescent pregnancy. *Curr Opin Pediatr* 2000;12(3):291-296.
10. Scholl TO, Hediger ML, Cronk CE, Schall JI. Maternal growth during pregnancy and lactation. *Horm Res* 1993;39(Suppl 3):59-67.
11. Frisancho AR. Reduction of birth weight among infants born to adolescents: maternal- fetal growth competition. *Ann N Y Acad Sci* 1997;817:272-280.
12. Siega-Riz AM, Herrmann TS, Savitz DA, Thorp JM. Frequency of eating during pregnancy and its effect on preterm delivery. *Am J Epidemiol* 2001;153(7):647-652.
13. Herrmann TS, Siega-Riz AM, Hobel CJ, Aurora C, Dunkel-Schetter C. Prolonged periods without food intake during pregnancy increase risk for elevated maternal corticotropin-releasing hormone concentrations. *Am J Obstet Gynecol* 2001.
14. Clausen T, Slott M, Solvoll K, Drevon CA, Vollset SE, Henriksen T. High intake of energy, sucrose, and polyunsaturated fatty acids is associated with increased risk of preeclampsia. *Am J Obstet Gynecol* 2001;185(2):451-458.
15. Institute of Medicine. Nutrition during pregnancy: part I, weight gain: part II, nutrient supplements. Washington, DC: National Academy Press; 1990.
16. Sowers MF, Scholl T, Harris L, Jannausch M. Bone loss in adolescent and adult pregnant women. *Obstet Gynecol* 2000;96(2):189-193.
17. Scholl TO, Hediger ML, Schall JI, Khoo CS, Fischer RL. Dietary and serum folate: their influence on the outcome of pregnancy. *Am J Clin Nutr* 1996;63(4):520-525.
18. Godfrey KM, Barker DJ. Fetal nutrition and adult disease. *Am J Clin Nutr* 2000;71(5 Suppl):1344S-1352S.
19. Carmichael SL, Abrams B. A critical review of the relationship between gestational weight gain and preterm delivery. *Obstet Gynecol* 1997;89(5 Pt 2):865-873.
20. Buschman NA, Foster G, Vickers P. Adolescent girls and their babies: achieving optimal birthweight. Gestational weight gain and pregnancy outcome in terms of gestation at delivery and infant birth weight: a comparison between adolescents under 16 and adult women. *Child Care Health Dev* 2001;27(2):163-171.
21. Hediger ML, Scholl TO, Schall JI. Implications of the Camden Study of adolescent pregnancy: interactions among maternal growth, nutritional status, and body composition. *Ann N Y Acad Sci* 1997;817:281-291.
22. Broussard CN, Richter JE. Nausea and vomiting of pregnancy. *Gastroenterol Clin North Am* 1998;27(1):123-151.
23. Weigel RM, Weigel MM. Nausea and vomiting of early pregnancy and pregnancy outcome. A meta-analytical review. *Br J Obstet Gynaecol* 1989;96(11):1312-1318.
24. Boyce RA. Enteral nutrition in hyperemesis gravidarum: a new development. *J Am Diet Assoc* 1992;92(6):733-736.
25. Tsang IS, Katz VL, Wells SD. Maternal and fetal outcomes in hyperemesis gravidarum. *Int J Gynaecol Obstet* 1996;55(3):231-235.
26. Behrman CA, Hediger ML, Scholl TO, Arkangel CM. Nausea and vomiting during teenage pregnancy: effects on birth weight. *J Adolesc Health Care* 1990;11(5):418-422.

27. van Stuijvenberg ME, Schabort I, Labadarios D, Nel JT. The nutritional status and treatment of patients with hyperemesis gravidarum. *Am J Obstet Gynecol* 1995;172(5):1585-1591.
28. Feeney JG. Heartburn in pregnancy [editorial]. *Br Med J (Clin Res Ed)* 1982;284(6323):1138-1139.
29. Bonapace ES, Jr., Fisher RS. Constipation and diarrhea in pregnancy. *Gastroenterol Clin North Am* 1998;27(1):197-211.
30. Kann L, Kinchen SA, Williams BI, Ross JG, Lowry R, Grunbaum JA, et al. Youth Risk Behavior Surveillance--United States, 1999. *Morb Mortal Wkly Rep CDC Surveill Summ* 2000;49(No. SS-5):1.
31. National Center on Addiction and Substance Abuse. *Dangerous liaisons: substance abuse and sex*. New York: Columbia University; 1999.
32. Midanik LT, Zahnd EG, Klein D. Alcohol and drug CAGE screeners for pregnant, low-income women: the California Perinatal Needs Assessment. *Alcohol Clin Exp Res* 1998;22(1):121-125.
33. Beard JL. Iron deficiency: assessment during pregnancy and its importance in pregnant adolescents. *Am J Clin Nutr* 1994;59(2 Suppl):502S-508S discussion 508S-510S.
34. Ross Laboratories. Updated breastfeeding trend through 1997. Data from Ross laboratories mothers' surveys. Columbia, MD: Ross Products Division, Abbott Laboratories 1999.
35. Institute of Medicine. *Nutrition during lactation*. Washington, DC: National Academy Press; 1991.
36. Motil KJ, Kertz B, Thotathuchery M. Lactational performance of adolescent mothers shows preliminary differences from that of adult women. *J Adolesc Health* 1997;20(6):442-449.
37. Institute of Medicine. *Nutrition during pregnancy and lactation: an implementation guide*. Washington, DC: National Academy Press; 1992.