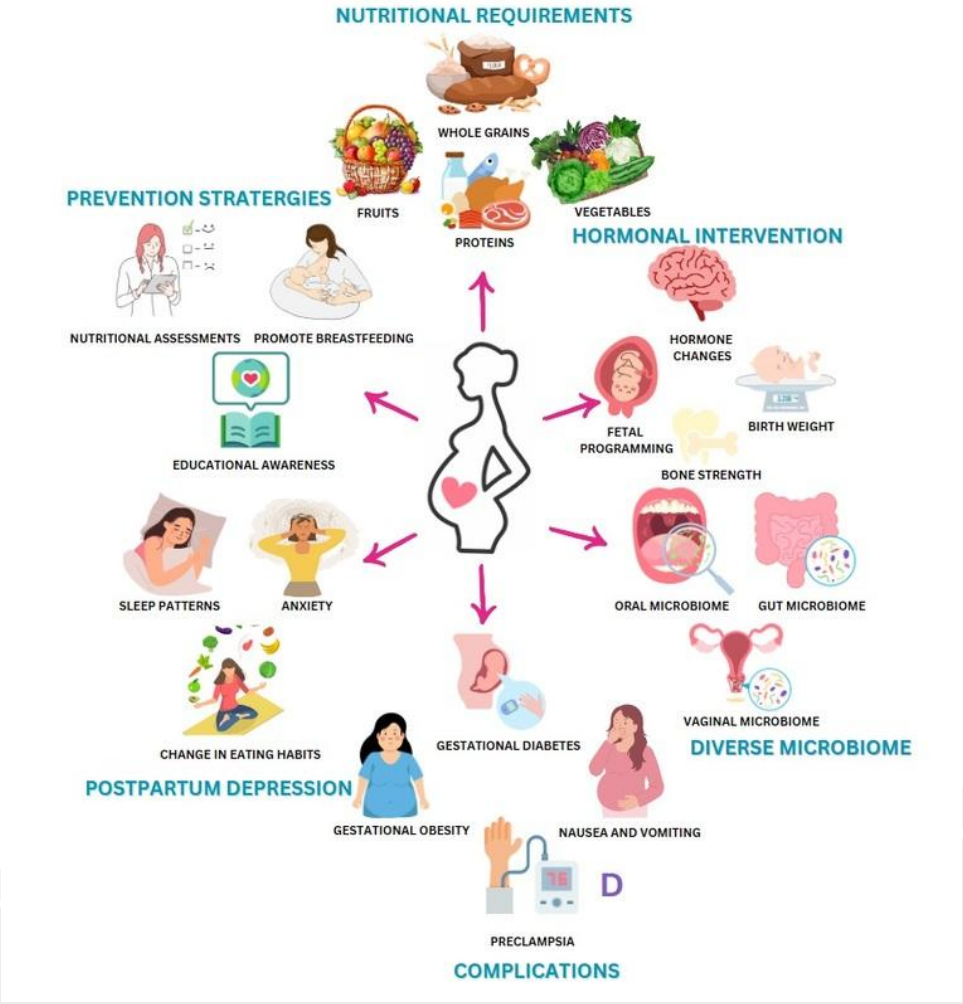
Tishk International University
Faculty of Applied Science
Nutrition and Dietetics Department
Maternal and Child Nutrition – 2nd Grade

# Micronutrient Needs and Supplementation During Pregnancy

# Maternal Undernutrition, Overnutrition, and Pregnancy Outcomes

Previous Lecture



## Contents:

# Micronutrients

- Vitamins vs Minerals

# Micronutrients during Pregnancy

- Important Nutrients during Pregnancy

# Learning Outcome

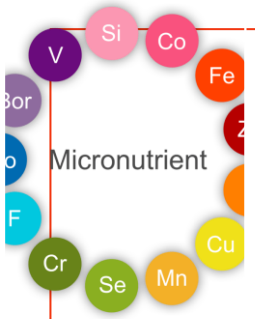
Identify the key micronutrients required during pregnancy and their recommended daily intake.

Explain the consequences of micronutrient deficiencies on maternal and fetal health.

# Vitamins VS Minerals:

| Feature | Vitamins | Minerals |
|---|---|---|
| **Chemical Structure** | **Organic** compounds (produced by plants and animals; contain carbon). | **Inorganic** elements (originate in soil, rock, and water). |
| **Susceptibility to Break Down** | **Can be broken down** by heat, air, or acid. This means they can be lost in food preparation (like cooking). | **Maintain their chemical structure**; they are indestructible by heat or light. |
| **Classification** | Classified as **Fat-soluble** (A, D, E, K) or **Water-soluble** (C and the B-complex vitamins). | Classified as **Macrominerals** (needed in large amounts, e.g., Calcium, Sodium) or **Trace Minerals** (needed in small amounts, e.g., Iron, Zinc). |
| **Storage in the Body** | **Fat-soluble** vitamins can be stored in the body's fatty tissues and liver. **Water-soluble** vitamins are not stored and are generally excreted in urine, requiring a more regular intake. | Minerals are often **incorporated into body tissues** (e.g., calcium in bones, iron in red blood cells) and can also accumulate in the body. |
| **Primary Role** | Often function as **coenzymes** to help release energy from food and regulate metabolic processes. | Often function as **cofactors** (assisting enzymes), and play structural roles (bones, teeth) or help with fluid balance, nerve impulses, and muscle contraction. |

# Micronutrients during Pregnancy:




Micronutrients are only needed in very small quantities but are essential for normal physiological function, growth and development.


Deficiencies of micronutrients such as vitamin A, iron, iodine and folate are particularly common among during pregnancy, due to increased nutrient requirements of the mother and developing fetus.

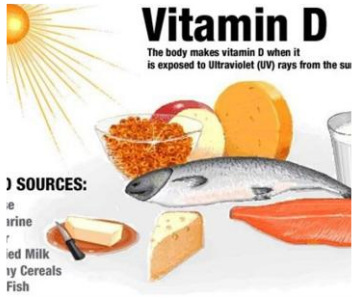
These deficiencies can negatively impact the health of the mother, her pregnancy, as well as the health of the newborn baby.

# Important Nutrients during Pregnancy:

Pregnant individuals need higher amounts of several important nutrients including:


Folic Acid


Calcium




Vitamin D


Iron

Omega 3 Fatty Acids

# **Folic Acid (Folate):** Prevents Birth Defects

Folic Acid (**Folate**, or **Vitamin B9**) **prevents** birth defects and **is** important for the development of the **neural tube** (brain, spine, skull). The neural tube **develops** during the first four weeks of pregnancy.


**Neural Tube Defects (NTDs)**. The **neural tube** is the structure in a developing embryo that eventually forms the Fetus's **brain, spinal cord, and the bones surrounding them (skull and vertebrae)**. It is one of the earliest structures to form, usually closing completely by the 28th day after conception.



Folic Acid **reduces** the risk of **Neural Tube Defects (NTDs)** and **reduces** pre-pregnancy, during, and postpartum complications.

# Folate vs Folic Acid

| Feature | Folate | Folic Acid |
| --- | --- | --- |
| **Origin/Source** | **Natural** form of Vitamin B9. | **Synthetic** (man-made) form of Vitamin B9. |
| **Found In** | Whole foods (leafy greens, beans, citrus fruits, liver). | Supplements and **fortified** foods (enriched flour, bread, rice, cereals). |
| **Chemical Structure** | Chemically complex, typically in the **polyglutamate** form. | Chemically simple, a stable **monoglutamate** form. |

# Recommended Folic Acid Amount During Pregnancy

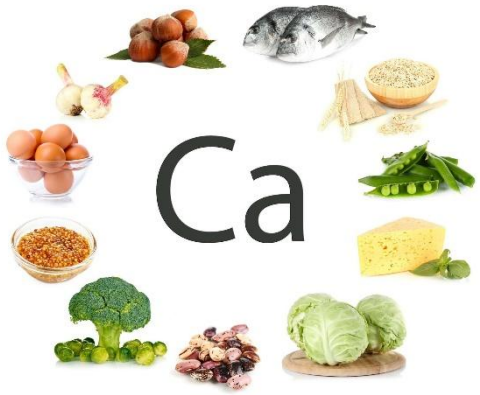
- The recommended daily amount of folic acid varies slightly depending on the specific phase of pregnancy and an individual's risk level.
- The key goal is to have adequate levels **before** and **during the first 12 weeks** of pregnancy to prevent Neural Tube Defects (NTDs).

| Category | Daily Recommended Folic Acid Amount | Timing |
|---|---|---|
| **Standard/Low-Risk** (General Women of Childbearing Age) | **400 mcg (0.4 mg)** | Before conception (at least 1 month prior) and continued **through the first 12 weeks** of pregnancy. |
| **During Pregnancy** (After the first 12 weeks) | **600 mcg** (0.6 mg) | Recommended daily intake for the remainder of pregnancy to support maternal and fetal growth (often found in prenatal vitamins). |
| **High-Risk Individuals** (Need a prescription) | **4,000 mcg** to **5,000 mcg ( 4 to 5 mg)** | Before conception (starting 1-3 months prior) and continued **through the first 12 weeks** of pregnancy. |

# Sources of Folate

| Food Category | Examples of Folate-Rich Foods | Key Serving Information |
|---|---|---|
| **Legumes** (The highest natural source) | **Lentils, Black Beans, Chickpeas, Edamame, Black-Eyed Peas** | A half-cup of cooked lentils can provide up to 90% of the Daily Value (DV). |
| **Dark Green Vegetables** | **Spinach, Kale, Broccoli, Brussels Sprouts, Romaine Lettuce** | The word 'folate' is derived from foliage. Asparagus and Spinach are especially high. |
| **Fruits** | **Oranges** (and orange juice), **Avocados, Papaya, Bananas** | Citrus fruits are excellent sources. |
| **Nuts and Seeds** | **Sunflower Seeds, Peanuts, Almonds, Walnuts** | Seeds and nuts provide folate along with healthy fats and fiber. |
| **Other Vegetables** | **Beets, Corn, Cauliflower** | Beets are a particularly good source of folate. |
| **Animal Sources** (Consume sparingly/avoid during pregnancy) | **Beef Liver** | Liver is extremely high in folate but **must be avoided during pregnancy** due due to its high Vitamin A content. |

# Calcium:




**What is Calcium?**

A mineral that is important for building bones and teeth of both pregnant individual and baby.

**Calcium Functions:**

- Helps with muscle function and nerve action
- Aids in hormone production

**How much Calcium is recommended?**

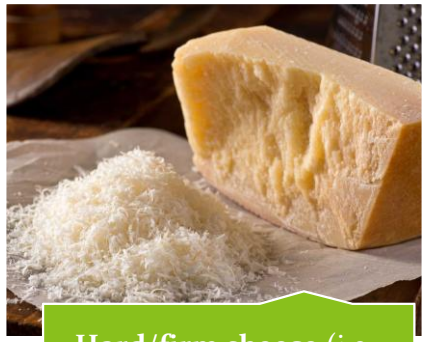
- 1000mg/ Day – most people should be able to get enough from food
- Same as non-pregnant individual

# Calcium: Sources

## Best Sources of Calcium (Dairy Foods)

Cows milk


Skim milk powder



Hard/firm cheese (i.e., Cheddar, Parmesan, Swiss)

Yogurt

Tofu with calcium

## Other Sources


Canned fish with bones


"Calcium fortified" plant-based beverages

Almonds/almond butter

Beans

Bannock made with baking powder

# Vitamin D

**What is Vitamin D?** → Very important **fat-soluble vitamin** → **Promotes Bone Strength**

## Vitamin D Functions:

- Vitamin D helps with **calcium absorption**
- Helps with **bone and teeth formation**
- Assists in **nerve and muscle activity**
- Supports **immune system**
- **Fetal tissue development**

## Recommended Dose?

- **600 IU per day from food and/or supplements**
- **Same as non-pregnant individual**

**Sources of Vitamin D:**

600 IU/day from food and supplements

**Limited food sources of Vitamin D:**

Fortified cow's milk/plant based beverage

Fortified yogurt

Fortified margarine

Fatty fish

Eggs

# Roles of Vitamin D

**Calcium Absorption:** It helps the body **absorb calcium**, which is vital for the baby's **bones and teeth** formation.

**Fetal Development:** It is crucial for **fetal tissue** and proper bone development. A lack of it can lead to rickets in newborns.

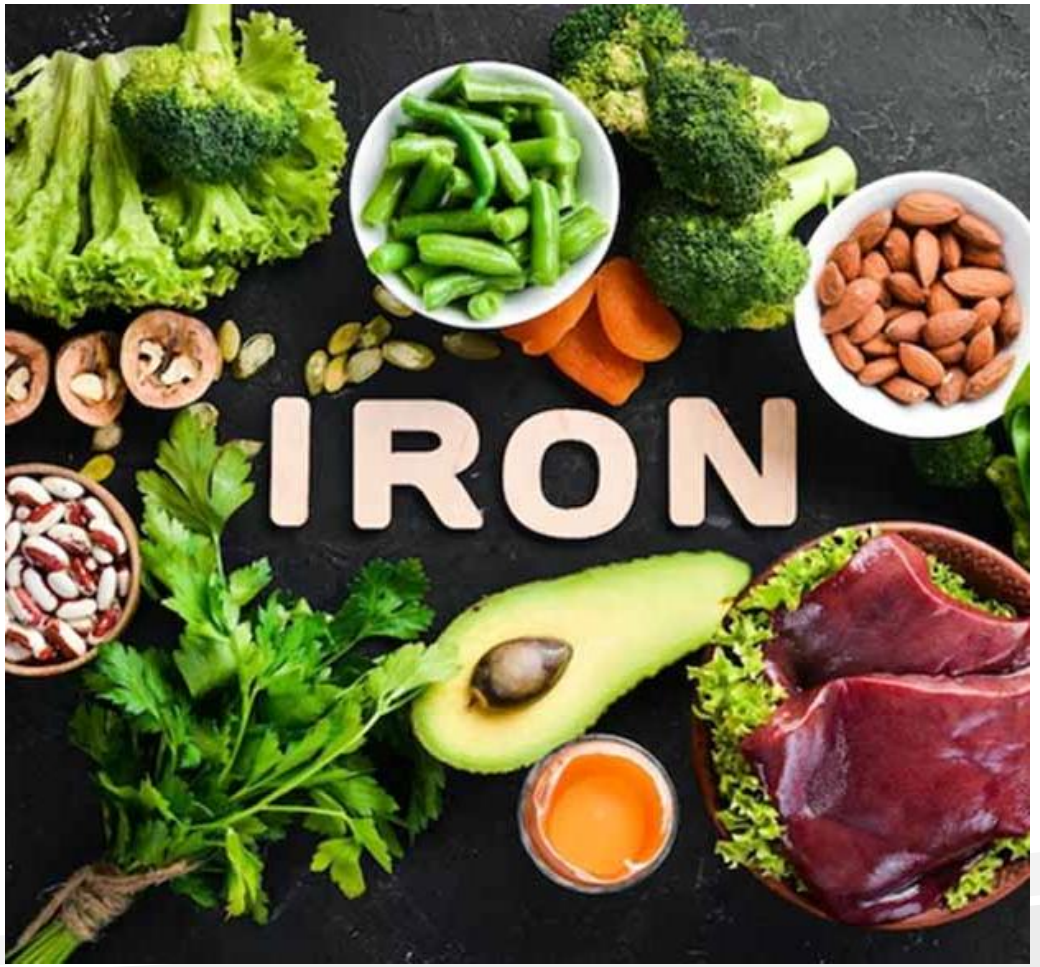
**Maternal Health:** Low levels are linked to a higher risk of complications like:

- **Pre-eclampsia** (high blood pressure)
- **Gestational Diabetes**

**Source Limitation:** Vitamin D is only found in a **limited number of foods**, and sunlight exposure alone may not be enough, especially for people with darker skin, those who stay indoors, or in winter.

# Iron:

- **What is Iron?**
- Important mineral used in many roles
- **Two types of iron:**
- Animal sources (**heme iron**): easily absorbed
- Plant sources (**non-heme iron**): less easily absorbed



## Iron Functions:

- Oxygen transport
- Immune function
- Growth and development

## Recommended Iron amount?

- **27mg/day** from food and/or supplements
- During pregnancy, the body will make an extra litre of blood to support baby's growth
- Prevents Iron Deficiency Anemia

# Iron:

- **Risks of Anemia During Pregnancy:**
- Preterm birth
- Low birth weight
- Baby developing anemia
- Blood loss during labor
- **During pregnancy**, babies store away the iron that they will need for the first 6 months of life. This is why iron intake during pregnancy is so important!
- **Iron Deficiency Anemia:** Low iron leads to a lack of healthy red blood cells in the body.

# Sources of Iron:

**27 mg/day** from food and supplements

## Food Sources:

- Beef
- Enriched Grains (bread, pasta, hot/cold cereal, crackers)
- Chickpeas, lentils, beans
- Tofu

## Tip on Absorption:

- Eating foods that contain **vitamin C** can helps body to use iron in a better way
- Oranges, strawberries, tomatoes
- Potatoes, broccoli, tomatoes/tomato sauce

# Omega-3:

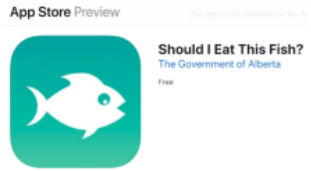
## What is Omega-3?

A type of polyunsaturated fatty acid

**Omega-3 Functions:**

- Tissue development (brain and eyes)
- Brain and Eye Development

**Mercury Safety:**




Choose fish that are low in mercury: **Salmon, herring, Atlantic mackerel, rainbow trout, sardines**

## How much Omega-3 is recommended?

Try to eat fish twice a week in pregnancy to meet requirements

- **5oz (150grams) of fatty fish per week**

# Omega-3:

- **Sources of Omega-3:**
- **Fish**
  - Salmon (farmed and wild)
  - Herring
  - Atlantic mackerel
  - Rainbow trout
  - Canned light tuna
- **Shellfish**
  - Shrimp
  - Clams
  - Oysters
  - Mussels
- **Omega-3 eggs**

# Multivitamin for Pregnancy

- **A Multivitamin (prenatal) should include:**
  ✓ Folic acid (0.4 mg or 400 mcg)
  ✓ Iron (16–20 mg)
  ✓ Vitamin $B_{12}$
  ✓ Vitamin D (400 IU)
- NIHB covers multivitamins for pre and postnatal individuals of childbearing age (12–50 years).
- A multivitamin does not replace the need for a healthy diet – both are needed to meet needs of pregnant person and baby

# Side effects of Multivitamins during Pregnancy :

**Some multivitamins can cause nausea or constipation during pregnancy:**

- To reduce **nausea**, you can take the pill at night, take it with food, or split it into two smaller doses.

- To reduce **constipation**, eat high-fiber foods, drink plenty of water, and stay active.

# Assignment 1: NIHB Overview & Reflection

**Instructions:**

- Write a **1–2 page** assignment covering the following:

  - What is the NIHB program?
  - Who is eligible to receive NIHB benefits?
  - List at least **five types of health benefits** covered.
  - Explain why prenatal vitamins are included.
  - Why is NIHB important for First Nations and Inuit communities?
  - How does it help improve maternal and child health?
  - In your opinion, what is one strength of the program?
  - What is one challenge it may face?


Thank
You