

Nutrition Prior to Pregnancy

- There are several health habits that contribute to healthy pregnancies.
- A man's fertility may be affected by nutrition.
- Achieve and maintain a healthy body weight.
- Choose an adequate and balanced diet.
- Be physically active.
- Receive regular medical care
- Manage chronic conditions
- Avoid harmful influences.

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Growth and Development during Pregnancy

- A new life begins at conception.
- The growth and development of the zygote, embryo and fetus proceed on their own schedule.
- There are critical periods that depend on nutrition to proceed smoothly.
- Folate is especially important.

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Preparing for Pregnancy

- 50% of pregnancies are unplanned
- Role of nutrition prior to pregnancy
- Mothers-to-be should strive for
 - ✓ Nutritional adequacy: folate, Fe, Zn, Ca
 - ✓ Appropriate body weight
- Fathers-to-be would be wise to
 - ✓ Consume plenty of fruits and vegetables: vitamin C
 - ✓ Abstain from alcohol
 - ✓ Also maintain healthy body weight



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Nutrition Before Conception

- Some deficiency related problems develop very early in pregnancy.
- Neural tube defects:
 - ✓ Related to inadequate level of folate
 - ✓ Effects the embryo in the first few weeks
 - ✓ Adequate folate (400mg daily) before conception can reduce the risks

Nutrition Before Conception

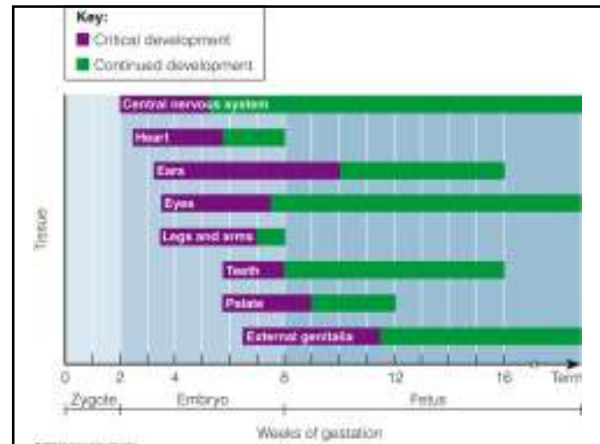
- A healthful diet before conception includes
 - ✓ Avoiding **teratogens**: substances that cause birth defects
 - Includes cigarettes, alcohol, and illegal drugs
 - ✓ Avoiding other possible hazards
 - Smoking, caffeine, medications, some herbs and supplements

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Growth and Development during Pregnancy

- Critical periods are finite periods of intense development and rapid cell division.
 - ✓ Neural Tube Defects
 - The critical period is 17-30 days gestation.
 - Anencephaly affects brain development.
 - Spina bifida can lead to paralysis or meningitis.

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Growth and Development during Pregnancy

- Neural Tube Defects
 - ✓ Factors that increase occurrence of neural tube defects
 - Previous pregnancy with neural tube defects
 - Maternal diabetes
 - Maternal use of antiseizure medications
 - Maternal obesity
 - Exposure to high temperatures early on in pregnancy
 - Race/ethnicity
 - Low socioeconomic status

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Neural Tube Defects

SPINA BIFIDA—A NEURAL TUBE DEFECT



Normally, the body's central chamber (neural tube) is formed by the folding and fusing of the surrounding ectoderm. In spina bifida, the neural tube fails to fuse completely, and the neural tube is open.

In this abnormal case, the neural tube is open, and the neural tube is open. This leads to some degree of paralysis and other neural complications.

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Growth and Development during Pregnancy

- Critical Periods
 - ✓ Folate Supplementation
 - Reduces risk of neural tube defects
 - RDA during pregnancy: 600 µg/day
 - Many fortified grains
 - Those who have previously given birth to a child with a neural tube defect may be prescribed a 4 milligram daily supplement.

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Growth and Development during Pregnancy

- Critical Periods
 - ✓ Chronic Diseases
 - Adverse influences during critical periods
 - Chronic disease in later life for the infant
 - Blood pressure, glucose tolerance, and immune functions
 - ✓ Fetal programming is the influence of substances during fetal growth on the development of diseases later in life.
 - Epigenetics is the study of heritable changes in gene function that occur without a change in the DNA sequence.
 - Nutrients play key roles in activating or silencing genes.
 - More research is needed.

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Maternal Weight

- A mother's weight prior to conception and weight gain during pregnancy will influence an infant's birthweight.
- Higher birthweights present fewer risks for infants.
- Lower birthweights present more problems.

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Maternal Weight

- Weight Prior to Conception
 - ✓ Underweight
 - Tend to have lower birth weight babies
 - Higher rates of preterm (premature <38 weeks) infants and infant deaths
 - Term infant is born between 38 and 42 weeks of pregnancy

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Maternal Weight

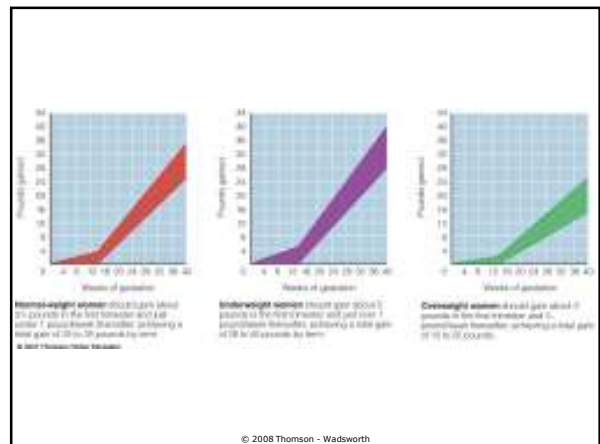
- Weight Prior to Conception
 - ✓ Overweight and Obesity
 - Tend to be born post term (>42 weeks)
 - Tend to be greater than 9 pounds at birth (macrosomia)
 - More difficult labor and delivery, birth trauma, and cesarean sections
 - Higher risk for neural tube defects, heart defects and other abnormalities
 - Weight loss should be postponed until after delivery.

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Maternal Weight

- Weight Gain during Pregnancy
 - ✓ Recommended Weight Gains
 - Underweight woman <18.5 BMI: 28-40 pounds
 - Healthy weight woman 18.5-24.9 BMI: 25-35 pounds
 - Overweight woman 24.9-29.9 BMI: 15-25 pounds
 - Obese woman ≥30 BMI: 15-pound minimum
 - A woman pregnant with twins: 35-45 pounds
 - ✓ Weight-Gain Patterns
 - 3 ½ pounds first trimester
 - 1 pound per week thereafter

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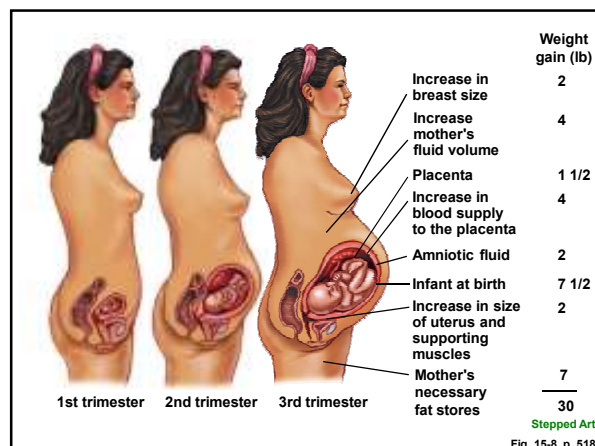


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Maternal Weight

- Weight Gain during Pregnancy
 - ✓ Components of Weight Gain
 - Increase in breast size = 2 pounds
 - Increase in mother's fluid volume = 4 pounds
 - Placenta = 1 ½ pounds
 - Increased blood supply = 4 pounds
 - Amniotic fluid = 2 pounds
 - Infant at birth = 7 ½ pounds
 - Increase uterus and muscles = 2 pounds
 - Mother's fat stores = 7 pounds

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Maternal Weight

- Weight Gain during Pregnancy
 - ✓ Weight Loss after Pregnancy
 - Some fluid losses
 - Some weight retention

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Maternal Weight

- Exercise during Pregnancy
 - ✓ Adjust duration and intensity as needed
 - ✓ Improves fitness, prevents gestational diabetes, facilitates labor, and reduces stress
 - ✓ Low-impact activities are recommended.

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Maternal Weight

- Exercise during Pregnancy
 - ✓ "Do" guidelines
 - Begin gradually if just starting
 - Exercise regularly
 - Warm ups and cool downs
 - 30 or more minutes of moderate activity
 - Watch fluids
 - Enough energy intake

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Maternal Weight

- Exercise during Pregnancy
 - ✓ "Don't" guidelines
 - No vigorous exercise
 - Keep out of hot and humid weather
 - No exercise when sick with fever
 - No exercise while lying on your back
 - No prolonged standing while motionless
 - Stop if painful, uncomfortable, or fatiguing
 - No activities harmful to abdomen
 - No bouncy or jerky movements
 - No saunas, steam rooms, or hot whirlpools

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Nutrition during Pregnancy

- Energy and Nutrient Needs during Pregnancy
 - ✓ Energy
 - Second trimester +340 kcal/day
 - Third trimester +450 kcal/day
 - ✓ Protein
 - + 25 grams/day
 - Use food, not supplements
 - ✓ Essential Fatty Acids—especially long-chain omega-3 and omega-6 fatty acids

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Nutrition during Pregnancy

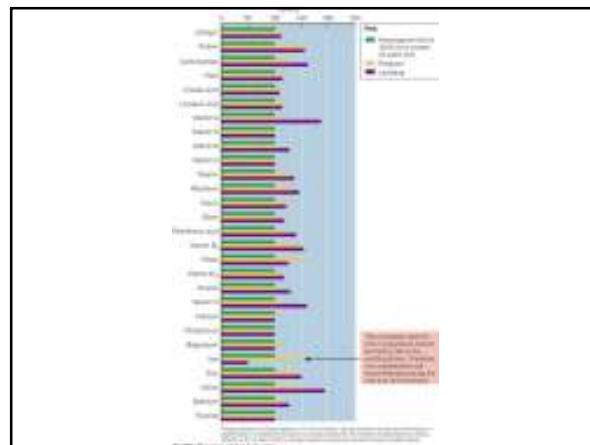
- Energy and Nutrient Needs during Pregnancy
 - ✓ Nutrients for Blood Production and Cell Growth
 - Folate at 600 µg/day
 - Vitamin B₁₂ at 2.6 µg/day
 - Iron at 27 mg/day
 - Zinc at 12 mg/day for adults ≤ 18 years of age, 11 mg/day for adults 19-50 years of age

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Nutrition during Pregnancy

- Energy and Nutrient Needs during Pregnancy
 - ✓ Nutrients for Bone Development
 - Vitamin D is required to use and absorb calcium effectively.
 - Calcium is required to allow for calcification of fetal bones.
 - ✓ Other nutrients are needed to support growth, development, and health of the mother and fetus.

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SAMPLE MENU

Breakfast 1 whole-wheat English muffin 2 tbs peanut butter 1 c low-fat vanilla yogurt 1/2 c fresh strawberries 1 c orange juice	Dinner Chicken cacciatore 3 oz chicken 1/2 c stewed tomatoes 1 c rice 1/2 c summer squash 1 1/2 c salad (spinach, mushrooms, carrots) 1 tbs salad dressing 1 slice Italian bread 2 tsp soft margarine 1 c low-fat milk
Afternoon snack 1/2 c cranberry juice 1 oz pretzels	
Lunch Sandwich (tuna salad on whole-wheat bread) 1/2 carrot (sticks) 1 c low-fat milk	

NOTE: This sample meal plan provides about 2500 kcalories (58% from carbohydrates, 25% from protein, and 17% from fat) and meets most of the vitamin and mineral needs of pregnant and lactating women.

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Nutrition during Pregnancy

- ✓ Nutrient Supplements
 - Prenatal supplements prescribed by physicians
 - May help to reduce risk for preterm delivery, low infant birthweights, and birth defects



Nutrition during Pregnancy

- Vegetarian Diets during Pregnancy and Lactation
 - ✓ Adequate energy is important.
 - ✓ Should include milk and milk products
 - ✓ Should contain a variety of legumes, cereals, fruits, and vegetables
 - ✓ Plant-only diets may cause problems during pregnancy.
 - ✓ Supplements of iron, vitamin B₁₂, calcium, and vitamin D may be required.

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Nutrition during Pregnancy

- Common Nutrition-Related Concerns of Pregnancy
 - ✓ Nausea
 - Morning (anytime) sickness
 - Ranges from mild queasiness to debilitating nausea and vomiting
 - Hormonal changes

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Nutrition during Pregnancy

- Nausea
 - ✓ Alleviation strategies
 - Eat desired foods at desired times.
 - Arise slowly upon awakening.
 - Eat dry toast or crackers.
 - Chew gum or hard candies.
 - Eat small, frequent meals.
 - Avoid offensive foods.
 - Consume carbonated beverages and avoid citrus juice, coffee, tea, water, or milk when nauseated

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Nutrition during Pregnancy

- Common Nutrition-Related Concerns of Pregnancy
 - ✓ Constipation and Hemorrhoids
 - Altered muscle tone and cramping space for organs
 - Straining during bowel movements
 - Alleviation strategies
 - High-fiber foods
 - Exercise regularly.
 - Eight glasses of liquids each day
 - Respond promptly to the urge to defecate.
 - Use laxatives only when prescribed by physicians.

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Nutrition during Pregnancy

- Common Nutrition-Related Concerns of Pregnancy
 - ✓ Heartburn
 - Digestive muscles are relaxed and there is pressure on the mother's stomach.
 - Stomach acid backs up into the lower esophagus.

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Nutrition during Pregnancy

- Heartburn
 - ✓ Alleviation strategies
 - Relax and eat slowly.
 - Chew food thoroughly.
 - Eat small, frequent meals.
 - Drink liquids between meals.
 - Avoid spicy or greasy foods.
 - Sit up while eating; elevate head while sleeping.
 - Wait an hour after eating before lying down.
 - Wait two hours after eating before exercising.

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Nutrition during Pregnancy

- Common Nutrition-Related Concerns of Pregnancy
 - ✓ Food Cravings and Aversions
 - Common
 - Do not reflect real physiological needs
 - Hormone-induced changes in sensitivity to taste and smell
 - ✓ Nonfood Cravings
 - Pica
 - Often associated with iron-deficiency

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High-Risk Pregnancies

- High-risk pregnancies threaten the life and health of both mother and infant.
- Proper nutrition and the avoidance of alcohol, drugs and smoking improve outcomes.
- Prenatal care includes the monitoring of weight gain, gestational diabetes and preeclampsia.
- Low-risk pregnancies are ones without risk factors.

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High-Risk Pregnancies

- The Infant's Birthweight
 - ✓ Low birthweight (LBW) is 5 ½ pounds or less and associated with complications during delivery.
 - ✓ Preterm infants may be appropriate for gestational age (AGA); that is, they are small but the right size for their age and catch up well.
 - ✓ Preterm infants may be small for gestational age (SGA); that is, they are small for gestational age and suffered growth failure in the uterus and do not catch up well.
 - ✓ Relationship to low socioeconomic status families

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High-Risk Pregnancies

- Malnutrition and Pregnancy
 - ✓ Malnutrition and Fertility
 - Severe malnutrition and food deprivation reduce fertility.
 - Men lose the ability to produce viable sperm.
 - Women develop amenorrhea.
 - Loss of sexual interest during starvation

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High-Risk Pregnancies

- Malnutrition and Pregnancy
 - ✓ Malnutrition and Early Pregnancy
 - Placenta problems
 - Impaired development in infant
 - ✓ Malnutrition and Fetal Development
 - Fetal growth retardation
 - Congenital malformations
 - Spontaneous abortion and stillbirth
 - Premature birth
 - Low infant birthweight

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High-Risk Pregnancies

- Food Assistance Programs
 - ✓ Supplemental Nutrition Program for Women, Infants and Children (WIC)
 - ✓ Nutrition education
 - ✓ Food vouchers for nutritious foods only

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High-Risk Pregnancies

- Maternal Health
 - ✓ Preexisting Diabetes
 - Proper management is important.
 - Risks include infertility, hypoglycemia, hyperglycemia, spontaneous abortions, and pregnancy-related hypertension.
 - ✓ Gestational Diabetes
 - Routine screening with glucose tolerance test

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High-Risk Pregnancies

- Gestational Diabetes
 - ✓ Risk factors
 - Age 25 or older
 - BMI >25 or excessive weight gain
 - Complications in previous pregnancies
 - Symptoms of diabetes
 - Family history of diabetes
 - Hispanic, African American, Native American, South or East Asian, Pacific Islander or indigenous Australian
 - ✓ Consequences
 - Complications during labor and delivery
 - High-birthweight infant

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High-Risk Pregnancies

- Maternal Health
 - ✓ Preexisting Hypertension
 - Heart attack and stroke
 - Low-birthweight infant
 - Separation of placenta from wall of uterus resulting in a stillbirth
 - ✓ Transient Hypertension of Pregnancy
 - Develops during second half of pregnancy
 - Usually mild
 - Returns to normal after birth

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High-Risk Pregnancies

- Preeclampsia and Eclampsia; also called toxemia
 - ✓ Preeclampsia
 - High blood pressure
 - Protein in the urine
 - Edema all over the body
 - Affects all organs
 - Retards fetal growth
- ✓ Eclampsia
 - Severe stage of preeclampsia
 - Seizures and coma
 - Maternal death

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High-Risk Pregnancies

- The Mother's Age
 - ✓ Pregnancy in Adolescents
 - Complications include iron-deficiency anemia and prolonged labor.
 - Higher rates of stillbirths, preterm births, and low-birthweight infants
 - Major public health problem and costly
 - Encourage higher weight gains
 - WIC program

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High-Risk Pregnancies

- The Mother's Age
 - ✓ Pregnancy in Older Women
 - Hypertension and diabetes
 - High rate of birth defects – Down syndrome

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High-Risk Pregnancies

- Practices Incompatible with Pregnancy
 - ✓ Teratogenic factors can result in abnormal fetal development or birth defects.
 - ✓ Consuming alcohol during pregnancy can cause fetal alcohol syndrome
 - ✓ Medicinal drugs may result in complications and problems with labor and serious birth defects.
 - ✓ Herbal supplements on the advice of physician only
 - ✓ Illicit drugs easily cross the placenta and cause complications.

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High-Risk Pregnancies

- Practices Incompatible with Pregnancy
 - ✓ Smoking and Chewing Tobacco
 - Fetal growth retardation
 - Low birthweight
 - Complications at birth
- Mislocation of the placenta
- Premature separation of the placenta
- Vaginal bleeding
- Spontaneous bleeding
- Fetal death
- Sudden infant death syndrome (SIDS)
- Middle ear diseases
- Cardiac and respiratory diseases

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High-Risk Pregnancies

- Practices Incompatible with Pregnancy
 - ✓ Environmental Contaminants
 - Lead can affect the nervous system of a fetus.
 - Fish with high levels of mercury should be avoided.
 - ✓ Foodborne illness can leave a pregnant woman exhausted and dehydrated.
 - ✓ Vitamin-mineral megadoses can be toxic, especially vitamin A.

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High-Risk Pregnancies

- Practices Incompatible with Pregnancy
 - ✓ Caffeine
 - Moderate to heavy use may cause spontaneous abortion.
 - Wise to limit consumption
 - ✓ Weight-loss dieting is hazardous and not recommended during pregnancy.
 - ✓ Sugar substitutes are acceptable, but follow FDA guidelines.

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Nutrition during Lactation

- Breastfeeding offers many health benefits to both mother and infant.
- Nutrient and energy needs are higher.
- Fluid needs are higher.
- Alcohol, other drugs, smoking and contaminants may reduce milk production as well as enter breast milk and impair infant growth and development.

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Nutrition during Lactation

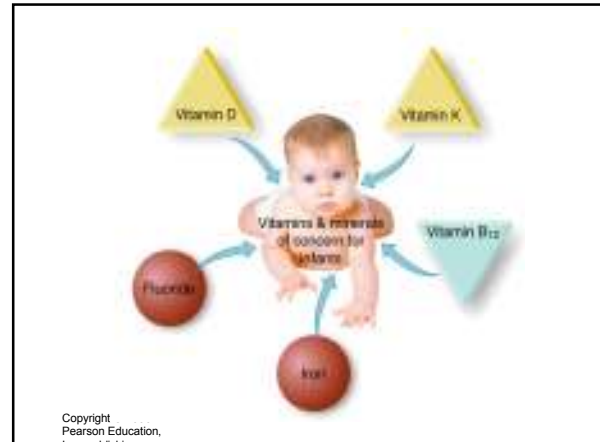
- Benefits of lactation
 - ✓ For infants
 - Appropriate composition and balance of nutrients with high bioavailability
 - Hormones that provide physiological development
 - Improves cognitive development
 - Protects against infections
 - May protect against some chronic diseases
 - Protects against food allergies

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Infant Nutrition

- Infants' nutritional needs are unique because
 - ✓ Their energy needs are high to support rapid growth
 - ✓ Their digestive tracts and kidneys are still immature
 - ✓ They are small in size

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Nutrition during Lactation

- Benefits of lactation
 - ✓ For mothers
 - Contracts the uterus
 - Delays the return of ovulation, thus lengthening birth intervals
 - Conserves iron stores
 - May protect against breast and ovarian cancer
 - ✓ Other benefits
 - Cost savings
 - Environmental savings
 - Do not have to purchase or prepare formula

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Nutrition during Lactation

- Lactation: A Physiological Process
 - ✓ Mammary glands secrete milk.
 - ✓ Prolactin is the hormone responsible for milk production.
 - ✓ Oxytocin is the hormone responsible for the let-down reflex.

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Nutrition during Lactation

- Breastfeeding: A Learned Behavior
 - ✓ Health care professionals offer information and encouragement.
 - ✓ The mother's partner offers support.

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Nutrition during Lactation

- Breastfeeding: A Learned Behavior
 - ✓ Successful breastfeeding in maternity facilities
 - Breastfeeding policy
 - Training for health care staff
 - Inform pregnant women about the benefits and management of breastfeeding.
 - Help mothers within ½ hour of birth.
 - Techniques for breastfeeding
 - Give newborn infants breast milk only unless medically indicated.
 - Practice rooming-in.
 - Encourage breastfeeding on demand.
 - No artificial nipples or pacifiers
 - Support groups

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Nutrition during Lactation

- Maternal Energy and Nutrient Needs during Lactation
 - ✓ Energy Intake and Exercise
 - +500 kcal per day, 330 kcal from food, rest from fat reserves
 - Losing 1-2 pounds per month is common.
 - Intense physical activity may raise lactic acid levels of the milk.
 - ✓ Energy Nutrients
 - Protein and fat the same
 - Carbohydrate and fiber increase

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Nutrition during Lactation

- Maternal Energy and Nutrient Needs during Lactation
 - ✓ Vitamins and Minerals
 - Inadequacies of nutrients affect milk quantity not quality
 - Uses mother's stores
 - ✓ Water as a protection from dehydration
 - ✓ Nutrient Supplements
 - Iron may be required to increase depleted stores.
 - Well-balanced diets should provide nutrient needs.

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Nutrition during Lactation

- Maternal Energy and Nutrient Needs during Lactation
 - ✓ Food Assistance Programs
 - The poor and least educated are more likely to participate in WIC.
 - Incentives are given to breastfeeding mothers.
 - ✓ Particular Foods
 - Strong or spicy foods may flavor breast milk.
 - Food allergies
 - Monitor problem foods

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Nutrition during Lactation

- Maternal Health
 - ✓ HIV Infections and AIDS – mother will transmit virus
 - ✓ Diabetes – careful monitoring and counseling
 - ✓ Postpartum Amenorrhea – but still can get pregnant
 - ✓ Breast Health
 - Breastfeeding does not change shape and size of breasts after lactation.
 - May protect against cancer

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Nutrition during Lactation

- Practices Incompatible with Lactation
 - ✓ Alcohol – infants drink less breast milk
 - ✓ Medicinal Drugs – consult with physician
 - ✓ Illicit Drugs – harmful to mother and infant
 - ✓ Smoking – reduces milk volume and changes flavor and smell
 - ✓ Environmental Contaminants – get into milk but impact is unclear
 - ✓ Caffeine – enters breast milk and causes irritability and wakefulness, also affects iron status

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Fetal Alcohol Syndrome

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Fetal Alcohol Syndrome (FAS)

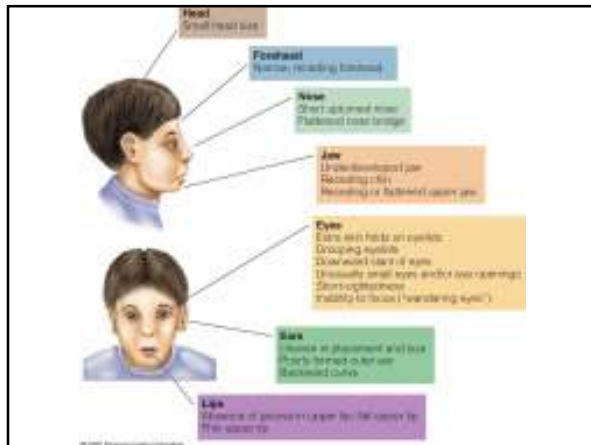
- Fetal alcohol syndrome can only be prevented; it cannot be cured.
- Thousands of infants are born with FAS because their mothers drank too much alcohol during pregnancy.
- Some are born with mild symptoms because their mothers drank during pregnancy (prenatal alcohol exposure).
- It is recommended that women do not consume any alcohol during pregnancy.

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Symptoms

- Prenatal and postnatal growth retardation
- Impairment of brain and central nervous system, called alcohol-related neurodevelopmental disorder (ARND)
- Abnormalities of face and skull and birth defects, called alcohol-related birth defects (ARBD)
- Fetal-alcohol effects (FAE) is an older term used to describe ARND and ARBD.

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Drinking during Pregnancy

- Malnutrition
- Intoxication
- Interferes with tissue development during critical periods
- Alcohol crosses the placenta

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How Much Is Too Much?

- Drinking alcohol in excess of liver's capacity to detoxify
- One drink or a binge is unclear
- Recommendation is to stop drinking

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When Is the Damage Done?

- First two months are critical periods and a woman may not know she is pregnant.
- Depends on the developmental events occurring at the time of the alcohol exposure
- Paternal intake of alcohol is also being studied.
- Don't drink alcohol prior to or during pregnancy.

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