



Nutrition during Pregnancy

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The Status of Pregnancy Outcomes

- Infant mortality:
 - Reflects general health and socioeconomic status of a population
 - Decreases in mortality related to improvements in social circumstances, safe & nutritious food availability, & infectious disease control



Low Birthweight, Preterm Delivery, and Infant Mortality



Low birth weight or preterm infants at high risk of dying in 1st year of life.

- 8.2% of births are LBW yet comprise 66% of infant deaths.
- 12% are born preterm yet account for high incidence of infant deaths



Reducing Infant Mortality and Morbidity

- Improve birth weight of newborns
- Desirable birth weight = 3-4.5 Kg
- Infants born with desirable wt are less likely to develop:
 - Heart and Lung diseases
 - Diabetes
 - Hypertension



Nutrition, Miscarriages and Preterm Delivery

- Thought to be caused by chromosome abnormalities, thyroid disorders, hormone imbalances, infections
- Underweight increases risk
- Elevated blood cholesterol or triglycerides increase risk
- Multivitamin use reduces risk



Nutrition, Miscarriages and Preterm Delivery



Infants born preterm are at risk for death, neurological problems, congenital malformations, & chronic health problems



Nutrition, Miscarriages and Preterm Delivery

- Multivitamin supplements or folate intake decrease risk
- 1-3 fish meals per week are protective
- Underweight and obesity increase risk
- Elevated blood lipids increase risk



Normal Physiological Changes during Pregnancy

Two phases of changes:

- Maternal anabolic changes(estrogen; insulin; growth hormone;)
- Takes place in the 1st half of pregnancy
- Maternal catabolic changes(Adrenaline, cortisol, and glucagon)
- Takes place in the 2nd half of pregnancy

Maternal Anabolic and Catabolic Phases of Pregnancy

Table 4.7 Summary of maternal anabolic and catabolic phases of pregnancy^{12,14}

Maternal Anabolic Phase 0–20 Weeks

Blood volume expansion, increased cardiac output
Buildup of fat, nutrient, and liver glycogen stores

Growth of some maternal organs
Increased appetite, food intake (positive caloric balance)

Decreased exercise tolerance
Increased levels of anabolic hormones

Maternal Catabolic Phase 20+ Weeks

Mobilization of fat and nutrient stores
Increased production and blood levels of glucose, triglycerides, and fatty acids; decreased liver glycogen stores

Accelerated fasting metabolism
Increased appetite and food intake decline somewhat near term

Increased levels of catabolic hormones



Preparation for pregnancy

- A mother brings to her pregnancy, all of her previous life experiences; diet, food habits, attitudes.
- Birth defects occur before the 10th week of pregnancy.
- The outcome of her baby's health depends on mother's nutritional state.
- Prepare body 2 years ahead.
- If nutrients are lacking the mother suffers first and then the baby suffers.



Bad diet can cause:

- Premature birth
- Low birth weight
- Feeble, weak
- Inability to breast feed
- Deformed babies
- complications at birth
- Depression
- Babies have fewer brain cells



Factors affecting Maternal Nutrition

- General nutritional status prior to pregnancy
- Maternal age
- Maternal parity
- Cultural and psychosocial factors
- Lactation
- Weight gain during pregnancy
- Metabolic or other complications of pregnancy



Maternal Weight Gain

- Changing viewpoints
- Increased weight gain reduces chances of IUGR
- No optimal weight gain recommendation fits everyone
- Recommendations are cited in terms of range and are based on RDA's



Optimal Weight Gain

- Personalized approach is best depending on patient's height, pre-pregnancy weight, bone structure, activity level
- Usual **12-17 kg weight gain**
- Fetus 3.5 kg
- Placenta 750 g
- Amniotic fluid 4 kg
- Uterus 1 kg
- Breasts 1 kg
- Stored Fat 2kg
- Total weight gain 12.5 kg



Semester by Semester weight gain

- Ist Trimester 1-2.5 kg
- 2nd Trimester 0.5 kg per week
- 3rd Trimester 0.5 kg per week

- The emphasis is on a gradual and consistent pattern in weight gain.



Red Flags

- Mid pregnancy weight gain should be at least 5 kg
- Sudden sharp increases (wt gains of 1.5-2.5 kg in one week) may indicate excessive fluid retention
- Inadequate gain = less than 1 kg per month during 1st and 2nd trimesters
- Excessive gain = greater than 3kg per month



Weight Gain

- 1st Trimester 1-2.5 kg
 - may lose weight if N & V
- 2nd & 3rd trimester 0.5 kg/wk
- **Dieting is never recommended during pregnancy ; ketoacidosis may result leading to fetal distress.**



Risks for obese expectant mothers

- Obese defined as $> 20\%$ or more above recommended pre-pregnant weight
- Increased risk of LGA
- Increased risk of hypertension
- Increased risk of gestational diabetes
- Weight gain does not guarantee adequate nutrition



BMI category	Weight gain goal: single	Weight gain goal: twins
BMI < 18.5: underweight	12-18 kg	Not enough data
BMI: 18.5-24.9: healthy weight	11-15 kg	16 -24 kg
BMI: 25-29.9: overweight	6-11 kg	14-22 kg
BMI: >30: obese	5-9 kg	11-19 kg

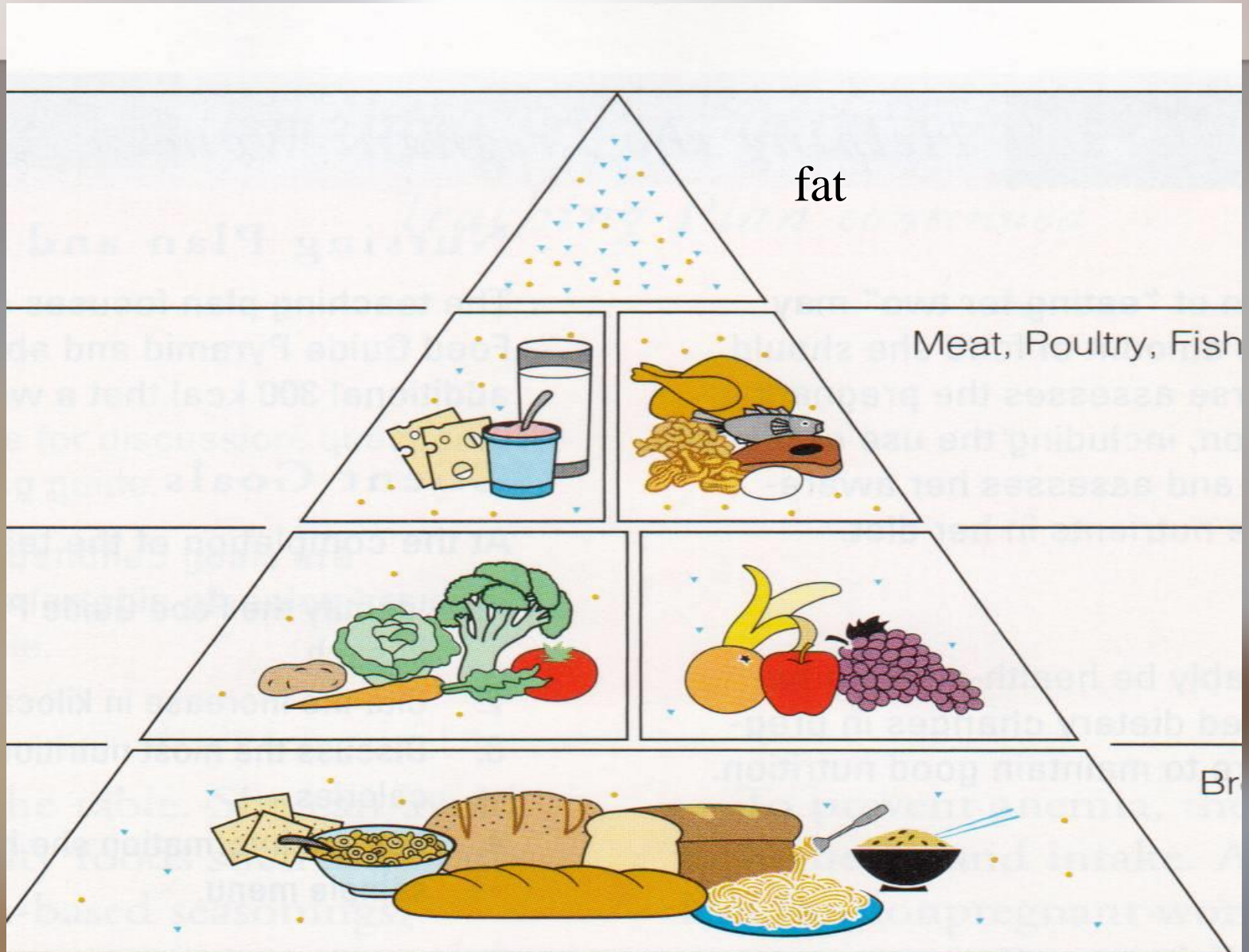


Suggested Caloric Intake

- For average size women, average activity level, age 15-45
- non pregnant 2200 cal./ day
- **pregnant (+300)** 2500cal./day
- **lactation (+500)** 2700cal./day
- Use food pyramid.



THE FOOD PYRAMID





Daily food portions should be increased to include:

- 6-11 servings of breads and other whole grains
- 3-5 servings of vegetables
- 2-4 servings of fruit
- 4-6 servings of milk and milk products
- 3-4 servings of meat and protein foods
- 6-8 large glasses of water, and limit soft drinks or coffee to no more than 1 cup per day



Important Nutrients



Protein

- Protein for growth and maintenance of tissue and overall metabolism.
- Greatest need is in last trimester
- Pregnant women require **60g** daily
- Half of requirement can be met with adding 4 cups milk daily.
- Meat, poultry, fish and eggs are also good sources of protein
- Commercial protein supplements are not recommended



Fat

- Valuable energy source
- Fats are more completely absorbed during pregnancy causing marked increase in serum lipids, and cholesterol.
- Fat deposits in the fetus increase from 2% at mid-pregnancy to almost 12% at term.
- RDA < 30% of daily intake with less than 10% from saturated fats



Omega-3 Fatty Acids, EPA, and DHA During

Pregnancy

- **EPA (eicosapentaenoic acid), DHA (docosahexaenoic acid)**
Adequate EPA & DHA during pregnancy & lactation linked to higher intelligence, better vision & more mature CNS
- Dietary intake recommendations for EPA & DHA
- Do not exceed 3 grams per day



Carbohydrate Metabolism

- Glucose is preferred fuel for fetus
- “Diabetogenic effect of pregnancy” results from maternal insulin resistance



Carbohydrate Metabolism

- Early pregnancy:
 - High estrogen & progesterone stimulate insulin which increases glucose → glycogen & fat
- Late pregnancy:
 - Human chorionic somatotropin (hCS) & prolactin inhibit conversion of glucose to glycogen & fat



Carbohydrates

- Provide energy, bulk and protective substances. Maintains caloric intake and protects against acidosis.
- Hugely increased needs, especially during the last 2 trimesters.
- Promotes weight gain of the fetus, placenta and other maternal tissues. Milk , fruit, vegetables, whole grain breads and cereals are good sources.



Calcium and Phosphorus

- Involved in mineralization of bones and teeth, energy and cell production and electrolyte acid-base buffering.
- Fetal bone and teeth calcification primarily occurs in last 2-3 months.
- If calcium levels are too low, demineralization of mothers bones and teeth may occur.
- 4 c milk daily or equivalent to supply 1200 mg calcium/1200mg phosphorous daily
- Excess phosphorous can be a problem. Avoid snack foods, processed meats and cola drinks.





Iodine

- 175mg day intake recommended
- Use iodized salt
- Prevents goiter



Goiter





Sodium

- Sodium intake is never restricted during pregnancy
- Excessive salt intake, however should be avoided



Zinc

- Affects growth
- RDA for pregnancy 15 mg
- Sources; shellfish, milk, liver, wheat bran



Magnesium

- Essential for cell metabolism and structural growth, essential electrolyte
- RDA 320 mg
- Sources; milk, whole grains, beet greens, nuts, legumes, tea



Magnesium source





Iron

- Anemia during pregnancy often caused by low iron stores
- Anemia may also be due to poor intake of nutrients aiding utilization and absorption of iron; ascorbic acid, vitamins B6 and B12 folic acid, copper and zinc.
- Fetal demands for iron are HIGH, especially during the 3rd trimester.
- Sources; lean meats, green leafy vegs, eggs, whole grain and enriched breads and cereals, dried fruits, legumes,
- RDA 30mg/day Supplements are often necessary during the 2nd and 3rd trimesters.
- Caution; Iron preparations cause nausea! Also constipation, dark stools Take with Vitamin C



Iron deficiency anemia:

a condition marked by depleted iron stores with weakness, fatigue, short attention span, poor appetite, increased susceptibility to infection and irritability



Iron deficiency anemia:

- a condition marked by low hemoglobin with signs of iron deficiency: pallor, and rapid heart rate



Iron-deficiency anemia in pregnancy

- Early pregnancy: risk of preterm delivery, LBW
- Late pregnancy: lower scores on intelligence, language, gross motor and attention tests



Iron supplement





Iron food source





Vitamins

- D: Increased need, RDA 10ug / day
- E: Increased need 10 ug/day Newborns need large amounts; found in large amounts in breast milk
- C: Increased need, aids in formulation of connective tissue and vascular functioning. Citrus, tomatoes, cantaloupe, strawberries, potatoes, broccoli, leafy greens
- B: All increased, all found in milk, liver, enriched breads



Folic Acid

- Water soluble vitamin
- Found in fresh green leafy vegs, liver, yeast, peanuts.
- Women at risk for folate deficiency:
Adolescents; taking Dilantin(phenytoin), multiple births; women who may not make adequate dietary choices
- RDA in pregnancy increased to 600 mcg



Vitamins Folate and pregnancy outcome

- Folate and congenital abnormalities
- NTDs = Neural Tube Defects
- Malformations of the spinal cord and brain
- Three major types
- Spina bifida
- Anencephaly
- Encephalocele

Neural tube defect





Nutrient Needs Before Conception

- First trimester crucial for embryonic and fetal organ development
- Healthful diet before conception ensures that adequate nutrients are available for developing fetus
- Folate or folic acid intake important in the periconceptual period
 - Neural tube defects are more common in infants of women with poor folic acid intake



Vitamin and mineral supplementation

- Iron only necessary supplement
- Multiple gestation, cigarette smoker, alcohol and other drug abuse or those with poor diet may require general MVI supplementation
- Vegan vegetarian may need B12 cyanocobalamin



Fluids

- Necessary for body's biochemical reactions
- Carries substances, aids in temperature control
- Recommended intake 250 ml, 6-8 large glasses of water
- Diet sodas should be limited
- Caffeinated beverages are diuretics and should be limited



Factors Affecting Dietary Intake During Pregnancy

Effect of taste and smell changes during pregnancy on intake

May lead to changes in taste and smell

Pica may result.



Pica

- Eating of substances not normally considered edible or of nutritional value
- Often occurs in low-socioeconomic areas
- Dirt, clay, laundry starch, freezer frost
- Some items can interfere with absorption of nutrients
- Non-judgmental approach ; re-education



Foods to avoid:

1. Ramen Noodles
2. Sodas
3. Pre-packaged lunches
(like lunchables)
4. Almost all prepared, frozen meals
5. Iceberg lettuce



Adolescents

- Nutritionally at risk
- Low pre-pregnant weight, low weight gain, smoking, excessive pre-pregnant weight, unhealthy lifestyle
- Adolescents who become pregnant less than 4 years after menarche are at highest biological risk and need to gain more weight to produce a baby of equal size to mature adolescent.
- Iron, calcium and folic acid are greatest concerns
- Counseling requires time, effort, consideration



- Other nutritional issues during pregnancy
 - Preeclampsia
 - The cause is still unknown
 - Speculation that poor intake of specific nutrients may be a contributing factor
 - An adequate diet remains the best means of prevention



Common Health Problems During Pregnancy

- Nausea and vomiting
- Hyperemesis gravidarum
- Severe N/V during most of pregnancy
- Management of nausea and vomiting
- Separate liquid & food intake
- Avoid odors and foods that trigger N/V



Common Health Problems During Pregnancy

- Dietary supplements for the treatment of nausea and vomiting
- Vitamin B6, multivitamins, & ginger



- Heartburn
- Management of heartburn
- Ingest small meals frequently
- Do not go to bed with a full stomach
- Avoid foods that make heartburn worse



Common Health Problems During Pregnancy

- Constipation
- Prevention
- Consume dietary fiber (30 grams/day)
- Drink water along with the fiber
- Laxative pills are not recommended



Post-partum

- May take 6 months or longer for weight to stabilize
- Hg and RBC levels should return to normal within 2-6 weeks
- Increase fluids, fiber to avoid constipation
- If not lactating, may return to pre-pregnancy nutritional levels



Postpartum Weight Retention

- Much concern over pregnancy weight gain and long-term obesity~6 kg lost at delivery
- Wt loss difficult in women who gained >20 kg
- Women with recommended wt gain in pregnancy are ~1 kg heavier at 1 yr postpartum
- Lactating women lose slightly more



Nursing Mothers

- Inadequate caloric intake can reduce milk amounts, although quality remains unaffected.
- Increase calories by 200kcal daily over pregnancy levels.
- 65 g protein daily
- Increase fluids –drink 250 ml every time breast feed
- Avoid foods that cause GI distress in infant



Exercise during Pregnancy

- Reduces fatigue and helps manage stress
- Increases endurance and strengthening muscles
- Help relieve back pressure
- Improve posture and balance
- Improve circulation & lowers blood pressure
- Helps prepare for the strain of labor
- Improve self image.
- Regain figure faster.





- **Physical activity during pregnancy**
 - Moderate exercise yields many benefits, including improving muscle tone, shortening course of labor, and sense of well-being
 - Liberal amounts of fluid should be consumed before, during, and after exercise
 - Calorie intake sufficient to meet increased needs of pregnancy and exercise



Exercises

1. Stretches for lower back
2. Upper back stretch
3. Pelvic Tilts
4. Kegels