

## **Part IV**

# **Human Nutrient Needs in the Life Cycle**

# 5

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## *Nutrition during Pregnancy and Lactation*

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### **Recommendations for Women before Pregnancy**

It seems logical that the nutritional status of a woman prior to pregnancy as well as maternal nutrition should affect fetal development and subsequent pregnancy outcome. However, many confounding variables are common to the investigation of maternal nutrition and fetal development.<sup>1</sup> This section briefly summarizes recommendations for maternal nutrition.<sup>2-7</sup> It also includes comments about lactation, since maternal diet plays a central role in the transfer of nutrients to the infant. Table 5.1 includes special recommendations for women during childbearing years. Suggestions for counseling and treatment during a preconception care office visit are given in [Table 5.2](#).

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### **Risk Factors for Prenatal Nutrition Risk and Indications for Referral**

Table 5.2 includes nutrition assessment, counseling, and treatment strategies for women seeking care in both the prenatal and postnatal stages. Fetal growth is affected by the

**TABLE 5.1**

#### Special Recommendations for Women before Pregnancy

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Maintain a healthy weight.

Engage in physical activity regularly.

If you need to gain or lose weight, do so gradually (no more than 1–2 pounds/week).

If trying to become pregnant and ordinarily drink alcoholic beverages, stop drinking or cut back on the amount you drink.

If you smoke, quit or cut back to improve health.

To minimize risk of having an infant with a neural tube defect, eat a highly fortified breakfast cereal that provides 100% of the Daily Value (DV) for folate or take a vitamin supplement that provides 400 µg/day of folic acid.

Folic acid, the synthetic form of folate, is obtained only from fortified foods or vitamin supplements. It is not yet known whether naturally occurring folate is as effective as folic acid in the prevention of neural tube defects.

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**TABLE 5.2**

Nutritional Care at Preconception, Prenatal, and Postnatal Visits

Visit	Assessment	Counseling/Treatment
Preconception care	Determine BMI	If <18 or >25, counsel on appropriate weight
	Evaluate diet/supplement intake	Develop a concrete plan for eating enough food to achieve/maintain a healthy weight Begin prenatal vitamin/mineral supplement Prescribe calcium supplement if intake <1000 mg Prescribe synthetic folic acid supplement of 400 µg per day
	Botanical use	Discontinue those with known or potential toxicities
	Evaluate for anemia	Hgb <12 g/dl, start therapeutic regimen of approximately 60–120 mg/day of ferrous iron; give multivitamin/mineral supplement that contains ~15 mg of zinc and ~2 mg of copper When anemia has resolved, discontinue high-dose iron
	Use of harmful substances	Reinforcement for any constructive steps already taken; provide assistance with quitting, and refer for further evaluation
Prenatal	Evaluate diet	Utilize dietary intake questionnaire, e.g. Diet Score, food frequency questionnaires
	Optimal weight gain during pregnancy	BMI <19.8 28–40 lbs 19.8–26.0 25–35 lbs 26.1–29.0 15–25 lbs >29 ~15 lbs
	Rate of weight gain	First trimester 1 1/2–5 lbs Second and third trimester 1/2–2 lbs/week
	Poor weight gain < 2 lbs/month < 10 lbs by mid-pregnancy	Intensive assessment and counseling
	Nutritional needs/barriers	If patient is economically unable to meet nutritional needs — referral to federal food and nutrition programs (WIC) Increase knowledge with dietary counseling
	Vitamin/mineral supplementation	No requirement for routine supplementation except folate (400 µg/day) and iron (30–60 mg elemental iron/day) Dietary supplements should be given if the adequacy of a patient’s diet is questionable or if she is at high nutritional risk Excessive vitamin and mineral intake (more than twice the RDA) should be avoided
	Prophylaxis for iron deficiency Iron deficiency anemia	Supplement of ferrous iron — 30 mg elemental iron daily 60–120 mg elemental iron daily
	Evaluate use of alcohol, tobacco, drugs	Effects of substance use/abuse on perinatal outcomes Abstinence from alcoholic beverages
	Caffeine intake	Consumption of 2–3 servings of caffeinated beverages is unlikely to have adverse effects; in general, caffeinated beverages provide few essential nutrients and often crowd out better sources of nutrients
	Lactose intolerance	May result in insufficient calcium intake Supplemental calcium necessary if insufficient calcium consumed from food sources
Gestational diabetes mellitus Nausea/emesis	Referral for nutrition assessment and counseling Eat crackers before getting out of bed in the morning; eat frequent small meals; eat low-fat, bland foods; eat ginger (soda, tea, or ginger snaps); suck on hard candy; eat salty/tart foods combined (e.g., potato chips with lemonade); supplement with vitamin B <sub>6</sub> (25 mg three times daily); wear Sea Band® (an elastic band worn on wrists to counter nausea caused by sea-sickness)	

**TABLE 5.2** (Continued)

## Nutritional Care at Preconception, Prenatal, and Postnatal Visits

Visit	Assessment	Counseling/Treatment
	Hyperemesis gravidarum	Doxylamine (Unisom), 12.5–25 mg three times daily; ginger in any form (tea, soda, tablets [250-mg capsule, 4 times daily for 4–5 days]); emetrol, 5–10 mL in the morning and every 3–4 hours as needed; anti-emetic/anti-nausea medications (e.g., trimethobenzamine [Tebamide, Tigan, Trimazide], 200 mg suppository three times daily, or promethazine, 12.5–25 mg orally, rectally, or intravenously every 4–6 hours)
	Constipation	Foods high in dietary fiber, including cereals, bread, fruits, and vegetables; adequate fluids; moderate exercise; soluble fiber (e.g., Metamucil, Citrucel); docusate; change brand of iron supplement
Postpartum	Diet	Utilize dietary intake questionnaire Dietary guidelines are similar to those established during pregnancy Balanced, nutritious diet will ensure both the quality and quantity of milk produced without depletion of maternal stores
	Caloric requirement	Minimal caloric requirement for adequate milk production in a woman of average size is 1800 kcal/day
	Vitamin/mineral supplement	Not needed routinely; mothers at nutritional risk should be given a multivitamin supplement with particular emphasis on calcium and vitamins B <sub>12</sub> and D
	Weight retention	There is no relationship between BMI or total weight gain and weight retention Aging, rather than parity, is the major determinant of increases in a woman's weight over time
	Residual postpartum weight retention	Special attention to lifestyle, including exercise and eating habits

quality and quantity of the maternal diet, the ability of the mother to digest and absorb nutrients, maternal cardiorespiratory function, uterine blood flow, placental transfer, placental blood flow, and appropriate distribution and handling of nutrients and oxygen by the fetus. Factors that put women at nutritional risk for pregnancy are listed in [Table 5.3](#).<sup>5,8–10</sup> Patients at high nutritional risk should be provided professional nutritional counseling and/or referral to a nutrition intervention program. ([Table 5.4](#)). The Women, Infants, and Children (WIC) Program is a food prescription program designed and proven to reduce poor pregnancy outcomes ([Table 5.5](#)).

## Weight Gain and Pregnancy

### Pregnancy Weight Goals

There is a lack of consistent findings concerning relationships of birth interval, parity, prepregnancy weight or body mass index (BMI), height, and physical activity to maternal weight or weight gain.<sup>11–24</sup> The Cochrane Pregnancy and Childbirth Group<sup>25</sup> summarized the findings on the effects of advising pregnant women to increase their energy and protein intakes, on gestational weight gain, and on the outcome of pregnancy. They found that nutritional advice appears to be effective in increasing pregnant women's energy and

**TABLE 5.3**

## Risk Factors for Prenatal Nutritional Risk

Risk Factor	Low Risk	High Risk
Is patient pre- or adolescent or less than 3 yrs post menarche?	No	Yes
Is patient economically disadvantaged or have limited income for food?	No	Yes
Does patient have history of anemia or is anemic (hematocrit <32 mg/% during pregnancy)?	No	Yes
Is patient's BMI <19.8 or >26.1?	No	Yes
Does patient have history of fad dieting, or restrictive eating?	No	Yes
Does patient have illness or medication that will interfere with absorption; is she HIV+ ?	No	Yes
Does patient use tobacco, alcohol, or drugs?	No	Yes
Does patient practice pica (consume ice, starch, clay, or other substances in large amounts)?	No	Yes
Does patient experience nausea and/or vomiting?	No	Yes
Is patient lactose intolerant?	No	Yes
Is weight gain 0.8–1.0 lb/wk?	No	Yes
Does patient stay within the weight gain range recommended for her prepregnancy BMI?	Yes	No
Weight gain less than 15 lbs or more than 45 lbs?	No	Yes

**TABLE 5.4**

## Indications for a Referral of Pregnant Patients for Nutrition Assessment and Counseling

Patient has interest in and desire to see a nutritionist
Patient has inappropriate weight gain
Patient has gestational diabetes
Patient has chronic condition managed with diet (e.g., diabetes, hyperlipidemia)
Patient has history of anemia
Patient has inadequate or inappropriate food supply
Patient has history of prepregnancy anorexia or bulimia
Patient has significant discomforts of pregnancy (e.g., heartburn, nausea, vomiting)
Patient has preeclampsia
Patient has multiple gestation
Patient is adolescent
Patient is vegetarian
Patient is interested in or undecided about breastfeeding

**TABLE 5.5**

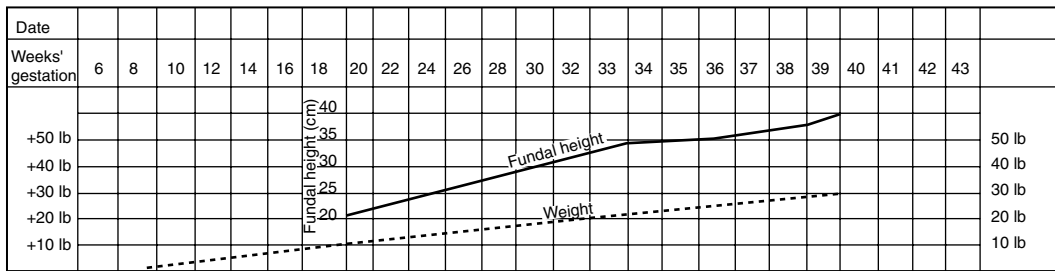
## Characteristics of Women, Infants, and Children (WIC) Program

Target Audience	Pregnant women Breastfeeding women Non-breastfeeding mothers of infants <6 months old Infants <1 y/o Children <5 y/o
Purpose	Provide nutritious foods, health checks, referrals, nutrition education, and counseling
Eligibility Criteria	Low income: <185% U.S. federal poverty level for women and children
Food	Nutrient rich, high in protein, calcium, iron and vitamins A & C Limited brand names Patient-purchased food and infant formula from local supermarkets
Nutrition Education	Individual and group Specific to risk
Health Checks	Height, weight, and anemia testing for women, infants and children Height, weight, and anemia testing for women and children 1 yr old test for lead

**TABLE 5.6**

Pregnancy Weight Goals

Optimal Weight Gain (pounds)	Characteristic
25–35	Most women and normal pregnancy Prepregnancy BMI 19.8–26.0 or 100% prepregnancy ideal body weight
28–40	Women at higher risk for low birth weight babies including adolescents and African American women Prepregnancy BMI <19.8 (underweight) or 90% ideal body weight Twin pregnancy
15–25	Prepregnant BMI >26.1 (overweight or obese) or >120% ideal body weight
15	Prepregnant BMI >29 or >135% ideal body weight



**FIGURE 5.1**

Graph for tracking weight and fundal height. (From Kolasa, K.M. and Weismiller, D.G., *Nutrition during pregnancy, Am Fam Phys*, 56(1): 206, July 1995. With permission.)

protein intakes but the implications for fetal, infant, or maternal health cannot be judged from the available trials.<sup>26</sup>

Some researchers question the recommendation that African American women gain more weight than caucasian women, suggesting that the data only show questionable benefit in reducing risks for low birth weight babies. Obese women have a greater risk of pregnancy complications, especially gestational diabetes, hypertensive disorders, cesarean deliveries, and postoperative morbidity. Infants of obese women may be at greater risk for macrosomia and perinatal death.<sup>21,25</sup>

The recommendations in [Table 5.6](#) were established by the National Academy of Sciences of the National Institute of Medicine in 1990.<sup>16</sup> They were reviewed and left unchanged by the Maternal Weight Gain Expert Group in 1996.<sup>24</sup> Weight gain goals are determined to provide optimal risk reduction for delivering a low birth weight baby while avoiding adverse effects on the mother’s health. The recommendations vary based on prepregnancy weight, age, and ethnicity. The weight gain expected is essentially linear, as demonstrated in [Figure 5.1](#).<sup>4</sup>

Women with prepregnant body mass index (BMI) >35 are at increased risk for gestational diabetes, preeclampsia, placenta abrupta, cesarean delivery, and endometriosis.

**Rate of Weight Gain**

In 1996, the Maternal and Weight Gain Expert Group<sup>24</sup> suggested a weight gain of 1.5 pounds/week for normal weight women during the second half of a twin pregnancy.

**TABLE 5.7**

Rate of Weight Gain (Pounds)

Timing (trimester)	Appropriate	Inadequate	Excessive
1st	3–5 Total	Less	More
2nd, 3rd	1/wk	Less than 2 lbs in a single month for normal wt women or less than 1 lb in obese	More than 6.5 in a single month

**TABLE 5.8**

Weight Gain Distribution during Pregnancy (Pounds)

Source	Pounds
Amniotic fluid	2–2.6
Baby	7–8.5
Fat/breast tissue stores for breastfeeding	1–4
Increased blood volume	4–5
Increased weight of uterus	2
Maternal fat stores	4–7
Placenta	0.7–1.0
Tissue fluid	3–5
Total	25–35

Weight gain is the single most reliable indicator of pregnancy outcome.<sup>11,23</sup> Weight status should be routinely assessed for amount and rate. [Figure 5.1](#) depicts an example of a graph for tracking weight. Weight charts should be shown to women and their support partners. [Table 5.7](#) gives recommended weight gains. The optimal weight for a newborn infant of 39 to 41 weeks gestation is 6.6 to 8.8 pounds.<sup>9</sup>

Women with inadequate weight gain should eat more frequently, be referred to a dietitian for nutrient assessment and counseling, choose more nutrient-dense foods, avoid alcohol and tobacco use, limit activity, and avoid caffeine or other appetite depressants. Women with excessive gain should reduce portion sizes, limit intake of sweets and foods high in fat, increase activity, and be evaluated by a registered dietitian.

### Weight Gain Distribution during Pregnancy

Weight gain by pregnant women consists of water, protein, and fat. Measurements of maternal water gain may predict birth weight better than measurements of composite weight gain. The total amount of weight gained, the composition of gain, and the rate of energy metabolism all differ among healthy pregnant women. [Table 5.8](#) is a typical teaching tool about weight gain distribution.

### Nutrition Snacks

Pregnant women may need suggestions for healthy snacks. [Table 5.9](#) includes snacks of about 100 calories.

## Dietary Requirements for Pregnancy and Lactation

### Dietary Reference Intake (DRI)

Dietary Reference Intakes are the levels of intake of essential nutrients considered adequate to meet or exceed known nutritional needs of practically all healthy people. [Table 5.10](#)

**TABLE 5.9**

Nutritious Snacks of 100 kcalories or Less

Food Item	Serving Size
Applesauce	2/3 cup
Bagel	1/2
Carrot, raw	1 cup or 1 large
Cheese, low-fat	1 oz.
Cottage cheese, low-fat	1/3 cup
Entenmann's® fat-free cakes/pastries	1 small slice
Figs, low-fat or other Newton® cookies	1-1/2 tsp
fruit, dried (like apricots, raisins, prunes)	4 tsp.
Fruit, fresh	1 medium
Graham crackers	2
Grits	1 package
Milk, skim	1 cup
Pretzels	15
Pudding made w/skim milk	1/3 cup
Rice cakes, flavored	2
Tortilla chips, baked, low-fat and w/salsa	12
Tuna	1/2 cup
Yogurt, frozen	1/2 cup
Yogurt, low-fat	1/2 cup

includes the Recommended Dietary Allowances (RDA) and Adequate Intakes (AI) as available in 1999 for pregnancy and lactation.<sup>27,28</sup> These levels are set by the Food and Nutrition Board of the National Academy of Sciences.

Nutrient needs that are increased during pregnancy and/or lactation include protein, folate, vitamins A, B6, C, and D, calcium, iron, and zinc.<sup>18,29-34</sup> Energy needs are also increased by 300 kcal/day at the second trimester of pregnancy and by 850 kcal/day during lactation to produce adequate breast milk supply. During lactation 500 calories should be consumed as nutrient-dense foods, with the remaining 350 calories coming from maternal fat stores accumulated during pregnancy.<sup>35</sup>

### The Food Guide Pyramid Servings

The Food Guide Pyramid (Table 5.11) provides guidelines for the number of servings from each food group that should be eaten daily during pregnancy and lactation. Pregnant women should drink 8 to 10 glasses of water each day.

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## Dietary Assessment of the Pregnant Woman

Individualized nutrition assessment and planning is important because of the strong associations between extremes in prepregnancy BMI, extremes in weight gain, and adverse pregnancy outcomes.<sup>3,4,7,36,37</sup>

### Behavior Change Tool

Assessment relies on the woman's medical record, history, and physical examination. Nutritional factors of importance include previous nutritional challenges, eating disorders, pica, fad dieting, strict vegetarian diet, medications, and quantity and quality of current diet. The Institute of Medicine provides a sample dietary history tool (Table 5.12).<sup>3</sup>



**TABLE 5.10**

Food and Nutrition Board, National Academy of Sciences — National Research Council Recommended Dietary Allowances,<sup>a</sup> revised 1989 (abridged) and Dietary Reference Intakes (DRI)

Designed for the maintenance of good nutrition of practically all healthy people in the United States

Category	Condition	Protein (g)	Vitamin A ( $\mu\text{g RE}$ ) <sup>b</sup>	Vitamin E (mg $\alpha$ -TE) <sup>c</sup>	Vitamin K ( $\mu\text{g}$ )	Vitamin C (mg)	Iron (mg)	Zinc (mg)	Iodine ( $\mu\text{g}$ )	Selenium ( $\mu\text{g}$ )
Pregnant		60	800	10	65	70	30	15	175	65
Lactating	1st 6 months	65	1300	12	65	95	15	19	200	75
	2nd 6 months	62	1200	11	65	90	15	16	200	75

Note: *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride* [1997] and *Dietary Reference Intakes for Thiamin, Riboflavin, Niacin, Vitamin B<sub>6</sub>, Folate, Vitamin B<sub>12</sub>, Pantothenic Acid, Biotin, and Choline* [1998].

<sup>a</sup> The allowances, expressed as average daily intakes over time, are intended to provide for individual variations among most normal persons as they live in the U.S. under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined.

<sup>b</sup> Retinol equivalents. 1 retinol equivalent = 1  $\mu\text{g}$  retinol or 6  $\mu\text{g}$   $\beta$ -carotene.

<sup>c</sup>  $\alpha$ -Tocopherol equivalents. 1 mg d- $\alpha$  tocopherol =  $\alpha$ -TE.

**TABLE 5.10** (Continued)

Food and Nutrition Board, Institute of Medicine — National Academy of Sciences

## Dietary Reference Intakes: Recommended Intakes For Individuals

Life-Stage Group	Calcium (mg/d)	Phosphorus (mg/d)	Magnesium (mg/d)	Vitamin D		Thiamin (mg/d)	Riboflavin (mg/d)	Niacin (mg/d) <sup>c</sup>	Vitamin B <sub>6</sub>		Folate (μg/d) <sup>d</sup>	Vitamin B <sub>12</sub>		Pantothenic Acid (mg/d)	Biotin (μg/d)	Choline <sup>e</sup> (mg/d)
				(μg/d) <sup>ab</sup>	(mg/d)				(mg/d)	(μg/d)		(μg/d)				
Pregnancy																
≤ 18 yr	1300*	<b>1250</b>	<b>400</b>	5*	3*	<b>1.4</b>	<b>1.4</b>	<b>18</b>	<b>1.9</b>	<b>600<sup>h</sup></b>	<b>2.6</b>	6*	30*	450*		
19-30 yr	1000*	<b>700</b>	<b>350</b>	5*	3*	<b>1.4</b>	<b>1.4</b>	<b>18</b>	<b>1.9</b>	<b>600<sup>h</sup></b>	<b>2.6</b>	6*	30*	450*		
31-50 yr	1000*	<b>700</b>	<b>360</b>	5*	3*	<b>1.4</b>	<b>1.4</b>	<b>18</b>	<b>1.9</b>	<b>600<sup>h</sup></b>	<b>2.6</b>	6*	30*	450*		
Lactation																
≤ 18 yr	1300*	<b>1250</b>	<b>360</b>	5*	3*	<b>1.5</b>	<b>1.6</b>	<b>17</b>	<b>2.0</b>	<b>500</b>	<b>2.8</b>	7*	35*	550*		
19-30 yr	1000*	<b>700</b>	<b>310</b>	5*	3*	<b>1.5</b>	<b>1.6</b>	<b>17</b>	<b>2.0</b>	<b>500</b>	<b>2.8</b>	7*	35*	550*		
31-50 yr	1000*	<b>700</b>	<b>320</b>	5*	3*	<b>1.5</b>	<b>1.6</b>	<b>17</b>	<b>2.0</b>	<b>500</b>	<b>2.8</b>	7*	35*	550*		

Note: This table presents Recommended Dietary Allowances (RDAs) in bold type and Adequate Intakes (AIs) in ordinary type followed by an asterisk (\*).

<sup>a</sup> As cholecalciferol. 1μg cholecalciferol = 40 IU vitamin D.

<sup>b</sup> In the absence of adequate exposure to sunlight.

<sup>c</sup> As niacin equivalents (NE). 1 mg of niacin = 60 mg of tryptophan; 0-6 months = preformed niacin (not NE).

<sup>d</sup> As dietary folate equivalents (DFE). 1 DFE = 1μg food folate = 0.6 μg of folic acid (from fortified food or supplement) consumed with food = 0.5 μg of synthetic (supplemental) folic acid taken on an empty stomach.

<sup>e</sup> In view of evidence linking folate intake with neural tube defects in the fetus, it is recommended that all women capable of becoming pregnant consume 400 μg of synthetic folic acid from fortified foods and/or supplements in addition to intake of food folate from a varied diet.

<sup>f</sup> It is assumed that women will continue consuming 400 μg of folic acid until their pregnancy is confirmed and they enter prenatal care, which ordinarily occurs after the end of the periconceptual period — the critical time for formation of the neural tube.

**TABLE 5.11**

## Food Guide Pyramid Servings

Food Group	Serving Size	Number of Servings		
		During Adolescent Pregnancy	During Pregnancy	During Pregnancy
Milk/dairy	1 milk, cottage cheese, or yogurt; 1 oz. cheese	5	4	4
Protein-rich	3 oz. meat, fish, or poultry; 1 dried beans	4	3-4	3-4
Breads/cereals, rice/pasta	1/2 cooked rice, cereal, or pasta; 1 slice bread; 4 crackers	9-11	6-11	6-11
Fruits	1 small piece fresh fruit; 1/2 canned fruit; 1/3 fruit juice	2-4	2-4	2-4
Vegetables	1/2 fresh, cooked, or canned	3-5	3-5	3-5
Fats/oils/sweets	1 tsp margarine, mayonnaise, salad dressing or gravy	use in moderation	use sparingly	use sparingly

**TABLE 5.12**

## Behavior Change Dietary Assessment Tool

What you eat and some of the lifestyle choices you make can affect your nutrition and health now and in the future. Your nutrition can also have an important effect on your baby's health. Please answer these questions by circling the answers that apply to you.

*Eating Behavior*

- Are you frequently bothered by any of the following? (circle all that apply)  
Nausea   Vomiting   Heartburn   Constipation
- Do you skip meals at least 3 times a week? No   Yes
- Do you try to limit the amount or kind of food you eat to control your weight? No   Yes
- Are you on a special diet now? No   Yes
- Do you avoid any foods for health or religious reasons? No   Yes

*Food Sources*

- Do you have a working stove? No   Yes  
Do you have a working refrigerator? No   Yes
- Do you sometimes run out of food before you are able to buy more? No   Yes
- Can you afford to eat the way you should? No   Yes
- Are you receiving any food assistance now? (circle all that apply)  
Food stamps   School breakfast   School lunch  
Donated food   Commodity Supplemental Food Program  
Food from a food pantry, soup kitchen, or food banks
- Do you feel you need help in obtaining food? No   Yes

*Food and Drink*

- Which of these did you drink yesterday? (circle all that apply)  
Soft drinks   Coffee   Tea   Fruit drink  
Orange juice   Grapefruit juice   Other juices   Milk  
Kool-Aid®   Beer   Wine   Alcoholic drinks  
Water   Other beverages (list) \_\_\_\_\_
- Which of these foods did you eat yesterday (circle all that apply):  
Cheese   Pizza   Macaroni and cheese  
Yogurt   Cereal with milk

13. Other foods made with cheese (such as tacos, enchiladas, lasagna, cheeseburgers)

Corn	Potatoes	Sweet potatoes	Green salad
Carrots	Collard greens	Spinach	Turnip greens
Broccoli	Green beans	Green peas	Other vegetables
Apples	Bananas	Berries	Grapefruit
Melon	Oranges	Peaches	Other fruit
Meat	Fish	Chicken	Eggs
Peanut butter	Nuts	Seeds	Dried beans
Cold cuts	Hot dog	Bacon	Sausage
Cake	Cookies	Doughnut	Pastry
Chips	French fries	Deep fried foods, such as fried chicken or egg rolls	
Bread	Rolls	Rice	Cereal
Noodles	Spaghetti	Tortillas	

Were any of these whole grain? No    Yes

13. Is the way you ate yesterday the way you usually eat? No    Yes

*Lifestyle*

14. Do you exercise for at least 30 minutes on a regular basis — 3 times a week or more? No    Yes

15. Do you ever smoke cigarettes or use smokeless tobacco? No    Yes

16. Do you ever drink beer, wine, liquor, or any other alcoholic beverages? No    Yes

17. Which of these do you take? (circle all that apply)

Prescribed drugs or medications

Any over the counter products (such as aspirin, acetaminophen, antacids, or vitamins)

Street drugs (such as marijuana, speed, downers, crack, or heroin)

From: Institute of Medicine, 1992.

Systematic assessment of the diet is preferable to questions like “How are you eating?” The 24-hour dietary recall method is commonly used to recall the types and amounts of foods and beverages consumed during the previous day. The food frequency questionnaire has been demonstrated to detect pregnancy-related changes in diet.

**Nutritional Risk Tool**

Table 5.13 is an example of a more quantitative method for assessing the diet.<sup>37</sup> The mother’s usual intake is determined for each of the food groups (meats and alternatives, dairy, bread and cereal, fruits and vegetables) and the score is tallied. A patient with fewer than 80 points is at nutritional risk. The evaluator should determine whether the patient has problems such as nausea/vomiting, lactose intolerance, constipation, or cravings for non-food items. Women with a score of fewer than 50 points should be referred to a registered dietitian for counseling.

**Complications of Pregnancy that May Impact Nutritional Status**

A number of complications of pregnancy may impact nutritional status. Some of these include nausea and vomiting, constipation, caffeine intake, and alcohol intake.

**Nausea and Vomiting**

About 70% of pregnant women report nausea during the first 14–16 weeks of pregnancy, and 37–58% experience vomiting. The etiology is unknown. The remedies include diet, fluids, and reassurance.<sup>38,39</sup> Table 5.14 is a collection of remedies.

**TABLE 5.13**

Nutritional Risk Score (Massachusetts Department of Health)

Foods Usually Eaten	Amount
<b>Meat or alternates</b>	
meats, fish, poultry (fresh or processed), liver, eggs, nuts, peanut butter, legumes	_____ servings
1 oz = 5 points	_____ oz. meat, fish, cheese <sup>a</sup>
maximum score = 40 points	_____ oz. alternate
<b>Milk (type) 1 unit = 5 points</b>	
1 unit = 8 fl oz.	_____ fluid _____ cups
<b>Cheese<sup>b</sup> (type) _____</b>	
maximum score = 15 points	_____ oz.
<b>Bread and cereal<sup>c</sup> whole grain, enriched, other maximum</b>	
score = 15 points	_____ servings
<b>Fruits and vegetables</b>	
citrus and/or vitamin C-rich vegetables	_____ servings
green and yellow vegetables	_____ servings
all other, including potato	_____ servings
	Total fruits
vitamin A                      vitamin C	
1 unit = 5 points      1 unit = 5 points	
2 units = 15 points    2 units = 15 points	_____ servings
<b>Supplements<sup>d</sup> (type)</b>	
	_____ amount
<b>Other foods and beverages</b>	

total score: more than 80 = no risk, less than 80 = risk, less than 50 = high risk

<sup>a</sup> Cheese in excess of the 3 units scored in milk; 1 oz. cheese equals 1 unit<sup>b</sup> Maximum of 3 oz. scored<sup>c</sup> Unit = 1 slice of bread or 1 oz cereal. Less than 3 units = 0, 3 units = 5 points, 4 units = 10 points, 5 units = 15 points<sup>d</sup> Not given a scoreFrom *JADA*: 86(10), 1986, with permission.**TABLE 5.14****Nonpharmacological Remedies for Nausea and Vomiting**


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Eat small, frequent meals
Eat dry foods/cold foods
Take dietary supplements after meals
Suck on candy
Switch brands of iron supplements
Eat combinations of foods that are salty and tart
Eat vitamin B6-rich foods
Try seabands or accupressure bands
Avoid beverages with meat
Avoid caffeine
Avoid spicy, acidic foods, strong odors
Sniff lemon
Drink ginger root tea, ginger ale; eat ginger snaps; take ginger tablets (250 mg tablets 4x daily for 4–5 days)
Drink plenty of fluids to avoid dehydration

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**TABLE 5.15****Hyperemesis Gravidurum**

<b>Medication</b>	<b>Dosage</b>
Vitamin B <sub>6</sub>	25 mg tid
Doxylamine	12.5–25 mg tid
Emetrol	5–10 cc in the morning and every 3–4 hrs as needed
Anti-emetic/anti-nausea medications, e.g., trimethobenamine (Tigan)	200 mg suppository q 8 prn
Promethazine	12.5–25 mg po. Pr or iv q 4-6

**Hyperemesis Gravidarum**

Vomiting that produces weight loss, dehydration, acidosis from starvation, alkalosis from loss of hydrochloric acid in vomitus, and/or hypokalemia may be treated pharmacologically. Management is to correct dehydration, fluid and electrolyte deficits, acidosis, and alkalosis. Table 5.15 includes some pharmacological approaches.

**Constipation**

Constipation is extremely common in pregnancy due to decreased motility of the gastrointestinal (GI) tract. Constipation can be exacerbated by iron supplementation. Constipation is often related to low dietary fiber intake and low fluid intake. Table 5.16 includes foods rich in dietary fiber. The recommended intake is 20 to 30 grams of dietary fiber daily.

**Caffeine during Pregnancy and Lactation**

The literature is mixed on the effects of caffeine during pregnancy. The official FDA position advises pregnant women to avoid caffeine or consume it sparingly. Most experts agree that caffeine should be limited to less than two servings per day. Caffeine is known to decrease availability of calcium, iron, and zinc. It is not known to exert effects on the fetus. The relationship of caffeine to spontaneous abortion remains controversial. A recent report suggests that risk increases with the consumption in the range of 6 to 18 cups of coffee per day.<sup>40</sup>

Caffeine does pass into breast milk, and therefore consumption during lactation should be limited. Table 5.17 lists caffeine values for popular beverages.

Some suggestions for reducing caffeine consumption include: 1) switching to decaffeinated coffee or soft drinks; 2) cutting down on caffeinated beverages; 3) mixing caffeinated and decaffeinated coffee grounds together before making coffee; or 4) limiting consumption of caffeinated beverages to a preselected number and then switching to decaffeinated beverages over time.

**Alcohol**

Consumption of alcohol during pregnancy and lactation is controversial.

**Pregnancy**

A safe lower limit of alcohol during pregnancy is not known. Therefore, the only sure way to avoid the possible harmful effects of alcohol on the fetus is to abstain. Binge

**TABLE 5.16**

## Dietary Sources of Fiber

Serving Size	Food	Grams of Fiber
<i>Breads, Cereals, Pastas</i>		
3 cups	Air-popped popcorn	4
1 medium	Bran muffin	3
$\frac{2}{3}$ cup	Brown rice	3
1 slice	Whole wheat bread	3
$\frac{1}{2}$ cup	Cooked legumes	5
$\frac{1}{2}$ cup	Baked beans	10
$\frac{1}{2}$ cup	Great northern beans	7
$\frac{1}{2}$ cup	Lima beans	7
<i>Fruits</i>		
1 cup	Raisins	6
3	Dried prunes	5
1 medium	Pear with skin	4
1 medium	Apple with skin	3
1 cup	Strawberries	3
1 medium	Banana	3
1 medium	Orange	3
<i>Vegetables</i>		
$\frac{1}{2}$ cup	Cooked frozen peas	4
1 medium	Baked potato w/ skin	4
$\frac{1}{2}$ cup	Brussels sprouts	3
$\frac{1}{2}$ cup	Cooked broccoli tops	3
$\frac{1}{2}$ cup	Cooked carrots	3
$\frac{1}{2}$ cup	Cooked corn	3

drinking or excessive drinking during pregnancy results in fetal alcohol syndrome. However, even small amounts of alcohol can temporarily alter fetal function. Adverse outcomes have not been found with daily consumption of fewer than two standard drinks. The danger from light drinking should not be overstated. This may cause undue stress in some patients who had a few drinks before realizing they were pregnant (see [Table 5.18](#)).

### **Lactation**

Alcohol does not increase milk volume. Chronic consumption can inhibit milk ejection reflex. The American Academy of Pediatrics does, however, consider minimal alcohol (no more than 2 to 2.5 oz liquor, 8 oz wine, or 2 cans of beer on any day) compatible with lactation.

### **Hypertension**

In 1999 the National High Blood Pressure Education Committee issued an advisory on diagnoses and treatment of high blood pressure.<sup>41</sup> Using evidence-based medicine and consensus, this report updates contemporary approaches to hypertension control during pregnancy by expanding on recommendations made in the *Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC VI)*.

**TABLE 5.17**

## Caffeine Audit

Approximate the caffeine you consume by filling in the table. Recall caffeine consumption during the past 24 hours and record in column A, the number of servings or doses for each listed item. Then multiply the column A value by its corresponding column B value and record the product in column C. Add all values in column C to estimate your intake.

Sources of Caffeine	Column A Number of Servings per Day		Column B Amount of Caffeine per Serving (mg)	=	Column C Total Caffeine (mg)
<i>Coffee (6 oz.)</i>					
Automatic drip	_____	×	180	=	_____
Automatic perk	_____	×	135	=	_____
Instant	_____	×	125	=	_____
Decaffeinated	_____	×	5	=	_____
<i>Soft Drinks (12 oz.)</i>					
Regular colas	_____	×	37	=	_____
Diet colas	_____	×	50	=	_____
<i>Cocoa Products</i>					
Chocolate candy (2 oz.)	_____	×	45	=	_____
Baking chocolate (1 oz.)	_____	×	30	=	_____
Milk chocolate (2 oz.)	_____	×	10	=	_____
South American cocoa (6 oz.)	_____	×	40	=	_____
<i>Drugs (one tablet or capsule)</i>					
Dexatrim (not caffeine free)	_____	×	200	=	_____
NoDoz	_____	×	100	=	_____
Anacin	_____	×	35	=	_____
Midol	_____	×	30	=	_____
Coricidin	_____	×	30	=	_____
<i>Tea (6 oz.)</i>					
Iced tea	_____	×	36	=	_____
Hot tea (moderate steeping time)	_____	×	65	=	_____
Total				=	_____

The recommendations to use K5 for determining diastolic pressure and to eliminate edema as a criterion for diagnosing preeclampsia are discussed. In addition, the use of blood pressure increases of 30 mm Hg systolic or 15 mm Hg diastolic as a diagnostic criterion has not been recommended, as available evidence shows that women in this group are not likely to suffer increased adverse outcomes. Management considerations are made between chronic hypertension present before pregnancy and hypertension occurring as part of the pregnancy-specific condition preeclampsia, as well as management considerations in women with comorbid conditions. A discussion of the pharmacologic treatment of hypertension in pregnancy includes recommendations for specific agents. The use of low-dose aspirin, calcium, or other dietary supplements in the prevention of preeclampsia is described, and expanded sections on counseling women for future pregnancies and recommendations for future research are included.<sup>14</sup>



**TABLE 5.18**

Effects of Alcohol, Tobacco, and Drug Use on Nutritional Status and Pregnancy Outcomes and Lactation

Effect	Cause
Increased nutrient requirements/impaired nutrient absorption	Smokers have reduced vitamin C levels
Impaired growth of the fetus/stunted growth of child	Drinkers have reduced serum folate, vitamin C levels Drinkers (1–2 alcoholic beverages/day) associated with LBW, and slow weight gain and failure to thrive Smokers
Infant sleep disruption/increased arousal Delayed development/mental retardation	Consumption of one drink/day in first trimester Drinkers have children who are more at risk for hyperactivity, poor attention span, language dysfunction
Reduced fertility	Chronic drinking and smoking associated with lower fertility in men and women
Transfer to baby during lactation disrupted sleep pattern of infant	Alcohol found in breast milk about 30 min after consumption; if woman chooses to drink during lactation, limit to 1.5 oz distilled spirits, 5 oz wine, or 12 oz beer, and consume after breastfeeding

## Vitamin and Mineral Requirements, Food Sources, and Supplementation

In the United States, vitamin and mineral supplementation is common among pregnant women. During pregnancy, maternal requirements for all nutrients increase. For some nutrients, the evidence indicates a direct link between chronic maternal deficiency and poor outcome for the mother and infant. Excessive intake (usually defined as more than twice the RDA) of some nutrients may be harmful to the fetus, especially very early in the pregnancy.<sup>16,26</sup>

Supplementation is recommended only after assessment of dietary practices of pregnant women. The Institute of Medicine does not recommend routine use of prenatal vitamins; however, many physicians prescribe them because of the marginal nutritional status of their patients or because it is difficult to be completely sure of their patients' nutritional status.<sup>3</sup> Prenatal vitamins and minerals are indicated for high risk populations and those with an obstetric history of high parity, previous delivery of a low-birth-weight infant, a short interval between births, and smokers, drug or alcohol abusers, and those with multiple pregnancies.

### Prenatal Vitamins

Indications for vitamin and mineral supplementation are in shown [Table 5.19](#), which lists nutrient dose and indication for use. The contents of typical prenatal vitamin-mineral supplements are shown in [Table 5.20](#), which includes usual formation of an over-the-counter (OTC) and a prescription supplement recommended to pregnant women.

### Vitamin A

Most pregnant women do not need supplemental vitamin A, the teratogenic threshold of which may be lower than previously thought. Vitamin A is essential for embryogenesis,

**TABLE 5.19**

## Indications for Vitamin and Mineral Supplementation

Indication	Nutrient	Dose
Inadequate diet; during first two trimesters for women at risk for preterm labor or low birth weight baby	Prenatal Supplements	Read label
Up to 1200 mg/day if dairy or fortified foods not consumed	Calcium	250–300 mg
For women receiving supplemental iron	Copper	2 mg
For all women of child bearing age	Folate	400 ug
Inadequate diet; anemia	Iron <sup>a</sup>	30–60 mg elemental
Inadequate diet	Vitamin B <sub>6</sub>	2 mg
Inadequate diet	Vitamin C	50 mg
Inadequate diet; no exposure to sunlight	Vitamin D	10 µg
For women receiving supplemental iron	Zinc	15 mg

<sup>a</sup> Supplements containing high levels of folate or iron negatively affect zinc metabolism. Supplementary forms of folic acid are better absorbed than folate occurring in food.

**TABLE 5.20**

## Prenatal Vitamin Mineral Supplements

	Flintstones Complete Chewables	Prenatal Vitamin (PreCare®)
Vitamin A	5000 IU	—
Vitamin C	60 mg	50 mg
Vitamin D	400 IU	6 µg
Thiamin	1.5 mg	—
Riboflavin	1.7 mg	—
Niacin	20 mg	—
B <sub>6</sub>	2 mg	2 mg
Folic acid	400 µg	1 mg
B <sub>12</sub>	6 µg	—
Biotin	40 µg	—
Pantothenic acid	10 mg	—
Calcium (as carbonate)	100 mg	250 mg
Iron	18 mg	40 mg
Phosphorus	100 mg	—
Iodine	150 µg	—
Magnesium	20 mg	50 mg
Zinc	15 mg	15 mg
Copper	2 mg	2 mg
Vitamin E	—	3.5 mg

growth, and epithelial differentiation. Case reports have suggested an association between high doses of vitamin A (> 25,000 IU) during pregnancy and birth defects. The American College of Obstetricians and Gynecologists established 10,000 IU as the cutoff for supplemental vitamin A (retinol) prior to or during pregnancy.<sup>2</sup>

### Calcium and Magnesium

About 99% of calcium in pregnant women and their fetus is located in their bones and teeth. Pregnancy and lactation are associated with increased bone turnover to meet fat needs. If dietary deficiencies occur, maternal bone will supply the calcium to the fetus. Calcium supplementation during pregnancy has been shown to lead to an important

reduction in systolic and diastolic blood pressure.<sup>29,31</sup> Controlled clinical trials to test the hypothesis that calcium supplements during pregnancy reduce the incidence of pregnancy-induced hypertension have had mixed results. Therefore there is no support for routine supplementation with 2000 mg/day for all pregnant women. In pregnant women who have diets deficient in calcium, prepregnancy hypertension, history of preeclampsia, or chronic use of heparin and steroids, supplemental calcium is recommended.<sup>42</sup>

The fetus absorbs 6 mg of magnesium each day. Maternal magnesium levels remain constant during pregnancy despite reported inadequate intakes. Magnesium supplementation has been associated with fewer hospitalizations, fewer preterm births, and more perinatal hemorrhages compared with placebo-supplemented women. Thus, further study is needed before routine supplementation is recommended.

## **Folate**

The available data from controlled trials provide clear evidence of an improvement in hematological indices in women receiving routine iron and folate supplementation in pregnancy.<sup>30</sup> No conclusions can be drawn in terms of any beneficial or harmful effects on clinical outcomes for mother and baby. However, the Cochrane Pregnancy and Childbirth Group concludes that there is no evidence to advise against a policy of routine iron and folate supplementation in pregnancy.<sup>25</sup> Both folate intake from food and synthetic folic acid should be included in assessing and planning diet. The literature contains a variety of recommendations. The DRI is higher than can usually be obtained from food. The current recommendation during pregnancy is 600 µg/day of folic acid per day. It is well established that periconceptional use of folic acid supplementation reduces the risk of first occurrence and recurrence of neural tube defect (NTD)-affected pregnancies. The Center for Disease Control (CDC) recommends supplementation with 400 µg/day. Research is needed to determine effective strategies for disseminating information about the protective effects of folate.<sup>26</sup>

## **Iron**

Additional iron is needed by most pregnant women in the U.S. A substantial amount of iron is required, given the amount of erythropoiesis. For example, a term infant contains an average of 225 mg of iron, the placenta and cord contain 50 mg of iron through the pregnancy, and the maternal red blood count volume increases 500 mL. Although maternal absorption of iron from the GI tract is increased by about 15%, it remains difficult to meet the increased iron need through diet alone. Iron absorption is increased in the presence of ascorbic acid. Adverse pregnancy outcomes are associated with hemoglobin levels below 10.4 g/dL or above 13.2 g/dL. Clinical diagnosis of anemia is made based on hemoglobin below 10.5 g/dL, a low MCV, and serum ferritin level below 12 µg/dL. Supplementation of 30 to 60 mg per day of elemental iron is usually prescribed, although the benefit of routine iron supplementation for healthy, well nourished women during pregnancy is unproven.<sup>26,32</sup> Common side effects include stomach upset, nausea, and constipation. These effects may be relieved by reducing the dosage or switching the brand of iron supplement. Some, but not all, sustained release preparations have been clinically shown to be associated with fewer discomforts. The safety of iron supplementation at dosages greater than 100 mg per day has been questioned. Researchers suggest that excess iron may lead to zinc depletion, which is associated with intrauterine growth retardation.

## Zinc

The prevalence and effects of mild zinc deficiency in pregnancy are poorly defined. However, there have been a few case reports of severe human zinc deficiency in pregnancy that led to major obstetric complications and congenital malformations in the fetus. Supplementation studies have yielded mixed results. Iron appears to depress plasma zinc in pregnant women; therefore, zinc supplementation is recommended when >30 mg supplemental iron is taken.<sup>43</sup> Higher birth weights in infants of women with low prepregnancy weight (BMI <26) and low plasma zinc levels have been reported in women who received 25 mg zinc daily.

## Vitamin B<sub>6</sub>

The value of supplementation with Vitamin B<sub>6</sub> in pregnancy is controversial. However, it is included in most prenatal vitamins.

## Vitamin C

Taking iron tablets along with a source of vitamin C facilitates iron absorption.

## Vitamin D

Vitamin D is critical in the absorption, distribution, and storage of calcium. Relatively few foods are good sources of vitamin D.

## Food Sources of Selected Nutrients

There are a variety of published recommendations for calcium in pregnancy and lactation. The optimal calcium intake recommended by the National Institutes of Health is 1200 mg per day. This is difficult to meet with a diet containing little dairy or calcium-fortified foods. The recommended daily intake (RDI) for pregnancy and lactation varies based on age from 1000 to 1300 mg/day. The usual calcium intake in the U.S. averages less than 700 mg per day. The benefit of meeting calcium needs has been demonstrated in reducing pregnancy induced hypertension. However, no benefit in reducing preeclampsia is seen with supplementing greater than 1200 mg calcium daily. Table 5.21 lists common dietary

**TABLE 5.21**

Dietary Sources of Calcium (DRI = 1000–1300 mg/d)

Food Item	Serving Size
<i>Good: &gt; 200 mg</i>	
Broccoli/greens	2 cups
Calcium fortified foods (juice, cereal)	varies, read label
Canned salmon w/bones	3 oz.
Canned sardines w/bones	3 oz.
Cheese (cheddar, edam, Monterey jack, mozzarella, Parmesan, provolone, ricotta)	1 oz.
Ice cream	1 cup
Ice milk	1 cup
Milk (skim, 2%, whole, buttermilk)	1 cup
Yogurt	6-8 oz.

**TABLE 5.22**

Dietary Sources of Folate (DRI = 500–600  $\mu\text{g}/\text{d}$  of dietary folate equivalents (DFE))

Food Item	Serving Size
<i>Excellent &gt;100 <math>\mu\text{g}</math></i>	
Asparagus	1/2 cup
Baked beans	1 cup
Bean burritos	2
Black-eyed peas	1 cup
Fortified grain and cereal products	varies, read label
Kidney beans	1 cup
Lentils	1 cup
Liver and other organ meats:	
beef	3.5 oz.
chicken	3.5 oz.
Orange Juice	1 cup
Peanuts	4 oz.
Spinach	1/2 cup
<i>Good: 15–99 <math>\mu\text{g}</math></i>	
Almonds	4 oz.
Bread, fortified	1 slice
Beets	1/2 cup
Broccoli, cooked	1/2 cup
Cantaloupe/Honeydew melon	1 cup
Cauliflower	1/2 cup
Egg	1
French fries	large order
Lettuce (romaine)	1/2 cup
Orange	1 med
Turnip greens	1/2 cup

sources of calcium. Table 5.22 lists common food sources of folate, Table 5.23 includes common dietary sources of iron, and Table 5.24 includes common dietary sources.

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## Physical Activity during Pregnancy

Several factors influence physical activity during pregnancy, including prepregnancy exercise levels, current exercise levels, personal preferences, risk, limitations, and contraindications.<sup>13</sup> Tables 5.25 through 5.29 include guidelines for physical activity.

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## Postpartum Weight Loss

While a great deal of attention is given to counseling women about appropriate weight gain for pregnancy, clinicians have typically given less assistance in achieving postpartum weight loss. Researchers are beginning to link failure to return to prepregnancy weight

**TABLE 5.23**

Dietary Sources of Iron (DRI = 15–30 mg/d)

Food Item	Serving Size
<i>Excellent &gt;4 mg</i>	
Beef liver	3 oz.
Clams	1/2 cup
Figs (dried)	10
Iron-fortified infant cereal	1/2 cup
Iron-fortified infant cereal	3 Tsp
Kidney beans	1 cup
Molasses (blackstrap)	3 Tbsp
Peaches (dried)	10 halves
Pinto beans	1 cup
Ready-to-eat, fortified cereals (like Product 19®, Total ®)	3/4 cup
Sunflower seeds (dried, hulled)	2/3 cup
<i>Good: 2–4 mg</i>	
Beef	3 oz.
Egg yolks	3
Iron-fortified infant formula	4 oz.
Lamb	3 oz.
Lima beans	1/2 cup
Oysters	3 oz.
Peas	1 cup
Pork	3 oz.
Prune juice	1 cup
Raisins	2/3 cup
Soybeans	1/2 cup

**TABLE 5.24**

Dietary Sources of Zinc (DRI = 15–19 mg/d)

Food Item	Serving Size	mg/Serving
<i>Excellent: &gt;4 mg</i>		
Beef (lean, cooked)	3 oz.	5.1
Calves' liver (cooked)	3 oz.	5.3
Lamb (lean, cooked)	3 oz.	4.0
Oysters, Atlantic	3 oz.	63.0
Oysters, Pacific	3 oz.	7.6
<i>Good: 0.9–3.4 mg</i>		
Black-eyed peas (cooked)	1/2 cup	3.4
Chicken	3 oz.	2.4
Crabmeat	1/2 cup	3.4
Green peas (cooked)	1/2 cup	0.9
Lima beans (cooked)	3 oz.	0.9
Milk (whole)	1 cup	0.9
Pork loin (cooked)	3 oz.	2.6
Potato (baked with skin)	1 medium	1.0
Shrimp	1/2 cup	1.4
Tuna (oil-packed, drained)	3 oz.	0.9
Whitefish	3 oz.	0.9
Yogurt (plain)	1 cup	1.1

**TABLE 5.25****Benefits of Physical Activity during Pregnancy**


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Improvement in circulation
Improved posture
Improved or maintained cardiovascular fitness
Reduced risk of cesarean section, decreased labor time, decreased use of epidural and forceps
Positive effects on mood, energy level
Release of tension and reduction of stress
Prevention of injury

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**TABLE 5.26****Contraindications to Physical Activity**


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Active myocardial disease, congestive heart failure, rheumatic heart disease
Thrombophlebitis
Risk of premature labor; incompetent cervix; uterine bleeding; ruptured membranes
Intrauterine growth retardation
Severe hypertensive disease
Suspected fetal distress

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**TABLE 5.27****Warning Signs to Stop Physical Activity**


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Vaginal bleeding
Uterine contractions
Nausea, vomiting
Dizziness or faintness
Difficulty walking
Decreased fetal activity
Palpitations or rapid heart rate
Numbness in any part of the body
Problems with vision

---

**TABLE 5.28****Guidelines for Physical Activity**


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<b>Activity</b>	<b>Guideline</b>
Intensity	Reduce the intensity of exercise by 25%
Heart rate	Not to exceed 140 beats per minute
Temperature	Not to go above 101 degrees
Time	Moderate activity should not exceed 30 minutes; intersperse with low-intensity exercise and rest periods
Position	Avoid lying on back for more than 5 minutes after entering the 2nd trimester
Frequency	Exercise should be performed consistently at least three times per week and include a warm-up and a cool-down period

---

**TABLE 5.29**

## Guidelines for Recreational Activity

Activity	Guideline
General conditioning exercises	Kegel, breathing, calf pumping, abdominal, bridging, lower trunk rotation, tail wagging
Jogging	May be continued moderately, however should not be started as a new activity after pregnancy; watch out for joint pain and decrease overall distance — recommendation is 2 miles or less per day
Aerobics	Avoid high impact or step aerobics; as for jogging, look out for joint pain or signs of over exertion; avoid exercises that involve lying on the back for more than 5 minutes
Bicycling	In the third trimester it may be necessary to switch to a stationary bike due to problems with balance
Weight lifting	Can be continued during pregnancy — use light weights and moderate repetitions; avoid heavy resistance
Avoid during pregnancy	Downhill skiing, gymnastics, horseback riding, scuba diving, any contact sports

**TABLE 5.30**

## Strategies for Postpartum Weight Loss

Encourage a healthy diet based on current dietary guidelines
Make energy intake less than energy expenditure
Reduce portion size but do not restrict kcalories to less than 1800 per day
Determine foods high in fats and calories and substitute with fruits, vegetables, lean meats and fish, skinless poultry
Avoid cooking in oil, butter, margarine
Drink 8–10 glasses fluid per day
Discuss feasible physical activity
Monitor women who
Restrict intake to less than 1800 kcalories per day
Are vegans (avoid all animal products including dairy, eggs, and meats)
Avoid foods enriched with Vitamin D and have limited exposure to sunlight

with increased risks for chronic disease later in life. Table 5.30 includes currently recommended strategies for post partum weight loss.

## Nutrition and Lactation

The RDA and AI for lactation are listed in [Table 5.10](#). Suggestions for maternal nutrition to meet the increased energy and nutrient needs are listed in [Table 5.31](#). Until relatively recently, breastfeeding has been considered too imprecise to study. A wealth of information is being developed about lactation and breast milk.<sup>50</sup> [Table 5.32](#) lists some of the benefits of unrestricted nursing for the infant. Many women and their clinicians still are concerned about ways to identify whether an infant is obtaining enough nutriture. [Table 5.33](#) lists signs of insufficient milk intake. The social history of infant feeding from the late 1800s to the 1950s in the U.S. shows a transition from breastfeeding to scientific feeding of infants. As a result of that, much cultural knowledge and support for breastfeeding had been lost. Guidebooks are important for women and clinicians.<sup>46-50</sup> [Tables 5.34](#) and [5.35](#) include common concerns and recommended actions to support breastfeeding.



**TABLE 5.31****Maternal Nutrition during Breastfeeding**


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Encourage a healthy diet based on current dietary guidelines  
 Reinforce that milk quality is generally not affected by the mother's diet  
 Suggest eating meals and snacks that are easy to prepare  
 Provide patient with information on normal postpartum weight loss in a breastfeeding woman  
 Drink enough fluids to keep from getting thirsty  
 Eat at least 1800 kcalories per day  
 Use appetite as a guide to amount of food eaten in first six weeks  
 Keep intake of coffee, cola, or other sources of caffeine to 2 servings or less per day. Caffeine accumulates in the infant and use should be discontinued if infant becomes wakeful, hyperactive, or has disturbed sleep patterns.  
 This reaction is intensified with a smoking mother.

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**TABLE 5.32****Benefits of Frequent, Early, Unrestricted Nursing**


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Provides colostrum that the baby needs  
 Helps decrease newborn jaundice because of the laxative effect of colostrum  
 Provides a period of practice time before milk volume increases  
 Stimulates uterine contractions, lessening chances of maternal postpartum hemorrhage  
 Prevents infant hypoglycemia

---

**TABLE 5.33****Signs of Insufficient Milk Intake in the Newborn**


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Failure to regain birth weight by 2 weeks of age  
 Weight gain of less than 7 oz per week after regaining birth weight and less than 4 lbs in 4 months  
 Fewer than 3–4 stools per day after day 5  
 Fewer than 6 urinations per day after day 5. (During the first 5 days wet and soiled diapers should increase in number each day.)

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**TABLE 5.34****Breastfeeding Tips: Common Concerns about the Infant**


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Concern	Recommended Action
Jaundice	Continue to breastfeed at least every 2 hours around the clock. If breastfeeding is stopped, pump breasts to maintain milk supply. Avoid water or formula feedings.
Latch-on	Latch-on is necessary for baby to begin sucking at the breast. Poor latch-on is a major cause of sore nipples. Baby's mouth should be at nipple level. Support the breast by placing the thumb on the top and four fingers underneath. Tickle baby's bottom lip with nipple until baby opens mouth very wide. Center nipple quickly and bring baby very close. Baby's nose and chin should be touching breast.
Leaking	Leaking is a sign of normal letdown in the early weeks of breastfeeding. Use breast pads in bra between feedings. Avoid pads with plastic lining. During sexual activity, leaking may occur; breastfeed your baby first.
Duration of breastfeeding: how long and how often?	Frequent (every 2–3 hours) and unrestricted breastfeeding for the first weeks. Baby should empty one breast, be burped, and offered the second breast. Watch baby for signs that he is full, like falling asleep, losing interest in feeding, or stopping breastfeeding.
Early first feeding	Put baby to breast soon after delivery, if possible within the first 2 hours. Cuddling, licking, and brief sucking are good signs that baby is learning to breastfeed. Offer your breast often to let your baby practice. Ask a supportive nurse for help.
Extra feedings	Healthy breastfed newborns do not need formula, water, or juice. Breastfeed at least every 2–3 hours during the first month. Older breastfed babies will be ready for solid foods and juices between 4–6 months of age.

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**TABLE 5.35****Breastfeeding Tips: Common Discomforts That Lead to Breastfeeding Termination**

Concern	Recommended Action
Hospital survival skills	“Rooming-in” with your baby is your right as a consumer. Keep your baby with you as much as possible so you can breastfeed often. Do not give bottles of formula or water. Do not limit feeding time at breast. Ask a supportive nurse for help. Do not accept formula gift packs.
Mastitis	Mastitis is a swollen, inflamed, or infected area in the breast. Watch for flu-like symptoms such as fever above 101°F, chills and muscle aches, and a reddened, hot, tender, or swollen area in the breast. Rest, breastfeed often, and drink more fluids. Avoid tight bra or clothing. Apply warm water soaks, heating pad. Massage affected area. Antibiotics may be needed. No reason to stop breastfeeding.
Myths and misconceptions	Breast sagging is not a result of breastfeeding. Breast size does not affect ability to breastfeed. Drinking beer, manzanilla tea, or large amounts of fluids does not make more milk.
Nipples, flat or inverted (before birth)	Flat or inverted nipples retract or move in toward the breast. Breast shells (milk cups) may be worn during the last month of pregnancy to help minimize inverted nipples. Gradually increase time of use from a few hours to 8–10 hours/day. Do not wear while sleeping. Air-dry nipples if leaking occurs. Breast shells should not be used by women at risk for preterm labor.
Nipples, flat or inverted (after birth)	Begin breastfeeding as soon as possible after birth. Breastfeed frequently to avoid engorgement. Use nipple rolling or stretching before each breastfeeding. Pump breast for a short period before breastfeeding, or apply ice wrapped in a cloth and placed on the nipple before feeding. Breast shells (milk cups) may be used between feedings. Remove the breast shell just before placing baby at breast.
Engorgement	Engorgement may occur when milk first comes in or when feedings are missed or delayed. Use warm compresses or shower before feedings. Hand-express to soften areola, making it easier for baby to latch on. Breastfeed every 1–2 hours for 10–20 minutes per breast. Apply ice to breast and under arm after feeding until swelling decreases. Gentle breast massage toward nipple. Take non-aspirin pain reliever.
Breast care	Nipple pulling, tugging, or rolling during pregnancy is not necessary to prepare for breastfeeding. Avoid soaps or lotions to the nipples. Air dry nipples after breastfeeding.
Breast creams	Vitamin E, breast creams, or ointments are not recommended. No evidence exists that they heal the nipple. May make soreness worse by keeping the nipple moist. Use pure lanolin. Can massage drops of breast milk on nipples.
Breast surgery Cesarean section	Any type of breast surgery may interfere with milk supply. Breastfeed baby as soon as possible after delivery, preferably in the recovery room. Hold baby in a comfortable position. Use pillows across abdomen to protect the incision and support baby.

**Resource Materials**

American College of Obstetricians and Gynecologists, Office of Public Information, 409 12th Street SW, Washington, DC 20024-2188; 202-638-5577.

Best Start Social Marketing. 3500 E. Fletcher Avenue, Suite 519, Tampa, FL 33613; 1-800-277-4975. Best Start is a not-for-profit corporation. One of its largest social marketing projects was developed in 1997 for USDA as part of the WIC National Breastfeeding Promotion Project. A wide variety of campaign and professional materials is available.

Beststart@mindspring.com; Also see [http://www.opc.on.ca/beststart/info\\_sheets/feed.html](http://www.opc.on.ca/beststart/info_sheets/feed.html)

Erick M. *No More Morning Sickness. A Survival Guide for Pregnant Women*, Plume Book, NJ. 1-800-245-6476.

Food and Nutrition Information Center, National Agricultural Library, ARS, USDA, Beltsville, MD 20705-2351. 301-504-5719.  
<http://www.nal.usda.gov/fnic>

La Leche League International, 1400 N Meacham Rd, PO Box 4079, Schaumburg IL 60168-4079.  
<http://www.lalecheleague.org>

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March of Dimes Birth Defects Foundation Resource Center, 1275 Mamoroneck Ave, White Plains, NY 10605.  
<http://modimes.org>

National Maternal and Child Health Clearinghouse, 2070 Chain Bridge Road, Suite 450, Vienna, VA 22182-2536. 703-356-1964; fax: 703-821-2098.  
e-mail: nmhc@circsol.com; Web site: <http://www.circsol.com/mch>.

National Center for Nutrition and Dietetics, The American Dietetic Association, 216 W Jackson Blvd, Suite 800, Chicago, IL 60606-6995.  
<http://www.eatright.org>

USDA. Is Someone You Know At Risk for Foodborne Illness? Food Safety and Inspection Service, April 1990.  
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