Prenatal Nutrition: A Practical Guide for Assessment and Counseling

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Adequate nutrition during the periconceptional and prenatal periods is important for healthy pregnancy outcomes. By enhancing maternal nutritional status, health care providers can help pregnant women lower their risk of certain pregnancy complications and decrease their children's risk of adverse birth outcomes and later chronic disease. Use of evidence-based tools and recommendations will assist in the assessment of pregnant women's diets and streamline the counseling session to optimize their nutritional status. This article contains a review of the literature related to nutrition intervention studies during pregnancy that were designed to improve habits or achieve target weight gains and nutrition recommendations specific for the pregnancy state, as well as tools/resources for the health care provider for implementation of these recommendations into their busy practices. J Midwifery Womens Health 2010;55:540–549 © 2010 by the American College of Nurse-Midwives.

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INTRODUCTION

Nutrition during the periconceptional period is a key component of healthy pregnancy outcomes. By achieving a normal body mass index (BMI) prior to pregnancy, as well as improving nutritional status prior to and during pregnancy, pregnant women can lower their risk of pregnancy complications (i.e., gestational diabetes, preeclampsia) and decrease the risk of certain birth outcomes, including birth defects, intrauterine growth restriction, and later chronic disease.[1,2] Although the importance of prenatal care has recently been emphasized to improve pregnancy outcomes, many women begin pregnancy with poor eating behavior, suboptimal nutritional status, and with a prepregnancy BMI that may adversely affect the pregnancy.[3] Though attaining good health and normal weight prior to conception is ideal, pregnant women can still improve the course of their pregnancy through a healthy lifestyle that includes a well-balanced diet and physical activity. Health care providers have the opportunity to provide nutrition assessment and counseling to women at prenatal care visits. This will allow them to promote the health of the woman and her child and may instill dietary habits that last well beyond the pregnancy and postpartum period.[4] This paper will focus on dietary guidance; physical activity guidance may be found in materials available from the US Centers for Disease Control and Prevention.[5]

GESTATIONAL WEIGHT GAIN

Weight gain guidance is provided by the Institute of Medicine (IOM) and individualized to the woman's pregravid BMI, calculated as weight in kilograms divided by height squared in meters (kg/m^2).[6] These recommendations are reviewed in a companion paper in this issue[7] and are as follows: underweight women (BMI < 18.5): 28 to 40 lb total and a rate of about 1 lb per week (1–1.3 lb) during the second and third trimester; normal weight women (BMI 18.5–24.9): 25 to 35 lb total and a rate of about 1 lb per week (0.8–1 lb) during the second and third trimester; overweight women (BMI 25.0–29.9): 15 to 25 lb total and a rate of about 0.6 lb per week (0.5–0.7 lb) during the second and third trimester; and obese women (BMI ≥ 30): 11 to 20 lb total and a rate of about 0.5 lb per week (0.4–0.6 lb).[6]

How health care providers can effectively help women achieve these targeted weight gain ranges is uncertain. A review of the literature indicates there are few successful intervention studies to help women achieve weight gain within these targeted ranges. Four trials have been conducted in North American populations; all used the 1990 IOM guidelines. Gray-Donald et al.[8] used a pretest/posttest design to study Cree women from Quebec. Participants were obese prior to conception and were provided ''regular, individual diet counseling, physical activity sessions and other activities related to nutrition,'' which had no effect on adherence to the IOM gestational weight gain guidelines and a ''minor impact'' on participants' diet.[8] Olson et al.[9] also used pretest/posttest design in their intervention for normal and overweight white women from rural New York. As part of the intervention, participants' weight gain was monitored by health care providers. Participants were given a ''health checkbook'' containing targeted gestational weight gain graphs and diet self-monitoring tools, including the Food Guide Pyramid and tips for healthy eating and physical activity during pregnancy. In addition, five patient-education newsletters meant to motivate patients to control weight gain in pregnancy, to exercise, and to diet were mailed to participants. Results indicated no overall differences in participants' adherence to the IOM guidelines or

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postpartum weight retention at 1 year between the control (n = 381) and intervention groups (n = 179); however, the low-income women in the intervention group gained less weight than the control group. These results should be interpreted with caution, as the participants were not properly randomized because the study used historical controls. Polley et al.[10] randomized 120 normal and overweight women to usual care or a stepped-care behavioral intervention. The intervention included newsletters, graphs of targeted weight gain, and the addition of individual counseling if weight gain targets were not achieved. The intervention reduced the proportion of normal weight women whose weight gain during pregnancy exceeded the 1990 IOM guidelines; however, the proportion of overweight women whose gestational weight gain exceeded the guidelines increased. This opposite effect in overweight women may have been due to problems with sampling.[11] Weight retention at 8-weeks postpartum was not affected by the intervention.[10] Finally, Asbee et al.[12] randomized 100 normal, obese, and overweight women to an intensive dietary and lifestyle counseling intervention (n = 57) or routine care (n = 43). At the first visit, intervention group participants met with a registered dietitian who provided a standardized counseling session about appropriate gestational weight gain by using the IOM guidelines and diet/lifestyle during pregnancy.[12] Participants were instructed to eat 40% of calories from carbohydrates, 30% of calories from protein, and 30% of calories from fat.[12] In addition, participants were instructed to engage in moderate-intensity exercise at least three times a week. At subsequent visits, the weight of the participants in the intervention group was charted on a grid. If the participant's weight gain was within the IOM guidelines for gestational weight gain, the participant was given positive feedback and encouraged to continue her diet and exercise routine. Intervention group participants gained significantly less weight than participants in the routine care group; however, the authors did not find any difference between the groups in adherence to the IOM 1990 guidelines.

In addition to these North American studies, two studies conducted in Scandinavian populations successfully reduced gestational weight gain, whereas one trial did not increase adherence to the IOM gestational weight gain targets.[13–15] Claesson et al.[13] provided 160 obese pregnant women with a motivational interview in early pregnancy. This interview was conducted by a midwife, who assessed the participants' knowledge about obesity during pregnancy and motivated them to change their behavior. During this session, the midwife provided information about consequences of certain eating behaviors and food intake. After this initial session, participants were invited to an aerobics class once or twice a week and weekly sessions with the midwife that focused on weight control and supportive discussion. When compared with the control group of 208 obese pregnant women, intervention group women gained on average 2.6 kg less weight during pregnancy and weighed on average 2.9 kg less weight between early pregnancy and the postpartum checkup. The authors did not disclose whether intervention group participants had better adherence to the IOM guidelines for gestational weight gain. Wolff et al.[14] randomized obese pregnant women to receive either usual care or the intervention of 10 one-hour dietary counseling sessions by a dietitian designed to restrict gestational weight gain to 6 to 7 kg. This weight gain goal is similar to the 1990 IOM recommendation for obese women and is within the 2009 IOM targets.[16,6] Compared with the control group (n = 27), women in the intervention group (n = 23) limited both their energy intake and had significantly less total weight gain (adherence to the IOM targets was not discussed).[14] Kinnunen et al.[15] recruited primiparous pregnant women from public health clinics, who mostly had normal pregravid BMI. Women in the intervention group (n = 49) had five individual dietary and leisure-time physical activity counseling sessions and were given information on the IOM 1990 guidelines for gestational weight gain, whereas women in the control group (n = 56) received usual care.[15] There were no differences between control and intervention groups in adherence to the gestational weight gain targets and leisure-time physical activity, yet small positive changes were made in the diets of women by increasing high-fiber breads and fruit and vegetable consumption.[15]

In sum, few of these studies were successful in achieving healthy gestational weight gain or adherence to the 1990 IOM guidelines. Polley et al.[10] successfully increased adherence to the IOM targets in normal weight women, whereas Claesson et al.[13] were also successful in reducing gestational weight gain in their intervention group. Through intensive interventions Asbee et al.[12] and Wolff et al.[14] were successful in reducing intervention group participants' weight gain. These interventions show potential, as reduced gestational weight gain may have a meaningful impact on pregnancy outcomes and postpartum weight retention. Based on these studies, it is evident that frequent one-on-one–based interventions, tailored dietary guidance, and physical activity counseling are promising methods for health care providers to foster appropriate weight gain in pregnant women. Further work in this area is warranted if we are to support women to gain within targeted weight gain ranges during pregnancy.

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NUTRITION ASSESSMENT AND COUNSELING

Health care providers first should assess the woman's energy needs and then determine the appropriate target for gestational weight gain based on the woman's prepregnant BMI. According to the Dietary Reference Intakes, which are nutrition recommendations by the IOM for the general public, pregnant women's energy needs are the same as the estimated energy requirements in nonpregnant women until the second trimester.[17] The estimated energy requirements are prediction equations for maintenance of energy balance in healthy adults with a certain age, gender, weight, height, and physical activity level.[17] One note of caution concerning the estimated energy requirements: they were originally based on a small sample of normal weight women and may not be appropriate for estimating the needs of women with higher BMIs for gaining within the targeted IOM guidelines for gestational weight gain.[18] To calculate estimated energy requirement, one must first assess the woman's physical activity level based on her current physical activity level (Table 1).[19] Using this physical activity level as well as the woman's age, weight, and height, one is able to calculate her nonpregnant estimated energy requirements (Table 1).[19] Pregnant estimated energy requirement is then calculated by adding pregnancy energy deposition based on trimester of pregnancy to the nonpregnant estimated energy requirement.[19] A sample calculation of energy needs for a 20-year-old pregnant woman in her second trimester who is classified as low active, is 66'' tall, and weighs 154 lb prepregnancy is available in Table 2. If providers have access to the Internet, estimated energy requirements and prepregnant BMI calculations can be done using the Interactive DRI (dietary reference intakes) for Healthcare Professionals[20] (Appendix A). To help patients better understand the calorie needs for pregnancy energy deposition—340 and 452 more calories for second and third trimester, respectively—providers may discuss simple dietary adjustments that can be made to the woman's current diet (Table 3). After calculating the patient's estimated energy requirement, her gestational weight gain target can be determined by using the 2009 IOM guidelines based on her prepregnancy BMI.[7]

Although there are numerous approaches to dietary counseling during pregnancy, there are few evidence-based tools for health care providers to help their patients eat a well-balanced diet and gain weight within the IOM targets. A list of dietary guidance resources is available in Appendix A. Canada adopted the 2009 IOM guidelines and created a quick reference tool for health care professionals to implement in practice (Appendix A).[21] This tool guides providers in establishing appropriate weight gain goals, discussing strategies for healthy weight gain, assessing rate and pattern of weight gain, and promoting healthy eating and lifestyle habits postpartum. This quick reference tool is similar to the recommendations in this paper.

If health care providers have sufficient time, MyPyramid for Pregnancy provides guidance in attaining the dietary intakes recommended by the Dietary Reference Intakes and achieving a balanced diet (Appendix A).[22] This tool calculates average calorie need levels based on weight, height, and activity level for each trimester of pregnancy, which are similar to the estimated energy requirements discussed above.[22,19] Using these calorie levels, MyPyramid provides food intake patterns and recommendations to help meet energy requirements and nutritional needs.[22] If a woman enters her weight, height,

Table 1. Equations for Calculating Pregnant Women's Daily Energy Needs

	Physical Activity Coefficient			
	Sedentary,[a] kcal/day	Low Active,[b] kcal/day	Active,[c] kcal/day	Very Active,[d] kcal/day
1. Assess physical activity for use in the EER equation				
Girls aged 3–18 years	1.0	1.16	1.31	1.56
Women aged ≥ 19 years	1.0	1.12	1.27	1.45
2. Calculate nonpregnant EER using PA, age, weight, and height				
Nonpregnant girls aged 9–18 years	EER = 135.3 − (30.8 × age [y] + PA × (10 × weight [kg]+ 934 × height [m]) + 25			
Nonpregnant women aged ≥ 19 years	EER = 354 − (6.91 × age [y]) + PA × (9.36 × weight [kg] + 726 × height [m])			
3. Calculate pregnant EER based on trimester of pregnancy				
First trimester	EER = nonpregnant EER + 0			
Second trimester	EER = nonpregnant EER + 340			
Third trimester	EER = nonpregnant EER + 452			

EER = estimated energy requirement; PA = physical activity coefficient.

[a]Sedentary: typical daily living activities (e.g., household tasks, walking to the bus).

[b]Low active: typical daily living activities and 30 to 60 min of daily moderate activity (e.g., walking at 5–7 km/h).

[c]Active: typical daily living activities and at least 60 min of daily moderate activity.

[d]Very active: typical daily living activities and at least 60 min of daily moderate activity PLUS either an additional 60 min of vigorous activity or 120 min of moderate activity.

Source: Institute of Medicine, 2005.[18]

Table 2. Sample Illustration of Calculating Energy Needs for a 20-Year-Old Pregnant Woman in the Second Trimester, Who Has Low Activity,[a] Is 66 Inches Tall (1.68 Meters), and Before Pregnancy Weighed 154 lb (70 kg)

1. Assess physical activity for use in the EER equation		
Women aged ≥ 19 years	Low active[a]	PA = 1.12
2. Calculate nonpregnant EER using PA, age, weight, and height		
Nonpregnant women aged ≥ 19 years	EER = 354 − (6.91 × age [y]) + PA × (9.36 × weight [kg] + 726 × height [m]) EER = 354 − (6.91 × 20) + PA × (9.36 × 70] + 726 × 1.68) EER = 2316	
3. Calculate pregnant EER based on trimester of pregnancy		
Second trimester	EER = 2316 + 340 = 2656 calories daily	

EER = estimated energy requirement; PA = physical activity coefficient.

[a]Physical activity includes typical daily living activities plus 30 to 60 min of daily moderate activity.

and daily activity level into the MyPyramid Web site, MyPyramid provides succinct recommendations for food intake for each trimester in Web-based and printable formats (Figure 1). After determining the MyPyramid recommendations for a pregnant woman, the MyPyramid menu planner is a useful resource to help patients determine whether they are meeting their dietary recommendations (Appendix A).[23] If a more thorough dietary assessment and planning tool is desired, MyPyramid tracker can be used to assess whether intake meets nutrient and calorie needs (Appendix A).[24] For assistance with use of MyPyramid tracker, a tutorial is available online (Appendix A).[25]

Providers with limited time may find a brief screening tool useful. One method that may be appropriate is Starting the Conversation for Pregnant Women (Figure 2), which is adapted from Starting the Conversation (STC), a brief food frequency questionnaire designed primarily for health care provider use in clinical practice.[26,27] Starting the Conversation for Pregnant Women uses health behavior techniques where the woman indicates whether she is ready to make changes and then self-administers questions about her dietary patterns. Depending on the woman's responses to the questions and readiness to change; the provider can then offer appropriate tips for dietary improvement and guidance with goal setting. To facilitate the counseling session, responses are organized into three columns. The left column indicates the healthiest dietary habits, whereas the center column indicates less healthy habits and the right column indicates the least healthy practices.[27] Responses in the left column are scored zero, whereas responses in the center column and right column are scored 1 and 2, respectively.[27] Total scores range from 0 to 14, with higher scores reflecting poor diet habits and lower scores healthy diet habits.[27] Validity of STC has been examined by Paxton et al.,[27] who determined that the STC classifies people relatively well according to their diet-related chronic disease risk. Starting the Conversation is currently being validated by Ammerman et al. (A. Ammerman, written communication, September 2009) as part of a study focused on diabetes control. Although STC was originally designed to determine diet-related chronic disease risk and guide counseling, it is generalizable to pregnant women as it assesses general dietary habits that can be quickly addressed in the counseling session and provides simple tips for dietary improvement.

Table 3. Ideas for Incorporating Food That Meets the Recommended 340 to 450 Additional Calories During the Second and Third Trimesters[49]

Food	Calories, kcal
8 oz lowfat vanilla yogurt + 2 Tbl almonds + ½ C berries	340[a]
2 oz cheddar cheese + 5 cherry tomatoes + 5 round crackers	340[a]
1 medium banana + 1½ Tbl peanut butter + 8 fl oz skim milk	340[a]
10 medium baby carrots + 1 Tbl reduced calorie ranch dressing + 1 medium apple + 2 Tbl walnuts	340[a]
12 fl oz fruit smoothie (fruit, juice, lowfat yogurt) + 2 Tbl trail mix	450

Tbl = tablespoon; C = cup; fl oz = fluid ounce.

[a]To increase to 450 kcal, add 1½ cups of skim milk or ½ cup lowfat yogurt to snack.

Food safety is another important topic to review as pregnant women and their fetuses are at a higher risk for developing food-borne illnesses. Food safety guidance should follow the 2005 dietary guidelines for pregnancy[28] and the Food and Drug Administration and Environmental Protection Agency guidance for fish avoidance and consumption.[29] Pregnant women are advised to follow general food safety practices by washing their hands and cooking surfaces frequently, refrain from cross-contamination by separating raw meat, poultry, and seafood from other foods, cook food to proper temperatures, and refrigerate foods quickly to prevent harmful bacteria from proliferating.[30] These practices will help minimize risk of food-borne illness. To further prevent toxoplasmosis, a parasitic infection, pregnant women should wash hands thoroughly with soap and water after handling soil, sand, raw meat, or unwashed vegetables.[31] In addition, pregnant

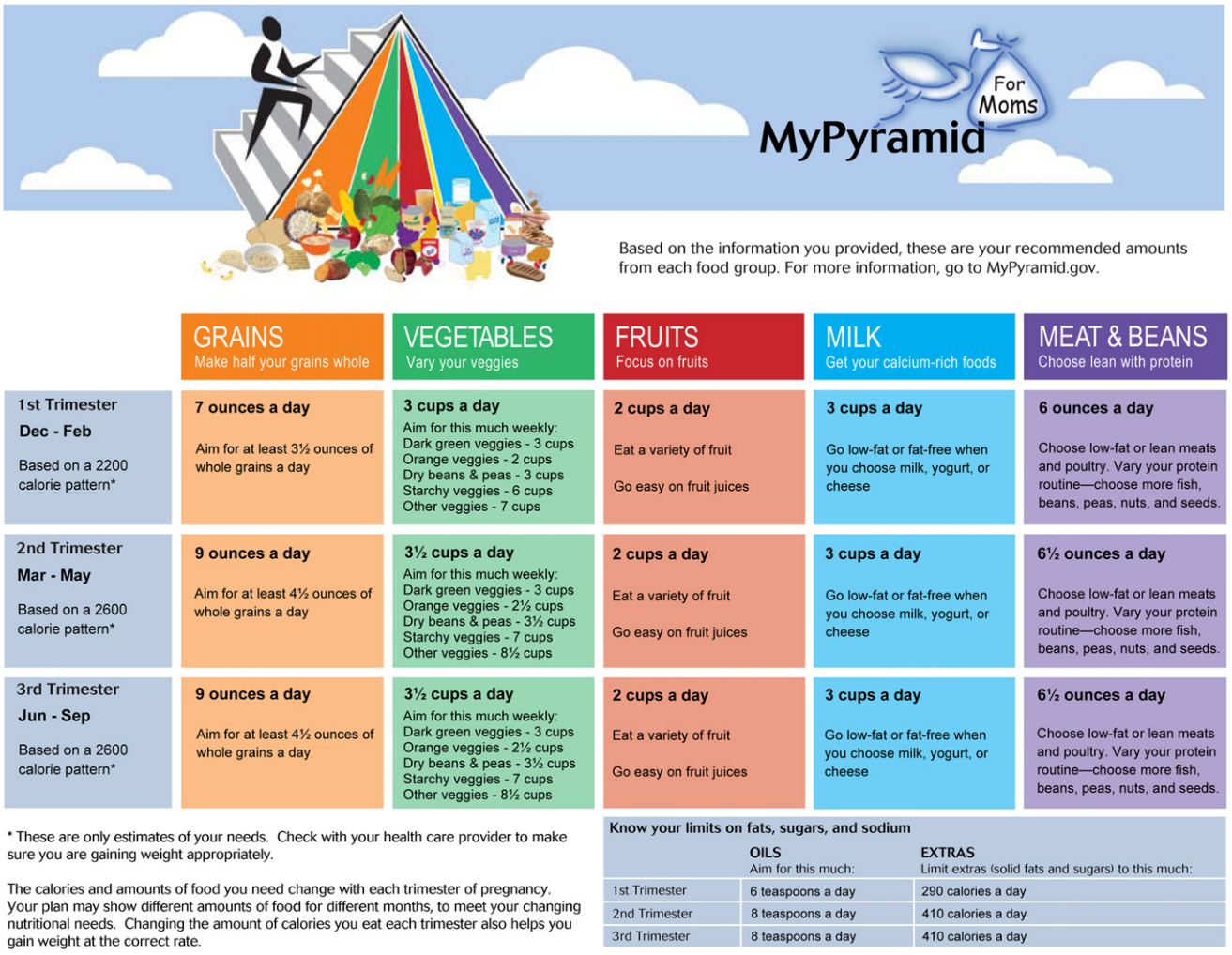

Figure 1. MyPyramid recommendations for an example 25-year-old woman who is 5'4," 185 lb, with less than 30 minutes of daily physical activity, in printable (pdf) format. Source: MyPyramid Plan for Pregnancy and Breastfeeding.[22]

women must avoid the following foods, which are more likely to have *Listeria,* a harmful bacteria[32]: 1) hot dogs, luncheon meats, and bologna, unless reheated to steaming hot; 2) salads made in the grocery, such as ham salad, tuna salad, and egg salad; 3) unpasteurized milk and milk products, such as soft cheeses (feta, queso blanco, Brie); and 4) smoked seafood and meat spreads from the deli counter. To avoid mercury from fish, pregnant women should not eat shark, swordfish, king mackerel, or tilefish; however, to obtain important nutrients widely available in fish—such as omega-3 fatty acids—pregnant women can eat up to 12 oz weekly of lower mercury–containing fish and seafood (e.g., shrimp, canned light tuna, salmon, pollock, and catfish).[29,33,34]

In addition to providing dietary and food safety guidance, health care providers may choose to evaluate household food security. Food-insecure households possess limited or uncertain availability of nutritious safe foods and may not be able to acquire these foods through socially acceptable methods.[35] Recently, Laraia et al.[35] found that household food insecurity was associated with heavier prepregnancy weight, greater gestational weight gain, and higher odds of gestational diabetes mellitus. Food security can be assessed using the Six-Item Short Form of the U.S. Household Food Security Module developed by the Economic Research Service of the United States Department of Agriculture[36] (Appendix A). Households with food insecurity may be referred to local and/or federal food assistance programs such as the Special Supplemental Nutrition Program for Women Infants and Children (WIC) and the Supplemental Nutrition Assistance Program.

Vitamins and Minerals

Multivitamin and mineral supplementation is recommended for women with iron-deficiency anemia and for women who consume few animal products.[1] For vegans and lacto-ovo

Starting the Conversation on Healthy Eating for Pregnant Women

ARE YOU READY TO WORK ON **HEALTHY EATING** DURING YOUR PREGNANCY?

___ I'm ready to make some changes and I would like help
___ I'm not sure if I'm ready to change the way I eat but I would like to start the conversation
___ I'm not ready to change the way I eat at this time

HOW WELL DO YOU EAT?	TIPS TO HELP YOU EAT WELL
How many times a week do you eat food that is fried or high in fat? ☐ Less than 1 ☐ 1-3 ☐ 4 or more	**Eat less fast food.** • If you eat fast food, order grilled chicken, a salad or plain burger.
How many servings of fruit and vegetables do you eat each day? ☐ 5 or more ☐ 3-4 ☐ 2 or less	**Aim for 5 or more servings of fruits and vegetables a day.** • Add a fruit and a vegetable to each meal. • Raw fruits and vegetables are easy snacks.
How many regular sodas, juice or glasses of sweetened beverages do you drink each day? ☐ Less than 1 ☐ 1-2 ☐ 3 or more	**Beverage calories add up.** • Drink water throughout the day. • If you drink milk, switch from whole or 2% to 1% or skim. • Limit soda and other sweet drinks to one or less per day.
How many times a week do you eat beans (like pinto or black beans), chicken or fish? ☐ 3 or more ☐ 1-2 ☐ Less than 1	**Eat more beans, chicken and fish.** • Beans are a great substitute for meat. • Eat up to 12 oz. of low-mercury fish weekly like canned light tuna, salmon or pollock. • Eat baked, broiled, or grilled chicken and fish. • Avoid high mercury fish like shark, swordfish, king mackerel and tilefish.
How many times a week do you eat regular (not low-fat) snack chips or crackers? ☐ 1 or less ☐ 2-3 ☐ 4 or more	**Hold the chips.** • Try popcorn, but limit oil, butter or salt. • Try nuts such as almonds or walnuts, but limit your serving to 2 Tablespoons.
How many times a week do you eat desserts and other sweets? ☐ 1 or less ☐ 2-3 ☐ 4 or more	**Be smart with your sweet tooth.** • Eat smaller amounts of dessert. • Try desserts with less fat and calories like fruit, sherbet or angel food cake.
How much butter, lard and animal fat (visible fat in red meat, chicken skin) do you eat? ☐ Very little ☐ Some ☐ A lot	**Cut back on animal fats.** • Use a small amount of plant-based oils and trans-fat free margarines. • Season foods with spices and fresh herbs. •

0 x (_____) + 1 x (_____) + 2 x (_____) = Total Score _____

IF YOU FEEL THIS WAY	TRY THESE THINGS
Healthy food costs too much.	**Eating well can save you money.** • Eat less meat and more beans. • Eat canned or frozen fruits and vegetables. • Eat at home instead of going out.
Healthy food doesn't taste as good as junk food.	**Don't give up your favorite foods—just eat smaller amounts.** • Try new foods and recipes.
I eat when I'm bored, tired, angry or depressed.	**Find something else to distract you.** • Work on a hobby, call a friend, go for a walk. • Keep only healthy snacks around.
It's hard to be healthy when I eat out.	**Avoid all-you-can-eat places and restaurants that don't offer healthy options** • Order grilled or low-fat sandwiches and salads instead of fried foods. • Ask for low-fat dressing on the side. • Ask for half portions, share with a friend, or bring leftovers home.
I eat too much at social events.	**You can still eat healthy at social events.** • Eat a healthy snack before you go. • Choose a few things to eat. • Bring healthy dishes to potlucks.
I eat too much when I'm cooking or cleaning.	**Don't just eat because it is there.** • Chew gum or a toothpick. • Ask someone else to put away leftovers while you wash dishes.
I tend to skip regular meals, but snack in front of the TV and throughout the day.	**Make time for regular meals.** • Sit down at the table and eat healthy meals with friends, family and/or co-workers. • Pack lunch and snacks to take to work or for travel.

Making a Plan

What goal(s) can you set for yourself now?
Before my next visit, I am going to:
___ Eat fried foods less often
___ Aim to eat 5 or more fruits and vegetables per day
___ Eat smaller portions
___ Instead of regular sodas, juice and sugar sweetened beverages, drink water or skim milk
___ Keep healthy snacks around
___ Other _____

Figure 2. Starting the Conversation for Pregnant Women.[26,53] Higher scores reflect poor dietary patterns, whereas lower scores indicate more healthy dietary patterns. Adapted with permission from A Ammerman.

vegetarians, vitamin B_{12} supplementation is imperative to prevent developmental delays.[1] Furthermore, it is recommended that women carrying multiple fetuses and women who are substance or alcohol abusers take a multivitamin and mineral supplement.[1] Women following a meal plan based on MyPyramid are likely to meet most of their nutrient needs;[22] however, iron requirements may not be met as maternal iron needs nearly double during pregnancy.[1,37] Maternal iron-deficiency anemia increases risk for adverse birth outcomes, including low birth weight, perinatal mortality, and may increase risk of preterm birth.[1] Daily iron intake of 27 mg of iron is recommended for women with adequate iron status, whereas the Centers for Disease Control recommend daily iron supplementation of 30 mg per day for all pregnant women beginning at the first prenatal visit.[38,39] Anemic women, with hematocrit levels less than 33% in the first and third trimesters or less than 32% in the second trimester (confirmed with a repeat hematocrit test), should be supplemented with 60 mg per day of oral iron and encouraged to consume iron-rich foods.[37,39] Good sources of iron-rich foods include red meat, clams, oysters, spinach, lentils, chickpeas, and fortified ready-to-eat cereals. Nonmeat, iron-rich foods can be consumed with food rich in vitamin C, such as citrus fruits, to enhance iron absorption.

All women are encouraged to take at least 400 to 800 μg of folic acid supplements daily during the periconceptional period to reduce risk of neural tube and other birth defects.[40] Women with a history of a neural tube defect–affected pregnancy or who are at high risk of neural tube defects need at least 4 mg of synthetic folic acid supplements daily.[40,41]

Vitamin D intake either from diet or from the sun may be sufficient during the summer; however, in winter months and for women with dark pigmented skin, daily supplementation of vitamin D in amounts up to the recommended dietary allowance of 200 IUs is suggested, with an upper limit of 2000 IUs.[1,42] The IOM is currently considering the evidence to revise the dietary reference intakes for calcium and vitamin D and expects to publish their updated recommendations in late 2010.[43]

Much attention has recently been given to the functions of omega-3 fatty acids during pregnancy as a result of evidence from observational studies showing a protective effect on pre-eclampsia and preterm birth; however, evidence from randomized trials is less supportive, and thus, an overall consensus on the amount to consume during pregnancy has not been reached in the United States.[44–46] The two main omega-3 fatty acid sources in the United States food supply are docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA). Although there are presently no dietary reference intakes for DHA or EPA, health care providers may recommend sources of omega-3 fatty acid–rich foods, such as fortified eggs, and up to 12 oz per week of certain fatty fish, including salmon, herring, trout, anchovy, mackerel (not King mackerel), and sardines.[34]

Alcohol, Caffeine and Alternative Sweeteners

Avoidance of alcohol and caffeine should also be encouraged. Alcohol intake during pregnancy is associated with major neurologic and developmental birth defects.[1] High caffeine intake during pregnancy is associated with spontaneous miscarriage and low birth weight.[1] Caffeine intakes greater than 300 mg per day are discouraged.[1] Average caffeine content of brewed coffee is 188 mg for 16 oz, with a range of 143 to 259 mg.[47] Carbonated sodas contain between 18 to 48 mg per 12-oz can, whereas energy drinks have higher caffeine content of 33 to 75 mg per 8.4 oz.[48] For more information on caffeine content of specific beverages, refer to the United States Department of Agriculture National Nutrient Database for Standard Reference (Appendix A).[49] Moderate intake of alternative sweeteners that are classified by the Food and Drug Administration as ''generally recognized as safe'' within acceptable daily intakes is considered safe; alternative sweeteners that are generally recognized as safe include acesulfame potassium, aspartame, saccharin, sucralose, neotame, and stevia.[50,51]

Referrals

Patients who desire more comprehensive dietary guidance should be referred to a registered dietitian. Patients with cultural practices and beliefs that affect their diet may need to be referred to a dietitian, who can help them meet their nutritional needs.[1] Referrals for patients with poor dietary patterns such as avoidance of certain foods or food groups are also recommended.[1] Patients with hyperemesis, phenylketonuria, diabetes, hypertension, or other chronic disease should be referred to a registered dietitian for medical nutrition therapy.[1] Women with a history of substance abuse may need to be referred as well.[1] The American Dietetic Association manages a ''find a nutrition professional'' Web site (Appendix A) that can assist in locating a registered dietitian in your area for referrals.[52]

CONCLUSIONS

Health care providers have an important role in nutrition assessment and counseling of pregnant women. Providers are the key individuals who monitor gestational weight gain and provide tools to promote healthy pregnancy with optimal infant and maternal outcomes. By providing dietary guidance to patients, health care providers collectively will improve the health and well-being of pregnant women, their offspring, and our society.

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Appendix A. Resource List for Dietary Guidance During Pregnancy

2005 USDA Dietary Guidelines	*www.health.gov/DietaryGuidelines/dga2005/document/default.htm*
American Dietetic Association Find a Nutrition Professional	*www.eatright.org/cps/rde/xchg/ada/hs.xsl/home_fanp_consumer_ENU_HTML.htm*
Canadian Gestational Weight Gain Quick Reference Tool for Healthcare Professionals	*www.hc-sc.gc.ca/fn-an/consultation/init/_matern-weight-poids2009/refer-tool-outil-eng.php*
International Food Information Council: Healthy Eating During Pregnancy Brochure	*www.foodinsight.org/Resources/Detail.aspx?topic=Healthy_Eating_During_Pregnancy*
MyPyramid for Pregnancy and Breastfeeding	*www.mypyramid.gov/mypyramidmoms/index.html*
MyPyramid Menu Planner	*www.mypyramidtracker.gov/planner/launch.aspx*
MyPyramid Tracker	*www.mypyramidtracker.gov/*
MyPyramid Tracker Tutorial	*www.mypyramid.gov/tracker/trackertutorial.html*
United States Department of Agriculture Interactive Dietary Reference Intake and Estimated Energy Requirement Calculator	*http://fnic.nal.usda.gov/interactiveDRI/*
United States Department of Agriculture Food Security Survey Short	*www.ers.usda.gov/Briefing/FoodSecurity/surveytools/short2008.pdf*
United States Department of Agriculture National Nutrient Database	*www.nal.usda.gov/fnic/foodcomp/search/*