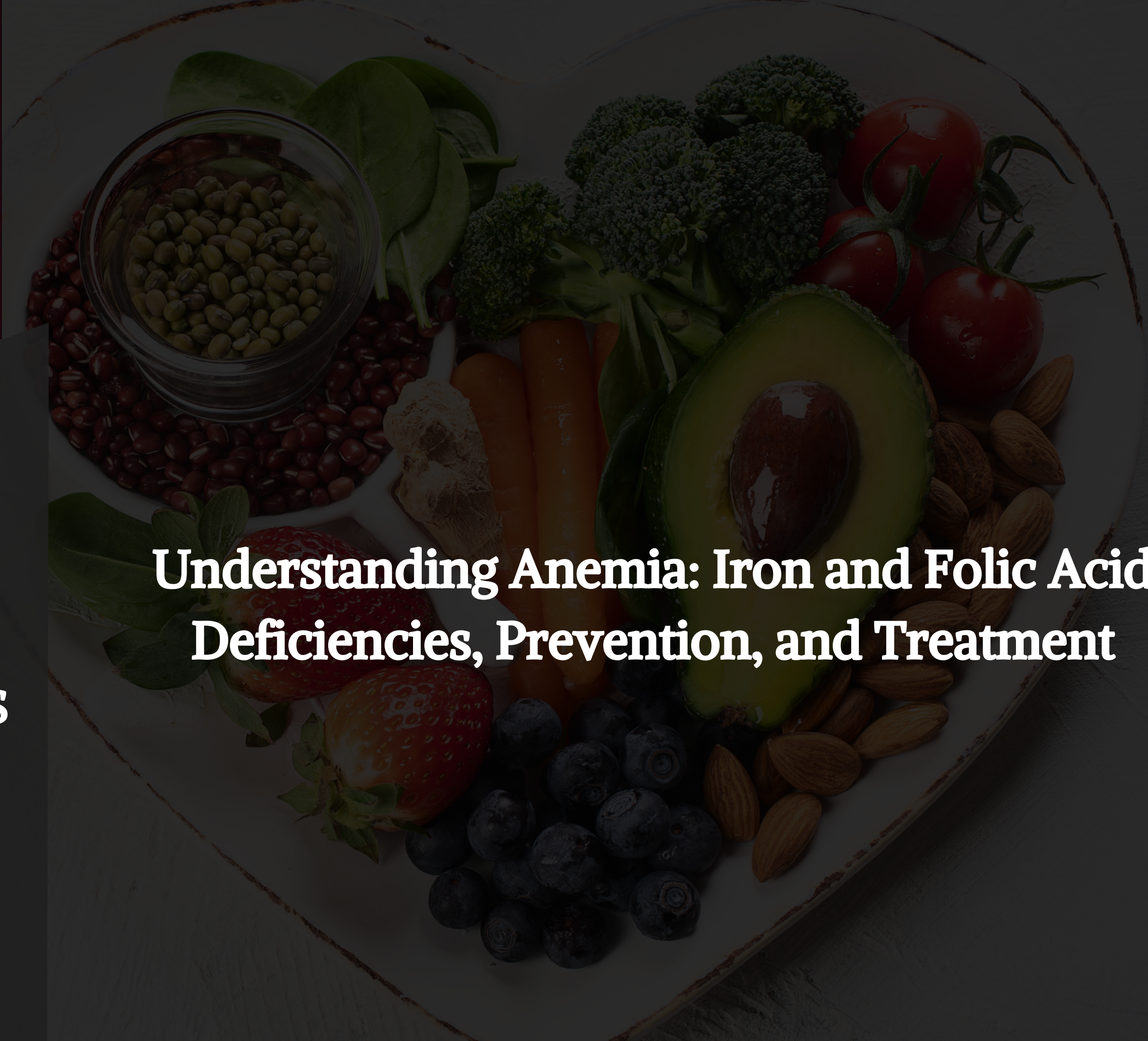




Public Health
Maternal, Child, and Adolescent Health

A top-down view of a white plate filled with various healthy foods. In the center is a small glass bowl of green lentils. Surrounding it are red kidney beans, fresh spinach leaves, several florets of broccoli, three whole red tomatoes, a half of an avocado with the pit removed, a piece of ginger root, two whole carrots, a cluster of almonds, a bunch of blueberries, and two strawberries. The background is a dark, textured surface.

Understanding Anemia: Iron and Folic Acid Deficiencies, Prevention, and Treatment

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Objectives

- Identify the different types of anemia
- Recognize the common signs and symptoms of anemia
- Understand the risk factors associated with anemia
- Describe potential health complications linked to anemia
- Define folic acid and explain its role in the body
- Define folate deficiency anemia
- Differentiate the difference between iron-deficiency anemia and folate deficiency anemia.
- Explain strategies for prevention and treatment





What is Anemia?

A condition in which the body lacks enough healthy red blood cells (RBCs) or hemoglobin to carry adequate oxygen to tissues

Why it matters: Oxygen is essential for energy production; low levels affect all body systems.

When anemia occurs:

- Decreased RBC production
- Increased RBC destruction
- Blood loss



(NIH, 2022)



Iron-deficiency vs Iron-deficiency Anemia

Iron-deficiency

- The body does not have enough iron to meet its needs.
- Iron is essential for producing hemoglobin.
- Hemoglobin is a protein in red blood cells that carries oxygen throughout the body.



Iron-deficiency Anemia

- A specific type of anemia that results from prolonged iron deficiency.
- Characterized by a decrease in the number of healthy red blood cells.
- Reduction in the amount of hemoglobin delivered to tissues.
- It can be acquired or inherited.
- It can be life-threatening.

(Cleveland Clinic, 2024)



Diagnostic Tests



How is anemia diagnosed?

- Complete blood count (CBC): checks RBC count, size, and shape
- Hemoglobin test: main component of RBCs
- Hematocrit test: measures percentage of RBCs
- Reticulocyte test: determine if bone marrow is producing healthy RBCs
- Ferritin levels: protein that stores iron

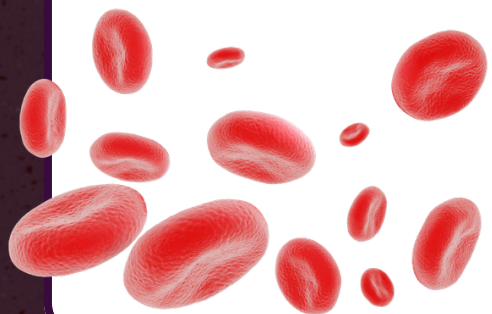
(Cleveland Clinic, 2024)



Common Types of Anemia and Their Cause

Inherited Anemias

- Autoimmune hemolytic: immune system attacks its own red blood cells
- Macrocytic: bone marrow makes unusually large red blood cells
- Normocytic: having fewer red blood cells than usual
- Pernicious: due to vitamin B-12 deficiency



Acquired Anemias

- Iron-deficiency: most common
- Thalassemia: body produces less hemoglobin
- Sickle-cell: stiff and sticky sickle-cells that block blood flow

Anemias that may be acquired or inherited:

- Aplastic: stem cells do not make enough red blood cells
- Hemolytic: red cells break down or die faster than usual
- Microcytic: red blood cells smaller than usual



Common Symptoms of Anemia

Symptoms may be mild initially. It depends on the cause and severity of the anemia.

- Tiredness
- Headaches
- Weakness
- Shortness of breath
- Pale skin
- Irregular heartbeat
- Dizziness or lightheadedness
- Chest pain
- Cold hand and feet
- Brittle nails



([Mayo Clinic](#), 2025)



Risk Factors for Anemia

People at risk for iron-deficiency anemia:

- Pregnant women
- Vegetarians and vegans
- Infants and children
- Gastric bypass or stomach surgeries
- Females who have heavy menstrual cycles
- Frequent blood donors



([Mayo Clinic](#), 2025)



Pregnancy Complications Associated with Iron-deficiency Anemia

In North America, it is estimated that iron deficiency affects more than 50% of pregnancies, and iron deficiency anemia affects nearly 12% of pregnancies.

Maternal Complications:

- Preterm labor
- Cesarean delivery
- Postpartum depression
- Maternal death
- Placenta previa (PP)
- Placental abruption (PA)

Fetal Complications:

- Low birth weight
- Small for gestational age
- Neonatal anemia
- Neurodevelopmental delays



([Benson, Lo, & Caughey, 2024](#))

([Lao, Hui, & Wong, 2022](#))



Management and Treatment of Anemia

Treatments vary based on the cause or underlying condition. Treatments may include dietary supplements or medications.

- Iron supplements
- Folic acid supplements: vitamin B9 (folate) essential vitamin to help the body form red blood cells
- Vitamin B-12 supplements
- Erythropoietin: medication to help bone marrow produce more stem cells
- Immunosuppressants
- Blood transfusions: replaces red blood cells
- Stem cell (bone marrow) transplant



(Cleveland Clinic, 2024)



Folic Acid and Folate Deficiency Anemia



What is Folic Acid?

- A water-soluble B vitamin (vitamin B)
- DNA synthesis and repair
- Production of red blood cells
- Critical for cell division and growth

Why is it important in pregnancy?

- Prevents neural tube defects in developing fetus

(ACOG, 2019)
(March of Dimes, 2025)



How Much Folic Acid Do Women Need?

- Folic acid can be obtained from both foods and vitamin supplements
- Folate is the natural form found in certain foods
- Folic acid is added to enriched products such as bread, pasta, and cereal
- Most multivitamins provide about 400 micrograms (100% of the daily value)
- Check supplement labels to confirm the exact amount

Supplement Facts		
Serving Size 1 Tablet		
	Amount Per Serving	% Daily Value
Folate	667 mcg DFE (400 mcg folic acid)	167%
Vitamin B12	6 mcg	250%
Pantothenic Acid	10 mg	200%
Calcium	200 mg	15%
Iron	18 mg	100%
Magnesium	100 mg	24%
Zinc	11 mg	100%

(CDC, 2025)

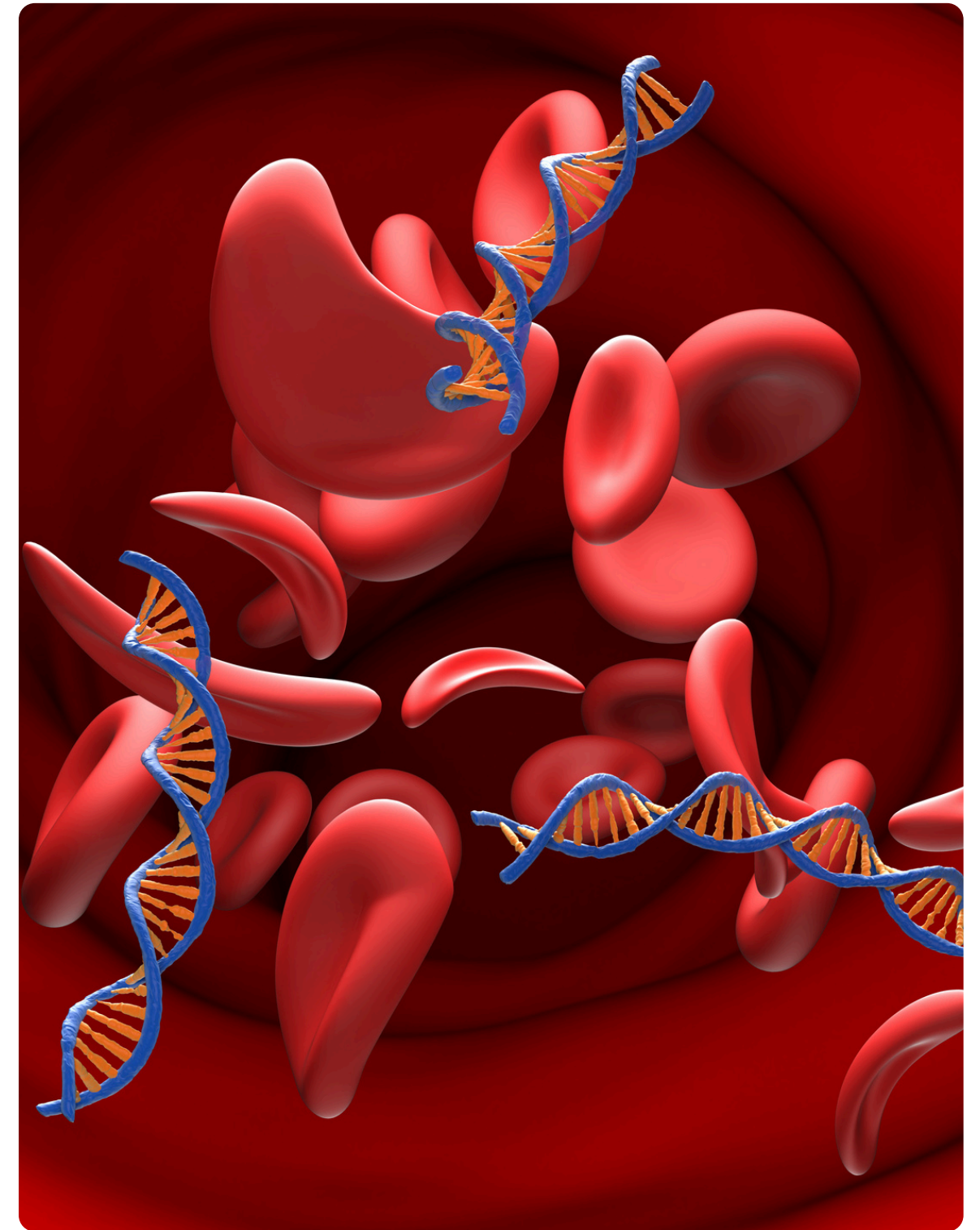


Folate-Deficiency Anemia

A type of anemia caused by not having enough folate (vitamin B9)

Causes:

- Poor diet (low in fruits and vegetables)
- Alcohol use
- Conditions that block nutrient absorption (e.g., celiac disease)
- Increased needs (pregnancy, rapid growth)



([Mayo Clinic](#), 2025)



Who Are At Risk and What Are The Symptoms?

You may be more likely to develop folate-deficiency anemia if you:

- Do not follow a balanced or healthy diet
- Consume high amounts of alcohol
- Are pregnant
- Have difficulty absorbing folic acid due to certain medical conditions
- Take specific medications, such as anti-seizure drugs



Common symptoms may include:

- Pale skin
- Reduced appetite
- Irritability or mood changes
- Low energy or easy fatigue
- Diarrhea
- A smooth, sore, or tender tongue





Key Differences: Iron vs. Folate-Deficiency Anemia

Feature	Iron Deficiency	Folate Deficiency
RBC size	Small (microcytic)	Large (macrocytic)
Cause	Low iron	Low folate
Onset	Gradual	Can develop more quickly
Symptoms	Brittle nails	Swelling of the tongue, mouth sores
Neurological effects	None	Rare
Treatment	Iron supplements	Folic acid supplements

(John Hopkins, 2026)



Prevention Strategies

- **Dietary habits:**
 - Eat iron-rich foods (meat, beans, fortified cereals)
 - Eat folate-rich foods (leafy greens, fruits, liver, beans, etc.)
- **Enhance absorption:**
 - Pair iron with vitamin C.
- **Supplementation:**
 - Prenatal vitamins for pregnancy
 - Iron or folate supplements if at risk
- **Public health measures:**
 - Food fortification (e.g., folic acid in cereals)
- **Routine screening:**
 - Especially for high-risk groups (pregnant individuals, children, elderly)



([CDC, 2025](#))
([John Hopkins, 2026](#))



Key takeaways:

- Anemia reduces oxygen delivery and can affect overall health
- Iron and folate are essential for healthy red blood cell production
- Deficiencies are common but preventable and treatable
- Early recognition and proper nutrition are important
- Simple dietary changes can make a significant difference
- Speak with your healthcare provider to create an appropriate plan



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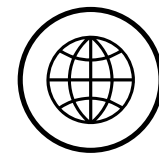
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