SECTION 3

MATERNAL HEALTH AND NUTRITION

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3.0 MATERNAL NUTRITION

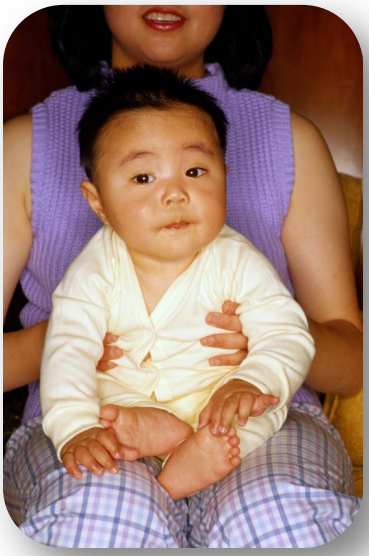
3.0.1 Introduction

A mother's nutrition status and health both before and during pregnancy have significant effects on the outcome of her offspring. A baby's birth weight, rate of postnatal growth and chances of survival are all influenced by the mother's health and dietary intake. Good nutritional status before, during and after pregnancy optimizes maternal health and reduces the risk of pregnancy complications, birth defects and chronic disease in her children in later adulthood. A healthy, well-nourished woman is more likely to have a healthy pregnancy, which increases her chances of having a healthy baby. A healthy baby has a better chance of growing into a healthy child and then growing into a healthy adult.

In this module you will learn about the special nutrition concerns and needs for prenatal, breastfeeding and non-breastfeeding postpartum women.

3.0.2 Purpose

The purpose of the Maternal Health and Nutrition Section is to provide information on the stages of fetal development and basic nutrition concepts pertinent to pregnant and postpartum WIC participants.



3.0.3 Objectives

Upon completion of Section 3, you will be able to:

1. Identify the stages of pregnancy and vulnerable periods of fetal development.
2. State several physiological adjustments during pregnancy.
3. State the recommended ranges of maternal weight gain during pregnancy.
4. Specify gestational nutrient needs and nutrition-related concerns.
5. Identify counseling recommendations for common pregnancy-related problems such as nausea, edema, heartburn, hemorrhoids and constipation.
6. Identify the risks and counseling recommendations for use of caffeine, alcohol, drugs and tobacco during pregnancy.
7. Compare a woman's nutritional needs as she transitions from pregnancy to lactation.

3.1 PREGNANCY

3.1.1 Signs of Pregnancy

Pregnancy is an exciting time of major change. Pregnancy symptoms differ from woman to woman and pregnancy to pregnancy; however, one of the most significant pregnancy indicators is a delayed or missed menstrual cycle. Some women experience signs or symptoms of pregnancy within a week of conception. Other women may develop symptoms over a few weeks or may not develop any symptoms at all.

Some of the most common pregnancy signs and symptoms include:

- Spotting or a very light menstrual period
- Nausea or queasiness
- Tender or swollen breasts
- Frequent urination
- Feeling very tired
- Being moody
- Feeling bloated

Symptoms listed above are normal for pregnancy, however, some symptoms may not be normal and could be indicators of early pregnancy loss or ectopic pregnancy—a pregnancy that occurs outside the uterus.

A medical intervention may be needed if potential pregnancy is suspected and a woman presents with any of the following signs:

- Cramps or severe abdominal pain
- Spotting that lasts more than one day
- Vaginal bleeding
- Faintness or dizziness

3.1.2 Prenatal Care

Prenatal care is the health care women receive during pregnancy. A pregnant woman needs prenatal care. Prenatal care is important to keep the mother and her baby healthy. Babies of mothers who do not receive prenatal care are three times more likely to be born with a low birth weight and five times more likely to die than those born to mothers receiving care. When health care providers see mothers regularly they can detect and treat health problems early, which can minimize many existing problems and prevent others. Further, prenatal care can provide opportunities to encourage women to adopt good health and eating habits, get emotional counseling or support if needed, find out about local family services and prepare for childbirth as well as being a parent.

The woman's health and well being will be closely monitored by a health care team that may include the doctor, nurse, WIC Nutritionist and others. Multiple tests and exams will be completed to check on the health of her baby. All women should be encouraged to ask their health care provider for advice on coping with common changes during pregnancy and collect the information they will need to make important choices.

3.1.3 Stages of Pregnancy

A typical pregnancy lasts for 280 days, or 40 weeks counting from the first day of the last menstrual period (LMP). The estimated date of confinement (EDC) of the infant is estimated from the LMP date. A sonogram and other measurements taken by the health care provider more accurately predict the EDC. An infant who is born at 38 to 40 weeks gestation is considered to be full term. The average pregnancy lasts for about 40 weeks and is divided into three trimesters. Each trimester is about 13-14 weeks or about 3 months.

Fetal Development by Trimester

The First Trimester: 0-13 Weeks

- The placenta develops
- Major organs and nervous system form
- Heart starts beating
- Lungs begin to develop
- Bones develop
- Head, face, eyes, ears, arms, fingers, legs and toes form
- Hair starts to grow
- Buds for 20 temporary teeth develop

The Second Trimester: 14-28 Weeks

- The organs develop further and begin to function
- Eyebrows, eyelashes, and fingernails form
- Skin is wrinkled and covered with a waxy coating
- Genitals develop
- Fine hair (lanugo) covers the body
- The fetus moves, sleeps, and wakes
- The fetus can swallow, hear, pass urine, and suck his/her thumb

The Third Trimester: 29-40 Weeks

- The fetus kicks and stretches
- Lanugo disappears
- With major development finished, the fetus gains most of its weight
- Bones harden, but the skull remains soft and flexible for delivery

***Source**: The American College of Obstetricians and Gynecologists. (2005). Your Pregnancy and Birth (4th ed.). Washington, DC: Meredith Books.*

3.2 Changes During Pregnancy

3.2.1 Breast Changes

For many women the first hint of being pregnant is the breast changes they experience. Women may notice an increase in breast size and some tenderness very early even before the pregnancy is confirmed. Breasts may grow a whole bra-cup size by the sixth week of the pregnancy. Breast growth is a positive sign that the breasts are preparing for breastfeeding.

Changes that take place in the breast include:

- An increase in the number of milk glands as the body prepares for making milk.
- Fat accumulates.
- Bluish veins may appear as blood flow to breasts increases.
- The nipples and areola darken. Nipples may stick out more and the areolas grow larger.
- Montgomery's tubercles, small glands on the surface of the areola, become raised and bumpy. These glands produce an oily substance that keeps the nipples and areolas soft.

Breasts may continue to grow in size and weight during the first three months of pregnancy. During the third month of pregnancy the first colostrum appears. Colostrum is the thick yellow, nutrient and immune component-rich milk the breast produces for the baby's first few days of life. Some women may notice slight drainage of colostrum from their nipples. In the last trimester the breast continues to expand from the enlargement of milk-making cells and engorgement with colostrum.

3.2.2 Swelling

Most pregnant women experience some edema or swelling in the hands, face, legs, ankles and/or feet. Edema which is caused by extra fluid in the body may worsen in late pregnancy and during the summer months.

To relief swelling:

- Avoid prolonged standing.
- Elevate feet. You may try to sleep with legs propped up on pillows. This keeps fluid from building up in the lower half of the body.
- Be physically active as exercise can improve circulation, which reduces edema.
- Avoid garters, socks or stockings that constrict the leg.

3.2.3 Mouth and Tooth Changes

During pregnancy gums and teeth are more vulnerable to cavities and gum disease. Pregnancy hormones can make gums swell and bleed. A dental check up early in pregnancy is important to ensure that the mouth stays healthy. Putting off dental work can lead to more dental problems. When scheduling a

dental appointment it is important that the woman lets her dentist know about the pregnancy. It is the role of certifying WIC staff to find out if a woman has any dental issues and provide appropriate dental referrals when needed.

Questions to ask	Possible dental risk conditions
Have you visited a dentist within the past 12 months?	There is diagnosis of dental problems by a dentist, physician or a health care provider working under the orders of a physician.
Do you have tooth decay, broken teeth, bleeding gums, gum infection, (periodontal disease), missing teeth and/or misplaced teeth that make chewing difficult?	Periodontal disease (gum infection) is evidenced by swollen, red, bleeding and inflamed gums.
Do you (or your child) avoid certain foods that you would otherwise eat, or choose softer foods, because of chewing problems?	Tooth decay, broken teeth, gum infection (periodontal disease), tooth loss and/or ineffectively replaced teeth that impair the ability to chew food in adequate quantity or quality.
Do your gums feel swollen, sensitive, bleed easily or have a reddened appearance?	Gingivitis is present in pregnant women.

Source: MO WIC Operations Manual. 2010 ER# 2.03900

3.2.4 Heartburn and Indigestion

Often the words “heartburn” and “indigestion” are used interchangeably however they are not the same condition. Indigestion happens when the stomach takes hours to empty. Indigestion symptoms include: feeling full, bloated and gassy. Heartburn is a burning feeling in the throat and chest. Pregnancy hormones, which relax the muscle valve between the stomach and esophagus are often the cause of heartburn during pregnancy. When the valve does not close, stomach acids leak into the esophagus. As the baby grows, it may press up against the stomach and cause stomach acid to leak into the esophagus.

Tips to help relieve or prevent indigestion and heartburn are:

- Eat five or six small meals per day instead of two or three big ones.
- Eat slowly and chew food well.
- Limit liquids with meals.
- Sit upright for at least one hour after a meal.
- Limit greasy, fried and fatty foods.
- Limit caffeinated and carbonated drinks, citrus fruits and juices.
- Do not eat or drink shortly before bedtime or napping.
- Wear clothes that are loose around the waist.

3.2.5 Nausea and Vomiting

Nausea and vomiting are common during pregnancy. This is often called "morning sickness" although it can occur at any time of the day. Most women who experience morning sickness notice a dramatic improvement after the first trimester but some women have nausea and vomiting throughout pregnancy. Morning sickness may be more severe with first-time pregnancies or multi-fetal pregnancies. Most mild cases of nausea and vomiting are not harmful to the mother or the baby. Morning sickness does not mean the baby is sick.

Some tips that may be helpful in relieving nausea and vomiting are:

- Before getting out of bed in the morning, sit on the side of the bed for a few minutes and then get up slowly. You may also try eating a cracker or dry piece of toast before getting up.
- Get plenty of fresh air.
- Eat five or six small meals each day instead of three big ones and do not let the stomach get empty.
- Sit upright after meals.
- Avoid strong smells.
- Avoid greasy, rich, fatty and/or spicy foods instead eat low fat, easy to digest foods such as: plain pasta, crackers, potatoes, rice, fruits and vegetables, lean meats, fish, poultry and eggs.
- Drinking ginger ale or peppermint tea may help relieve these symptoms for some women.

Frequent vomiting during the day may make it more difficult to keep adequate fluids. This is a health concern for the mother and her baby. Medical attention may be necessary if liquids have not been kept down for more than one day. Medical intervention may also be needed if the mother has vomited blood, has had a more than 2 pound weight loss, and/or vomits more than four times in one day. Severe morning sickness, also known as hyperemesis gravidarum, may require a hospital stay for treatment with intravenous fluids and medications.

3.2.6 Constipation and Gas

Most pregnant women experience constipation during the course of their pregnancy for several reasons, including:

- Hormone changes. Increased levels of the hormone progesterone during pregnancy slow the digestive process.
- Iron supplements. Often prescribed to prevent anemia in pregnancy, may make constipation worse.
- Changes in digestion. The colon absorbs more water during pregnancy so less water is available for stool formation which results in harder stool.

- Toward the end of pregnancy, the weight of the uterus puts pressure on the rectum.

When this occurs, gas can build up in the abdomen and cause bloating and pain.

- Tips for managing constipation during pregnancy:
  - Drink plenty of liquids—especially water.
  - Eat high-fiber foods.
  - Eat meals at regular times each day.
  - Be physically active every day. Note: Laxatives are not recommended during pregnancy.

3.2.7 Hemorrhoids

Constipation during pregnancy can lead to hemorrhoids. Hemorrhoids are swollen blood vessels in and around the anus. These vessels are normally present but stretch under pressure. The two main causes of the swelling are the extra blood in the pelvic area and the pressure the growing uterus puts on veins in the lower body. The straining during bowel movements caused by constipation can lead to swollen veins as more blood is being trapped in the veins.

To avoid or relief this problem, it is recommended to:

- Eat high-fiber foods and drink plenty of liquids.
- Be physically active as standing or sitting for long time can put pressure on the veins in the pelvic area.
- Keep prenatal weight gain within recommendations. Excess weight can aggravate hemorrhoids.
- If hemorrhoids have already developed the discomfort can be alleviated by soaking in a tub few times a day or by applying an ice pack to the problem area.

Fiber-Rich Foods	
Breads/Cereals	Whole wheat bread, bran breads and cereals, oatmeal, shredded wheat, bran flakes, whole wheat, pita bread, whole wheat pasta
Grains	Barley, bulgur, cornmeal, whole grain, oat bran, brown rice, wheat bran
Fruits	Apple with skin, dried apricots, dried figs, kiwi fruit, prunes, raisins, raspberries, strawberries
Vegetables	Beans, broccoli, brussels sprouts, cabbage, carrots, cauliflower, corn, potatoes (with skin), peas, sweet potatoes, tomatoes (raw),turnip greens
Other	Nuts, almonds, coconut, hazelnuts, peanuts

3.3 PRENATAL NUTRITION

3.3.1 Prenatal Diet

Good nutrition is important during pregnancy. A pregnant woman must consume adequate nutrients and energy for her body functions and to support her developing fetus. A woman's diet during pregnancy can significantly affect the outcome of the pregnancy. When a pregnant woman eats, the nutrients absorbed travel through her blood stream to the placenta. The nutrients cross the placenta and are taken up by the blood stream of the fetus.

The prenatal diet should include proteins, carbohydrates, vitamins, minerals and fat to fuel the body and help the baby grow. If the maternal diet does not contain adequate nutrients to meet the growing fetus needs, the mother will supply some of the nutrients at her own body's expense. She may not produce a healthy placenta or make enough blood, causing her infant to grow more slowly.

Pregnant women need adequate fluid intake to prevent dehydration which can lead to miscarriage or premature labor. Pregnant women need a minimum of 2 quarts (64 oz) of fluids every day. Water should account for at least half of the fluids consumed. The remainder can come from milk, juice and other beverages.

Criteria for a Healthy Prenatal Diet

- Provides adequate calories for appropriate weight gain
- Is well-balanced and follows MyPlate
- Tastes good and is enjoyable to eat
- Spaces eating at intervals throughout the day
- Provides adequate amounts of high fiber foods
- Includes 8 cups of fluid daily
- Limits beverages that contain caffeine (2-3 servings or fewer daily)
- Has moderate amounts of fat, saturated fat, cholesterol, sugar and sodium
- Stable and continuous food supply
- Excludes alcohol

Source: Story M, Stang J (eds). (2000). Nutrition and the Pregnant Adolescent: A Practical Reference Guide. Minneapolis, MN: Center for Leadership, Education, and Training in Maternal and Child Nutrition, University of Minnesot

3.3.2 Nutrient Needs During Pregnancy

All of the nutrients needed to support a healthy pregnancy, except for iron and folic acid can be obtained from a healthy diet. One way to make sure that all nutrient needs are met is to follow the MyPlate food plan developed by the U.S. Department of Agriculture (USDA). MyPlate gives guidelines to help mothers get the nutrients they need. For more information visit the MyPlate web page at

http://www.ChooseMyPlate.gov. Section 2 of this manual provides more information for counseling women on choosing foods using MyPlate.

During pregnancy higher amounts of certain nutrients are needed to support growth of the fetus and cell differentiation.

Dietary Reference Intakes for Women[ab]			
Nutrient	**Adult woman**	**Pregnancy**	**Lactation (0-6 mo)**
Energy (kcal)	2,403	2,743[c], 2,855[d]	2,698
Protein (g/kg/d)	0.8	1.1	1.1
Carbohydrate (g/d)	130	175	210
Total fiber (g/d)	25	28	29
Linoleic acid (g/d)	12	13	13
α-Linolenic acid (g/d)	12	13	13
Vitamin A (µg RAE[e])	700	770	1,300
Vitamin D (µg)	5	5	5
Vitamin E (mg α-tocopherol)	15	15	19
Vitamin K (µg)	90	90	90
Vitamin C (mg)	75	85	120
Thiamin (mg)	1.1	1.4	1.4
Riboflavin (mg)	1.1	1.4	1.6
Vitamin B-6 (mg)	1.3	1.9	2.0
Niacin (mg NE[f])	14	18	17
Folate (µg dietary folate equivalents)	400	600	500
Vitamin B-12 (µg)	2.4	2.6	2.8
Pantothenic acid (mg)	5	6	7
Biotin (µg)	30	30	35
Choline (mg)	425	450	550
Calcium (mg	1,000	1,000	1,000
Phosphorus (mg)	700	700	700
Magnesium (mg)	320	350	310
Iron (mg)	18	27	9
Zinc (mg)	8	11	12
Iodine (µg)	150	220	290
Selenium (µg)	55	60	70
Fluoride (mg)	3	3	3
Manganese (mg)	1.8	2.0	2.6
Molybdenum (µg)	45	50	50
Chromium (µg)	25	30	45
Copper (µg)	900	1,000	1,300
Sodium (mg)	2,300	2,300	2,300
Potassium (mg)	4,700	4,700	5,100

[a]Data from reference 22 (Institute of Medicine. *Dietary Reference Intakes: The Essential Guide to Nutrient Requirements* Washington, DC: National Academies Press; 2006)
[b]Values are Recommended Dietary Allowances except for energy (Estimated Energy Requirement) and total fiber, linoleic acid, α-linolenic acid, vitamin D, vitamin K, pantothenic acid, biotin, choline, calcium, manganese, chromium, sodium and potassium (Adequate intakes).
[c]Second trimester for women age 19 to 50 years.
[d]Third trimester for women age 19 to 50 years.
[e]RAE = retinol activity equivalents.
[f]NE = niacin equivalents.

Calories

It is difficult to specify precise energy requirements during pregnancy because these vary with pre-pregnancy weight, amount and composition of weight gain, stage of pregnancy and activity level. Most pregnant women will probably need a total of 2,200 to 2,900 kcals per day. More research is needed to establish calorie requirements for women carrying more than one fetus.

Women, even obese women, should not decrease their calorie intake during pregnancy. If energy needs are not met, the protein the pregnant woman consumes will be used to meet her caloric requirements. If protein intake is not adequate, the mother's muscle stores may be utilized to provide needed calories. This is a potentially dangerous situation since the protein used to meet energy requirements is then not available for building new cells and tissues in the mother and fetus.

Protein

Protein needs during pregnancy are variable, increasing as pregnancy progresses. The greatest demand for protein occurs during the second and third trimesters. Good sources of protein include lean meats, poultry and fish. These sources also supply other necessary nutrients, such as iron, B vitamins, and trace minerals. Other high-protein foods include dry beans, lentils, nuts, eggs and cheese.

Iron

The RDA for iron increases from 18 mg per day to 27 mg per day during pregnancy. Iron is used to make hemoglobin, a protein in red blood cells that carries oxygen to all organs and tissues as well as the baby. The fetus also stores enough iron to utilize in the first few months of life.

Certain foods are good iron sources, including lean beef and pork, organ meats, dried fruit and beans, whole grains and dark leafy greens. Vitamin C enhances iron absorption from plant sources whereas calcium can block iron absorption. For this reason calcium and iron should not be taken together. A good practice is to take supplements with iron in the morning and supplements with calcium at night. Iron supplements should be taken only with a health care provider's recommendation. Section 6 provides more information on iron sources and prevention of iron deficiency anemia.

Folic Acid

The RDA for folic acid increases to 600 micrograms during pregnancy. Folic acid is necessary for normal cell division and the formation of certain major fetal structures. Consuming recommended amounts of folic acid before conception and especially during the early months of pregnancy can help prevent neural tube defects. Women who might get pregnant are advised to consume 400 micrograms of folic acid daily.

Folate is naturally present in certain foods such as leafy dark green vegetables, citrus fruits and beans. Additionally, almost all breads, cereals, pasta, rice and flour are fortified with folic acid. Section 6 provides more information about folic acid and preventing folic acid deficiency anemia.

Calcium

The calcium recommendation during pregnancy is 1,000 mg/day for women 19 to 50 years of age, and 1,300 mg/day for teens. Calcium is essential during pregnancy. It is an important structural component of fetal bones and teeth and is needed for the bone health of the mother during and after pregnancy. When a woman does not get enough calcium from her diet, the body takes it from her bones. Over time, this loss may weaken bone and lead to osteoporosis, a disorder characterized by abnormal bone mineral density.

In general, non-pregnant women consume only about 75 percent of the recommended amount of calcium therefore most pregnant women need to add calcium-rich foods to their diet. Calcium from plant sources is not as well absorbed as calcium from dairy sources. The best sources of calcium are milk and other dairy products such as cheese and yogurt. Calcium-fortified orange juice and other fortified foods, sardines, salmon with bones and collard, kale, mustard, spinach, and turnip greens are good sources of calcium from outside the dairy group.

Iodine

Iodine is an essential element that is needed for the production of thyroid hormone. The body does not make iodine. The RDA for iodine during pregnancy is 220 µg per day and 290 µg per day during lactation. According to The American Thyroid Association, severe iodine deficiency in the mother has been associated with miscarriages, stillbirth, preterm delivery, and congenital abnormalities in their babies. Children of mothers with severe iodine deficiency during pregnancy can have mental retardation and problems with growth, hearing, and speech. In the most severe form, an underactive thyroid can result in cretinism. Even mild iodine deficiency during pregnancy may affect cognitive development in children. The American Thyroid Association has recommended that all pregnant and breastfeeding women in the U.S. take a prenatal multivitamin containing 150 µg iodine per day. Not all prenatal vitamins contain

iodine. Pregnant women should be advised to discuss the content and iodine adequacy of their prenatal vitamin with their health care provider.

KEY NUTRIENTS DURING PREGNANCY		
Nutrient RDA	**Why You and Your Baby Need It**	**Best Sources**
 **Folate** 600 mcg	Helps make the neural tube which becomes your baby's spinal cord. It reduces the risk of neural tube defects, including spina bifida.	Citrus fruits and juices, dark green leafy vegetables and enriched grain products like whole wheat breads and tortillas, flour, pasta, rice, and ready-to-eat cereals.
 **Vitamin A** 770 mcg	Forms healthy skin and helps eyesight.	Carrots, sweet potatoes, dark or yellow vegetables.
 **B Vitamins**	Help your body release energy from the foods you eat.	Lean meats (pork, beef, poultry) and enriched grain products like whole wheat breads and tortillas.
 **Vitamin C** 85 mg	Helps with wound healing, tooth and bone development, and promotes metabolic processes. Vitamin C may reduce your risk of pregnancy-induced hypertension and miscarriage.	Vegetables and fruits, such as broccoli, green and red peppers, collard greens, brussel sprouts, cauliflower, lemon, cabbage, pineapple, strawberries, citrus fruits.
 **Iron** 27 mg	Carries oxygen to cells and tissues, helps make red blood cells, and supports brain development. Too little iron can cause *anemia*.	Liver, lean red meats, eggs and poultry; also leafy greens like spinach, broccoli, mustard greens, and dried fruit.
 **Calcium** 1000 mg	Helps your body regulate fluids, and it helps build your baby's bones and tooth buds. If you do not get enough calcium in your diet, the body will use the calcium from your bones to build your baby's bones.	Dairy foods (milk, cheese, yogurt), canned fish (salmon, sardines); fortified orange juice, soy milk and tofu; leafy green vegetables (collard, kale, turnip, and mustard greens).
 **Choline** 450 mg[1]	Helps to form the brain and spinal cord.	Eggs, meats, oatmeal, iceberg lettuce, soybeans and wheat germ.
 **Iodine** 220 mcg	Helps in the production of thyroid hormones. Infants born to mothers with *severe* iodine deficiency can have mental retardation and problems with growth, speech, and hearing. [2]	Iodized salt, dairy foods (milk, cheese, yogurt), seaweed, shellfish, fish, meats, and eggs. Check with your health care provider to make sure that the prenatal vitamin you are taking contains iodine.
1. Upper Intake (UI) 2. Iodine Deficiency. American Thyroid Association. http://www.thyroid.org		

3.3.3 Supplementation

During pregnancy, there is increased need needs for certain vitamins and minerals. Mothers need to consume enough nutrients to meet their increased needs as well as those of their growing baby. A pregnant woman can get most of the nutrients she needs by making healthful choices using MyPlate with the exception of iron and possibly folic acid. However, most doctors recommend that

pregnant women take a vitamin and mineral supplement every day. Prenatal formulations have the appropriate amount and balance of nutrients needed during pregnancy.

Prenatal vitamins are most effective when taken with water or juice. Taking vitamin supplements with milk, tea or coffee can reduce iron absorption. Toxic levels of vitamins and minerals can be reached quickly, especially for vitamin A. Large doses of vitamin A and zinc may cause birth defects. All women should be tell their health care provider about any supplements they may already be taking, including herbals or botanicals and follow his or her advise to protect themselves from taking too much.

3.4 Special Health Concerns During Pregnancy

3.4.1 Diabetes

Pre-Diabetes

Pre-diabetes is defined by impaired fasting glucose (IFG) and/or impaired glucose intolerance (IGT). IFG is diagnosed for individuals with fasting glucose level between 100-125 mg/dl. IGT is diagnosed for individuals with plasma glucose levels of 140-199 mg/dl after a 2-hour oral glucose tolerance test. Women diagnosed with pre-diabetes are at increased risk for developing type 2 diabetes and cardiovascular disease. The American Diabetes Association recommends testing for pre-diabetes in adults who are overweight or obese and who have one or more additional risk factors- see table below.

Diabetes Risk Factors

- Physical inactivity
- Members of a high-risk ethnic population (e.g. African American, Latino, Native American, Asian American, Pacific Islander)
- Women who delivered a baby weighting > 9 lb or were diagnosed with gestational diabetes mellitus
- Hypertension (blood pressure ≥ 140/90 mmHg or on therapy for hypertension)
- HDL cholesterol level < 35 mg/dl and/or a triglyceride level > 250 mg/dl
- Women with polycystic ovarian syndrome (PCOS)
- IGT or IFG on previous testing
- Other clinical conditions associated with insulin resistance (e.g. severe obesity and acanthosis nigricans)
- History of CVD

Source: United States Department of Agriculture (USDA). Food and Nutrition Service. *WIC Policy Memorandum 98-9, Revision 10 Nutrition Risk Criteria*.

Gestational Diabetes

During pregnancy, IFG and IGT are diagnosed as gestational diabetes. Women who are diagnosed with gestational diabetes (GDM) during pregnancy are more likely to develop diabetes later in life. Additionally, women with a history of GDM are at higher risk for GDM diagnosis in a subsequent pregnancy. Risk factors associated with subsequent GDM include: obesity, insulin use in previous pregnancy, weight gain between pregnancies, and unhealthy BMI. All women with a history of GDM but without postpartum diagnosis of diabetes should be advised to talk with their doctor about having a Glucose Tolerance Test (GTT) at 6-12 weeks postpartum. Obese women with a history of GDM should be encouraged to lose weight before subsequent pregnancy.

Diabetes Mellitus

Diabetes mellitus is a group of metabolic diseases characterized by inappropriate hyperglycemia. Diabetes mellitus is further characterized by abnormalities in the metabolism of insulin, protein, fat and carbohydrates as well as by abnormalities in the structure of blood vessels and nerves. There are three classifications of diabetes: Type 1 and Type 2 Diabetes and Maturity Onset Diabetes of the Young or MODY.

Type 1 is associated with beta-cell destruction that leads to absolute insulin deficiency. Type 2 diabetes ranges from predominantly insulin resistance with relative insulin deficiency to a predominantly insulin secretory defect with insulin resistance. MODY is a series of familial disorders characterized by early onset and mild hyperglycemia, often diagnosed before the age of 25.The long- term complications of diabetes include:

- Retinopathy and potential vision loss
- Nephropathy and renal failure
- Peripheral neuropathy with risk of foot ulcers, amputations and Charcot joints
- Autonomic neuropathy causing gastrointestinal, genitourinary, cardiovascular symptoms and sexual dysfunction.

General dietary recommendations for diabetes include high fiber consumption, calorie monitoring and reduced carbohydrate intake. The WIC Food package provides high fiber and low fat foods. It emphasizes consumption of whole grains, fruits and vegetables, and dairy that may assist WIC clients in reducing their risk for diabetes.

3.4.2 Hypertension and Preeclampsia

Hypertension is defined as having blood pressure reading with systolic blood pressure above 140 mm Hg or diastolic blood pressure above 90 mm Hg. Prehypertension is diagnosed with blood pressure readings between 130/80 to

139/89 mm Hg. People with prehypertension are twice as likely to develop hypertension. When untreated, hypertension can lead to congestive heart failure, end-stage renal disease, and peripheral vascular disease. There is no cure for hypertension, however lifestyle modifications can prevent or delay the onset of hypertension. Dietary interventions in hypertensive individuals have been proven to be effective in reducing blood pressure and in delaying drug treatment.

Lifestyle Changes to Manage Hypertension and Prehypertension

- Consuming a diet consistent with the Dietary Guidelines for Americans or following the DASH (Dietary Approaches to Stop Hypertension) eating plan, if recommended by healthcare provider.
- Limiting dietary sodium
- Engaging in regular physical activity
- Achieving and maintaining healthy weight
- Smoking Cessation

Source: United States Department of Agriculture (USDA). Food and Nutrition Service. *WIC Policy Memorandum 98-9, Revision 10 Nutrition Risk Criteria*.

Hypertension is the most common medical complication of pregnancy. Hypertension during pregnancy may lead to low birth weight, fetal growth restriction, and premature delivery, as well as maternal, fetal, and neonatal morbidity.

Pregnancy-induced hypertension is referred to as preeclampsia. Preeclampsia is characterized by elevated blood pressure (> 140 mm Hg systolic or 90 mm Hg diastolic) and significant proteinuria usually developing after the twentieth week of pregnancy. Edema, renal failure and the HELLP (hymolysis, Elevated Liver enzymes and Low Platelets) syndrome are some of the symptoms of preeclampsia. Women who have had preeclampsia in prior pregnancies are at higher risk for recurrence. There is no treatment for preeclampsia. The condition resolves itself with end of pregnancy.

Risk Factors for Preeclampsia

- Pre-pregnancy obesity BMI $\geq$ 30
- Preeclampsia in a prior pregnancy
- No prior delivery
- Maternal age > 35 years
- Endocrine disorders (e.g. diabetes); autoimmune disorders (e.g. lupus); renal disorders
- Multi-fetal gestation
- Genetics
- Black race

Source: United States Department of Agriculture (USDA). Food and Nutrition Service. *WIC Policy Memorandum 98-9, Revision 10 Nutrition Risk Criteria*.

Certain lifestyle modifications- such as early prenatal care, taking prenatal vitamin, and physical activity- have shown to have protective effect against preeclampsia. Vitamin D may also be important in prevention of preeclampsia because of its role in blood pressure regulation and influence on vascular structure and function.

3.4.3 Overweight and Underweight

Among the various prenatal nutritional counseling goals in WIC- one is to achieve recommended weight gain during pregnancy. The overweight woman should be encouraged to make food selections that are of high nutritional quality and to avoid calorie rich foods. For the underweight emphasis should be on increased consumption and inclusion of calorie dense foods. Prepregnancy overweight and underweight have been associated with a higher incidence of various pregnancy complications.

Pregnancy Complications Associated with Prepregnancy Weight	
Weight Status Before Pregnancy	**Potential Complications**
Overweight	▪ Higher rates of cesarean delivery ▪ Gestational diabetes mellitus ▪ Preeclampsia ▪ Other pregnancy-induced hypertensive disorders ▪ Postpartum anemia
Underweight	▪ Higher risk for delivery of LBW infants, retarded fetal growth and perinatal mortality. ▪ Higher rates of cesarean delivery ▪ Antepartum hemorrhage ▪ Premature rapture of membranes ▪ Anemia ▪ Endometriosis

Source: United States Department of Agriculture (USDA). Food and Nutrition Service. *WIC Policy Memorandum 98-9, Revision 10 Nutrition Risk Criteria*.

The Institute of Medicine (IOM) prenatal weight gain recommendations are associated with improved maternal and child health outcome. See section 3.*1 Prenatal Weight Gain* for more information.

3.5 Special Dietary Concerns During Pregnancy

3.5.1 Adolescence

Adolescence is a time of intense physical, intellectual, emotional and social growth. Peer pressure, concern about appearance, and an active lifestyle can have a negative influence on the types and amounts of foods a teen eats. National surveys reveal that the diets of teens are often low in vitamins A and E, folate, vitamin B_6, calcium, iron, zinc, and fiber and high in fat and sugar. Pregnancy in adolescence is associated with higher risks for preeclampsia,

anemia, premature birth, low-birth weight, infant mortality and sexually transmitted diseases. If a pregnancy occurs within two years of the onset of menstruation or if the adolescent is younger than 16 years of age, she may still be growing and could compete with her fetus for nutrients. By learning to make healthy food choices pregnant adolescents can increase their baby's chance of being born healthy. Nutritional care for pregnant adolescents begins with the determination of daily caloric needs.

3.5.2 Pica and Unusual Cravings

Pregnant women often have food cravings. For most, giving into these cravings causes no harm. The cravings can become a problem if only one type of food is consumed and the rest of the diet is neglected. Variety in the diet is important to ensure nutrient needs are being met.

Pica is the practice of eating non-food items or substances having little or no nutritional value. Women at risk for pica behavior are more likely to be African American, live in rural areas and have a family history of pica. Reasons for pica are not known. Proposed explanations include: it is due to a deficiency of an essential nutrient; it is related to hormonal changes; or it is a family tradition to consume a non-food item during pregnancy.

The potential risks associated with pica in pregnancy include fetal and maternal toxicity as well as medical complications.

Potential complications from pica include:

- Constipation and gastric or intestinal obstruction
- Low intakes of iron, zinc and energy, which may lead to nutrient deficiencies and/or inadequate weight gain
- Appetite depression, particularly with ice eaten before and instead of meals
- Malabsorption of minerals caused by them binding to substances ingested
- Delivery of an infant that is irritable, cries often and has smaller head circumference (especially associated with ice, freezer frost and starch consumption)
- Tooth fractures from chewing hard substances
- Congenital lead poisoning in infants if mothers ingested lead-containing substances

The extent of the risk is dependent on the type, quantity and frequency of the substances ingested. Pregnant woman who experience pica should be counseled on the possible effects and monitored for anemia and poor fetal development.

Example of Pica Substances					
Ingested		**Chewed**	**Inhaled**		
Baking Powder	Ice	Aspirin	Air freshener	Bleach	
Burned matches	Lemons	Concrete chips	Rubbing alcohol	Freezer air	
Chalk	Laundry	Foam rubber	Carpet deodorizer	Wet dirt	
Dirt	Starch	Plastic	Marking pens	Gasoline	
Cigarette ashes	Newspaper	Sponge	Pine cleaner	Detergent	
Baked clay	Paper	Styrofoam	Automobile exhaust	Ammonia	
Cornstarch	Dried paint	Tissues	Air conditioner emissions		
Detergent	Baby powder	Toilet paper	Powder cleanser		
Freezer Frost	Raw potatoes	Wax	Nail polish remover		
Powder cleanser	Salt				
	Tobacco				

Source: *Story M, Stang J (eds). (2000). Nutrition and the Pregnant Adolescent: A Practical Reference Guide. Minneapolis, MN: Center for Leadership, Education, and Training in Maternal and Child Nutrition, University of Minnesota.*

3.5.3 Special Diets

Vegetarian Diets

A vegetarian is someone who does not eat meat, fish or fowl or products containing these foods. Common reasons for choosing a vegetarian diet include health considerations, concern for the environment, and animal welfare factors. The eating patterns of vegetarians can vary considerably. Individual assessment is important to determine the diet's nutritional adequacy when someone reports they consume a vegetarian diet.

Types of vegetarianism include:

- Semivegetarian**.** Semivegetarians are not true vegetarians however, they may describe themselves as vegetarians when they choose to limit intake of meat in certain ways. They may choose to not eat certain types of meat, such as beef and pork, but eat fish or fowl. A semi-vegetarian may also choose to eat meat once or twice a week. Pregnant women consuming a semivegetarian diet can generally get the nutrients needed for a healthy pregnancy without needing to add supplements.

- Lacto-ovo-vegetarian**.** A vegetarian who does not eat any meat, fish or fowl or products containing these foods, but does eat eggs, dairy products, nuts, legumes, seeds, grains, fruits and vegetables is considered a lacto-ovo-vegetarian. If not planned carefully, this type of diet may be low in foods sources rich in iron and zinc. Lacto-ovo-vegetarian food sources of iron include whole grain enriched breads, deep green leafy vegetables, legumes, eggs and dried fruit. Zinc sources for prenatal women consuming this type of diet can be found in whole grains and milk.

- Vegan**.** Vegans do not eat any animal products, including eggs or dairy products. They only eat foods from plant sources such as vegetables, fruits, grains, legumes, nuts and seeds. A vegan diet may be completely lacking in vitamin B_{12} since this vitamin is only found in animal products. Sources of vitamin B_{12} that vegans may use to meet their vitamin B_{12} requirement include fortified foods (such as some brands of soy milk, breakfast cereals and nutritional yeast) or supplements. Diets of pregnant vegans should include reliable sources of vitamin B_{12} daily. Vitamin D status may also be a concern for someone following a vegan diet. If there is limited synthesis because of limited sunlight exposure, skin tone, season or sunscreen use, pregnant women should use vitamin D supplements or fortified foods. Vegan diets may also be low in calcium, iron and zinc. During pregnancy, vegans may need to increase their intake of these nutrients, either through nutrient-rich food sources, fortified foods or supplements. Because vegan diets utilize only protein from plant sources, which may have lower digestibility than protein from animal sources, it is important that vegans consume a variety of protein sources such as grains, nuts, legumes and seeds to get all essential amino acids. Dietary quality of plant proteins varies with the source.

Lactose Intolerance

Lactose intolerance is an inability to digest the sugar lactose found in dairy products. People who suffer from lactose intolerance do not produce enough of the enzyme lactase, so the undigested lactose sits in their digestive tract, causing gas, bloating and diarrhea. People of Asian, African American, Native American and Latina descent have a higher prevalence of lactose intolerance. Research has also shown a genetic link among people with lactose intolerance.

People with lactose intolerance may be at risk for low calcium intake due to restriction of dairy products. There are many alternatives for meeting calcium requirements. These include:

- Consuming lactose-free dairy products.
- Taking lactase enzymes before eating to help digest lactose-containing foods.
- Consuming fermented dairy products, such as yogurt, which may be easier to digest.
- Consuming goat's milk. This contains less lactose than cow's milk and may be better tolerated.
- Consuming other calcium-rich food sources such as broccoli, sardines and fortified foods.
- Consuming smaller amounts of lactose-containing foods may also be tolerated.

Calcium in plant sources is not absorbed as well as the calcium found in milk products. Since an expectant mother needs 1000 mg of calcium each day, mothers with lactose intolerance may need to take a calcium supplement.

3.5.4 Food Safety

Pregnant women and their fetuses are at higher risk of developing food borne illness. Food borne illness is a sickness that occurs when people eat or drink harmful microorganisms such as bacteria, parasites, viruses or chemical contaminants found in some foods or drinking water. Certain foods have been linked to outbreaks of food-borne illnesses and pose special health concerns during pregnancy when the mothers immune system is weakened, which makes it harder for her body to fight off harmful microorganisms.

Food Source	Food-borne Illness Agent
▪ Milk	▪ Campylobacter
▪ Shellfish	▪ Norwalk-like viruses
▪ Unpasteurized apple cider	▪ Escherichia coli o 157:H7
▪ Eggs	▪ Salmonella
▪ Fish	▪ Ciguatera poisoning
▪ Rasberries	▪ Cyclospora
▪ Strawberries	▪ Hepatitis A virus
▪ Ready-to-eat meats	▪ Listeria monocytogenes

Source: United States Department of Agriculture (USDA). Food and Nutrition Service. *WIC Policy Memorandum 98-9, Revision 10 Nutrition Risk Criteria*.

Listeria monocytogenes is the cause of food borne illness known as Listeriosis. L. monocytogenes can grow at refrigerator temperatures. According to the Centers for Disease Control and Prevention, pregnant women are about 20 times more likely to get listeriosis than other healthy adults. An estimated 1/3 of all Listeria cases occur in pregnant women. Listeriosis during pregnancy can be transmitted to the fetus through the placenta even when the mother shows no signs of the illness. Most of the time, pregnant women who are infected with listeriosis don't feel sick. During the first trimester of pregnancy, listeriosis may cause miscarriage. The mother is at a highest risk for listeria infection as the pregnancy progresses to third trimester. During the third trimester her immune system is somewhat suppressed. Listeriosis can result in premature labor, the delivery of a low-birth-weight infant or infant death. When the infection occurs late in the pregnancy it poses wide range of health problems to the fetus such as mental retardation, paralysis, seizures, blindness, or impairments of the brain, heart, or kidney. In newborns, L. monocytogenes can cause blood infections and meningitis.

Certain foods contain chemicals that can affect the baby's development. The table below lists food sources to be avoided during pregnancy. Some types of fish should be avoided completely during pregnancy (swordfish, shark, king mackerel and tilefish), however twelve ounces or less per week of fish and shellfish determined to be low in mercury (shrimp, canned light tuna, salmon, sardines, pollock and catfish) is safe. Albacore or "white" tuna should be limited to 6 oz or less per week because it has more mercury than canned light tuna.

Foods To Avoid During Pregnancy

- Swordfish, shark, king mackerel and tilefish. These fish can contain potentially risky levels of mercury, which can be transferred to the growing fetus and cause serious health problems.
- Raw fish, especially shellfish (oysters, clams).
- Undercooked meat, poultry and seafood. Cook thoroughly to kill bacteria.
- Raw hot dogs or luncheon meats (deli meats such as ham, turkey, salami and bologna).
  - If consumed these types of meats should be heated until steaming hot to prevent contamination with listeriosis.
- Refrigerated fresh pates or meat spreads. Canned versions are safe.
- Refrigerated fresh smoked seafood unless it has been cooked (as in a casserole). Canned versions are safe.
- Soft-scrambled eggs and all foods made with raw or lightly cooked eggs.
- Soft cheeses made with unpasteurized milk, including Brie, feta, Camembert, Roquefort, blue-veined, queso blanco, queso fresco and Panela. Check the label to see what kind of milk was used to make the cheese.
- Unpasteurized milk and any foods made from it.
- Unpasteurized juices.
- Raw vegetable sprouts, including alfalfa, clover and radish.
- Herbal supplements and teas.

Source: *March of Dimes, Pregnancy & Newborn Health Education Center. Food Safety. http://www.marchofdimes.com*

Also, it is not recommended to eat large amounts of liver as it contains high amounts of vitamin A, which can lead to birth defects.

3.6 PRENATAL WEIGHT GAIN

3.6.1 Recommendations

Maternal weight gain must support the products of conception (the fetus, placenta, and amniotic fluid) and maternal increase of tissues. The 2009 Institute of Medicine (IOM) report *Weight Gain During Pregnancy: Reexamining the Guidelines* updated the pregnancy weight categories. These updates were made to conform to the categories developed by the World Health Organization and adopted by the National Heart, Lung and Blood institute in 1998. The IOM recommendations are based on the maternal prepregnancy Body Mass Index (BMI). Body Mass Index (BMI) is the relationship between weight and height and potential health risks.

For a woman with a normal BMI (18.5 to 24.9), the recommended weight gain over the course of the pregnancy is 25 to 35 pounds. Women in the underweight BMI category (<18.5) should gain between 28-40 lbs and women in the overweight BMI range (25.0-29.9) should gain 15-25 pounds. A weight gain of 11-20 lbs is recommended to those in the obese BMI category.

Recommended Weight Gain

FOR PREGNANT WOMEN

BY PREPREGNANCY BODY MASS INDEX (BMI)*

	Range in Kg	Range in lbs
Underweight (<18.5)	12.5-18	28-40
Normal Weight (18.5-24.9)	11.5-16	25-35
Overweight (25.0-29.9)	7-11.5	15-25
Obese (≥30.0)	5-9	11-20

Institute of Medicine. Weight Gain During Pregnancy: Reexamining the Guidelines. Washington, DC: National Academy Press, May 2009.

Multi-fetal Gestation

- For twin gestations normal weight women should gain 37-54 pounds; overweight women 31-50 pounds and obese women 25-42 pounds. A gain of 1.5 pounds per week during the second and third trimesters is advisable.
- In triplet pregnancies the overall weight gain should be around 50 pounds. A gain of 1.5 pounds per week throughout the pregnancy is advisable.
- Pregnant women with twins have greater requirement for all nutrients than women with only one infant.

$$\textbf{BMI} = \frac{\text{(weight in pounds x 703)}}{\text{height in inches}^2}$$

The IOM prenatal weight gain recommendations have been associated with improved maternal and child health outcomes. The 2009 IOM guidelines recommend that the BMI categories used for pregnant adults be used for pregnant adolescents. More research is needed to determine whether or not special categories need to be developed for adolescents. All WIC professionals should use their expertise to assess anthropometric status of adolescent prenatals and to provide appropriate nutrition counseling.

3.6.2 High Maternal Weight Gain

How much weight a woman gains during the second and third trimester is an important determinant of fetal growth. Therefore, it is recommended that the pregnancy weight gain should be steady throughout the second and third trimester. All women should be advised to gain about the same amount of weight

each week or month during the second and third trimester. Most women need to gain 3 to 4 pounds each month.

Gaining too much weight during pregnancy has been associated with an increased risk for cesarean delivery and delivering large for gestational age infants. There is strong correlation between high maternal weight gain and postpartum weight retention. Further, women with excessive gestational weight gain may be at higher risk for glucose abnormalities and gestational hypertension.

If a pregnant woman gains most of her weight by the end of the first trimester, she should not limit her weight gain during the last two trimesters. The goal is to aim for a continuous, gradual increase in weight for the remainder of the pregnancy. Pregnancy is not the time to try to lose weight. After pregnancy and nursing a mother will be able to cut down on calories.

3.6.3 Low Maternal Weight Gain

How much weight a woman should gain during pregnancy depends on her prepregnancy weight status. Gaining too little weight has been associated with an increased risk of low birth weight infants, retarded fetal growth, cesarean delivery, preterm birth and failure to initiate breastfeeding. Identifying inadequate weight gain early in the pregnancy by plotting the weight gain in the prenatal weight grid at each visit is crucial. Dietary interventions for weight gain include increasing caloric intake with specific suggestions for dietary and lifestyle changes. Strategies should be based on the woman's diet history.

Tips to Increase Weight Gain

Eat often
Growing babies mean less room for the stomach to expand. Eating more often can compensate for smaller meals.

Drink in some calories
Water takes up the same amount of room in the stomach as fruit juice or milk. Fruit smoothies and milkshakes are great sources of calories.

Choose high fiber foods
Preventing constipation can help appetite. Fruits, vegetables, whole grains, beans and cereals are good fiber choices.

Choose nutrient dense snacks
Peanut butter, nuts, cheese, dried fruit, granola and yogurt are a few good choices.

Source: *http://www.storknet.com/experts/nutrition/cd18.htm*

3.6.4 Where Does The Weight Go?

Most healthy babies weigh between 7 and 8 pounds. If the infant's birth-weight was less than or equal to 5 lbs. 8 oz. or 2500 grams, it is considered Low Birth Weight (LBW), and if the infant's birth-weight was less than or equal to 3 lbs. 5 oz. or 1500 grams it is considered Very Low Birth Weight (VLBW). A baby's birth weight is influenced by maternal weight gain, however not all of the weight gained during pregnancy is baby. So where does the weight go? Table below illustrates the breakdown.

Weight Gain Distribution During Pregnancy

Where does the weight go?

Baby	7 ½ lbs
Breast Growth	2 lbs
Maternal Stores	7 lbs
Placenta	1 ½ lb
Uterus growth	2 lbs
Amniotic fluid	2 lbs
Blood	4 lbs
Body fluids	4 lbs
Total	**30 lbs**

Your Pregnancy and Birth, 4th ed., 2005.The American Academy of Obstetricians and Gynecologists (ACOG), Washington, DC.

3.6.5 Exercise

Regular exercise during pregnancy can help prepare the body for labor and delivery, and provides a good basis for the woman to get back in shape after the baby is born. According to the American College of Obstetrics and Gynecology's guidelines unless there is a medical or pregnancy complication, pregnant women can and should try to exercise moderately for at least 30 minutes on most, if not all days of the week.

Benefits of exercise during pregnancy include:

- Fewer physical discomforts such as backaches, fatigue, nausea, leg cramps, and constipation
- Decreased incidence of gestational hypertension and preeclempsia
- Shorter active phase of labor
- Improved self esteem and positive body image
- Improved blood glucose control in gestational diabetes
- Increased placental weight, blood flow and infant birthweight
- Less likelihood of excess weight gain
- Fewer stretch marks
- Improved posture
- Faster postpartum recovery

Most exercises are safe to perform during pregnancy; however pregnant women should avoid scuba diving and activities with high risk of falling or abdominal trauma.

Exercise may not be safe if the pregnant woman has any of the following conditions:

- Preterm labor in current or past pregnancies
- Vaginal bleeding
- Cervical problems
- Leaking of amniotic fluid
- Shortness of breath
- Dizziness and/or fainting
- Decreased fetal activity or other complications
- Tachycardia (increased heart rate)
- Certain health problems such as high blood pressure or heart disease

3.7 LIFESTYLE RISKS DURING PREGNANCY

3.7.1 Smoking

Cigarette smoking is the largest modifiable risk factor for intrauterine growth retardation and prematurity in the United States. Smoking causes vascular disease, which reduces blood flow through the placenta reducing oxygen supplied to the fetus. Heavy smokers have higher risks for miscarriage, ectopic pregnancy, placental abruption, premature rupture of the membranes, premature birth and low birth weight.

Effects of Smoking during Pregnancy	
Mother	**Baby**
▪ increased heart rate and cardiac output ▪ vasoconstriction (narrowing) of the arteries ▪ increase in blood pressure ▪ changes in carbohydrate, fat and protein metabolism ▪ increase of carbon monoxide levels related to the number of cigarettes smoked per day ▪ decreased capacity of the blood to carry oxygen	▪ increased heart rate ▪ possible oxygen deprivation due to a decreased blood supply ▪ increase in carbon monoxide ▪ possible severe changes in arteries and veins with possible heart disease in later life ▪ decreased capacity of the blood to carry oxygen ▪ lowered birth weight and premature birth

Source: *Story M, Stang J (eds). (2000). Nutrition and the Pregnant Adolescent: A Practical Reference Guide. Minneapolis, MN: Center for Leadership, Education, and Training in Maternal and Child Nutrition, University of Minnesota.*

Women in lower socioeconomic groups have the highest rates of cigarette use before, during and after pregnancy. While any smoking is harmful to the mother and fetus, smoking less than a half pack a day is much better than a heavier habit. Research suggests that if a woman gives up smoking early in her pregnancy (before the third trimester), her risk of delivering a low birth weight

baby approaches that of a non-smoker. Pregnant mothers who smoke, and are having problems quitting, should be referred to smoking cessation programs.

Note: Regular exposure to passive cigarette smoke has an effect similar to light smoking on infant birth weight. Smokeless tobacco can also decrease infant birth weight.

3.7.2 Alcohol

Alcohol is a very powerful drug. It rapidly crosses the placenta and distributes in maternal and fetal blood at comparable levels of concentration. The liver of a fetus however does not produce the necessary enzymes to metabolize alcohol effectively, resulting in extended exposure and increased vulnerability to its effects. A woman suffering from alcoholism may have a poor diet low in calories and other nutrients that can further harm a developing fetus.

Alcohol use during pregnancy is associated with an increased risk of a birth defect known as Fetal Alcohol Syndrome (FAS). Babies born with FAS tend to weigh less and be shorter than normal. The greater a mother's alcohol use during pregnancy, the more severe a child's FAS symptoms tend to be. Even moderate drinking during pregnancy may have behavioral or developmental consequences. The effects of FAS last a lifetime. Pregnant women or those who may become pregnant should not consume alcohol. If a pregnant woman admits that she drinks alcohol, she should receive appropriate referrals to alcohol counseling programs in the community.

Fetal Alcohol Syndrome Diagnostic Criteria	
Prenatal/Postnatal Growth Deficiency	Weight, length, and/or head circumference below the 10th percentile (NCHS growth standards)
Central Nervous System Dysfunction	Neurologic or behavioral abnormalities Developmental delay Mental retardation
Facial Dysmorphology (At least two of these)	Microcephaly Small eyes Short palpebral fissures (eye openings) Epicanthus (vertical fold of skin on side of the nose, covering part of eye opening) Strabismus (crossed eyes) Flat maxillary area Short, upturned nose Underdeveloped philtrum (groove between nose and upper lip) Thin upper lip Large, low-set ears which are rotated back Receding chin

Source: *Story M, Stang J (eds). (2000). Nutrition and the Pregnant Adolescent: A Practical Reference Guide. Minneapolis, MN: Center for Leadership, Education, and Training in Maternal and Child Nutrition, University of Minnesota.*

There is no known safe threshold for alcohol use in pregnancy. The U.S. Surgeon General recommends that pregnant women abstain completely from alcohol.

3.7.3 Caffeine

Caffeine is a potent central nervous system stimulant. It increases the body's heart rate and metabolism, which in turn can stress the fetus. Caffeine is found in colas, coffee, tea, chocolate, cocoa, energy drinks and some over-the-counter and prescription drugs. Caffeine is also a diuretic and can deprive the body of water.

Fetal exposure to caffeine is increased due to slower clearance from the maternal system during pregnancy and the fetus's inability to metabolize caffeine. High caffeine intake is associated with delayed conception, spontaneous miscarriage, and low birth weight, but not with birth defects. Women should avoid caffeine intakes above 300 mg/day and are advised to talk to their health care provider before consuming caffeine during pregnancy.

3.7.4 Drugs

Prescription, over-the-counter and illegal drugs can be toxic to the fetus. If exposed to drugs in the first trimester, the infant may be born with birth defects. Exposure to drugs later in the pregnancy can affect growth and development and lead to fetal growth restriction. Street drugs, such as marijuana, cocaine and heroin, can cause early labor, cerebral hemorrhage in the infant, and addiction with subsequent withdrawal, low birth weight, and infant or fetal death. Women who use illicit drugs are at higher risk for behaviors that also negatively impact the pregnancy such as using multiple drugs, smoking and drinking alcohol or caffeinated beverages. They are also more likely to live in poverty and have poor nutritional intake. Furthermore, drugs can decrease a woman's appetite for foods or affect how her body uses nutrients.

3.8 Postpartum Care

3.8.1 Postpartum Sadness and Depression

After having a baby, many women experience changes in mood. One minute they may feel happy and the next they may be tearful. This condition is called postpartum blues and is often referred to as the "baby blues" or "maternity blues." Women experiencing postpartum blues may feel a little depressed and have a hard time concentrating. They may lose their appetite or have difficulty sleeping. These symptoms usually start 3 to 4 days after delivery and improve within a couple of weeks. In some cases however, such feelings are extreme and do not go away indicating a more serious condition called postpartum depression.

The Baby Blues

Baby blues are experienced by up to 70-80% of new mothers. Symptoms occur in the first few weeks after delivery and usually disappear on their own. The blues may occur because new moms are often surprised at how exhausted, weak and sometimes alone they feel.

The following may help mothers overcome the blues:

- Talking to partner or a good friend about feelings
- Getting plenty of rest
- Asking a partner, friends or family for help with household and infant care responsibilities
- Taking time for self-care
- Keeping a diary and writing down emotions
- Getting out of the house each day, even if it is only for a short time

Postpartum Depression

Depression that occurs within six months of childbirth may be postpartum depression. Postpartum depression is an illness experienced by up to 10-20% of new mothers. The exact cause of postpartum depression is not known. It is speculated that changes in hormone levels during pregnancy and right after childbirth could be the cause. Postpartum depression can be treated with therapy, support networks and antidepressant medicines. Women with the following signs of depression should be advised to talk to their healthcare provider and given appropriate referrals:

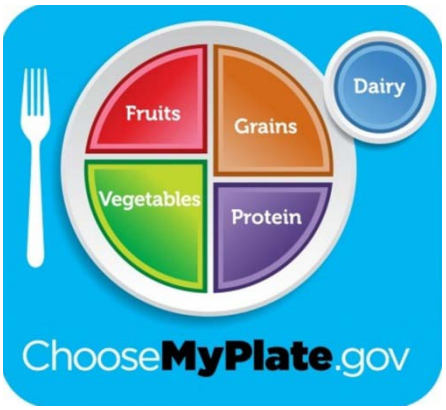
- Frequent sadness or crying
- Changes in appetite
- Insomnia or hypersomnia
- Intense fatigue
- Feelings of helplessness
- Irritability, surges of anger
- Feelings of guilt or shame
- Difficulty concentrating
- Frightening feelings
- Anxiety/panic
- Repetitive fears, thoughts or images
- Low or no interest in sex
- Over concern for the baby
- Lack of emotions for the baby
- Exaggerated high or low moods
- Striking changes in feelings ranging from sadness to thoughts of suicide

3.8.2 Postpartum Nutrition

Often, once the new baby arrives, a mother's attention to her diet fades. However, it is a great time to re-evaluate a woman's nutritional needs. Adequate diet is especially important to help ensure maternal health and to supply her with

the energy necessary to care for the new baby. In addition, postpartum nutrition advice should emphasize replenishing nutrient stores, returning to a healthful weight, preventing problems in subsequent pregnancies and reducing the risk of chronic disease later in life. Postpartum women are advised to continue eating a good-quality diet just as they did during pregnancy. If not breastfeeding, a woman's postpartum nutrient and calorie needs are the same as they were before pregnancy. A special nutritional management may be required if the new mom is breastfeeding, anemic or recovering from a cesarean delivery. New moms who experience loss of appetite due to the physical stress of labor and delivery, hormonal changes or exhaustion from caring for a new infant; should be encouraged to consume small amounts of food rather than completely skipping meals if they have no appetite.

Breastfeeding



To provide adequate nutrition for her baby while protecting her own nutrition status, a breastfeeding mother must choose a varied, healthful, nutrient-dense diet. Her nutrient needs are higher or the same as pregnancy with the exception of folic acid, niacin, magnesium and iron where the requirements are lower. Unless physical activity is reduced, breastfeeding women need about 500 more calories per day over pre-pregnancy energy needs. By following MyPlate to balance food choices, most lactating women can obtain all the nutrients they need from their diet. More information on breastfeeding is provided in Section 4.

Anemia

Some women may become anemic after childbirth. This means that they have fewer red blood cells than what is needed to adequately supply their body with oxygen. Postpartum anemia may be caused by severe blood loss during childbirth, a multiple fetus pregnancy or low iron levels during pregnancy. A typical treatment for anemia aims at restoring iron levels through diet and supplements. Section 6 of this manual has more information about iron deficiency anemia.

Cesarean Delivery

Delivery via cesarean section may temporarily upset the passage of food through the digestive tract, resulting in gas production and constipation. Being physically active can lessen both of these discomforts. Many women may feel impelled to not eat when feeling very bloated, however, eating even small amounts of food helps restore normal bowel action. Nutritional management after surgery includes increasing vitamin C and protein in the diet to promote wound healing and tissue repair.

3.8.3 Weight Control

Many new mothers are concerned about losing their pregnancy weight. Postpartum weight loss rate varies with each individual, but in general most new mothers can expect to lose 10 to 12 pounds at delivery. The rest of the weight should be lost gradually by means of a balanced diet and regular physical activity. Weight loss of no more than 1 to 2 pounds a week should be encouraged. It is important to remind all mothers to be patient and encourage slow, gradual weight loss.

Breastfeeding women may lose pregnancy weight faster as they use calories to produce milk. They still need to consume more calories than they did before pregnancy. It is much more important to get adequate nutrition and calories for breastfeeding than to hold back on nutrients to speed weight loss.

3.8.4 Dietary Supplements

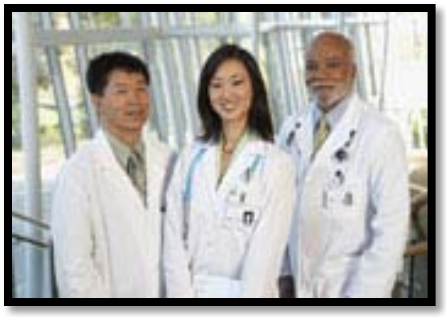
Postpartum and breastfeeding moms are encouraged to obtain their nutrition from food. Eating a balanced diet and obtaining the recommended servings from MyPlate will ensure that the woman gets all the nutrients she needs. For women that have difficulty obtaining all the nutrients they need from their diet a daily multivitamin is recommended. Most women are encouraged to continue to take prenatal vitamins until six weeks postpartum. The key supplements postpartum women should think about taking are iron, calcium and folic acid.

Basic Vitamin Supplements for Women Aged 19-50 Years			
Supplement	Use	DRI	Food Sources
Iron 	Iron is needed to make new blood cells. Low iron levels may cause anemia. Anemic women feel tired and weak, and look pale.	18 mg	Liver, meat, dried beans and peas, prunes, prune juice, fortified grains
Calcium 	Calcium helps keep bones strong and prevents osteoporosis.	1,000 mg	Milk, yogurt, cheese, spinach, fortified orange juice and other foods
Folic Acid 	All women who can become pregnant should take folic acid to lower the risk of having a baby with certain birth defects of the spine and skull. Folic acid should be taken before conception and during the first months of pregnancy.	400 μg	Spinach, collard greens, oranges, lemons and enriched breads, pasta, flour, crackers, cereal and rice

Source: *The American College of Obstetricians and Gynecologists. (2005). Your Pregnancy and Birth (4th ed.). Washington, DC: Meredith Books.*

3.8.5 Routine Healthcare

The postpartum doctor visit is often referred to as the “six-week postpartum check-up.” Most doctors and midwives want to see their patients approximately six weeks after delivery to make sure they are recovering well physically and emotionally. If the woman had a cesarean section, she will likely be seen by her doctor a few weeks earlier to make sure the incision is healing properly. At the post partum visit the health care provider will examine the uterus to see if it is back to normal size and if hemoglobin and hematocrit levels are within acceptable ranges.



Women of all ages can stay healthy by getting regular healthcare. Routine visits consist of a physical exam and health history update. Women in certain age groups may have special needs. Being aware of factors that cause illness in their age group enables them to play an active role in trying to manage problems early and to prevent future health problems.

3.9 SELF TEST QUESTIONS

1. List 3 common signs of pregnancy.

2. List 4 tips to relieve nausea and vomiting in pregnancy.

3. What is Pica? Give 2 examples.

4. What are the recommendations for gestational weight gain for a woman with a normal BMI? What are the recommendations for weight gain for twin pregnancy?

5. What are the risks associated with not gaining enough weight during pregnancy? What are the risks when gaining too much?

6. What are the benefits of exercise during pregnancy?

7. What risk factors are associated with smoking and alcohol use during pregnancy?

8. Identify 3 lifestyle changes to manage hypertension.

9. Distinguish between baby blues and postpartum depression.

10. What are the benefits of routine healthcare?

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3.11 RESOURCES

State of Missouri Department of Health and Senior Services
Phone Number(s): 573-751-6400
Internet Address: http://www.dhss.mo.gov/

Centers for Disease Control and Prevention
National Center on Birth Defects and Developmental Disabilities
Phone Number(s): (770) 488-7150, (888) 232-6789
Internet Address: http://www.cdc.gov/ncbddd/

Smart Moms, Healthy Babies
Phone Numbers(s): (734) 936-4000
Internet Address: http://www.smartmoms.org/

March of Dimes
Phone Number(s): (914) 428-7100, (888) 663-4637
Internet Address: http://www.modimes.org/

American College of Obstetricians and Gynecologists
Phone Number(s): (800) 762-2264 x 192 (for publications requests only)
Internet Address: http://www.acog.org/

American Academy of Family Physicians
Phone Number(s): (913) 906-6000
Internet Address: http://www.aafp.org/

MyPyramid.gov United States Department of Agriculture
Phone Number(s): 1-888-7-PYRAMID (888-779-7264)
Internet Address: http://www.mypyramid.gov/mypyramidmoms/index.html

Baby Blues Connection Support Groups
Phone Number(s): 503-797-2843 or 360-735-5571
Internet Address: www.babybluesconnection.org