

Micronutrients that matter: Essential vitamins and minerals you might be missing.

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Received: 1-Aug-2025, Manuscript No. aajfnh-25-167958; **Editor assigned:** 3-Aug-2025, PreQC No. aajfnh-25-167958 (PQ); **Reviewed:** 17-Aug-2025, QC No. aajfnh-25-167958; **Revised:** 24-Aug-2025, Manuscript No. aajfnh-25-167958 (R); **Published:** 30-Aug-2025, DOI: 10.35841/aajfnh-8.3.273

Introduction

Micronutrients—vitamins and minerals—are small but mighty components of our diet that play crucial roles in maintaining health, supporting growth, and preventing disease. Unlike macronutrients, which provide energy, micronutrients don't contribute calories but are indispensable for nearly every bodily function. Despite their importance, many people may be unknowingly deficient in key vitamins and minerals, which can lead to subtle or serious health problems over time [1].

One of the most common micronutrient deficiencies worldwide is iron. Iron is essential for producing hemoglobin, the protein in red blood cells that carries oxygen throughout the body. Low iron levels can cause anemia, resulting in fatigue, weakness, and impaired cognitive function. Women of childbearing age, infants, and vegetarians are particularly at risk, as iron from plant sources is less easily absorbed than from animal products [2].

Vitamin D deficiency is another widespread concern. Often called the “sunshine vitamin,” vitamin D is produced by the skin in response to sunlight and supports bone health by aiding calcium absorption. Insufficient vitamin D can lead to bone disorders like rickets in children and osteomalacia or osteoporosis in adults. Modern indoor lifestyles and living in northern latitudes can reduce sun exposure, increasing the risk of deficiency [3].

Calcium is vital for strong bones and teeth, muscle contraction, and nerve signaling. While dairy products are well-known sources, many people don't consume enough calcium-rich foods, especially those who avoid dairy. Plant-based

sources such as kale, broccoli, and fortified plant milks can help meet calcium needs [4].

Magnesium is involved in over 300 enzymatic reactions, including energy production, muscle function, and nervous system regulation. Deficiency symptoms can be subtle, such as muscle cramps, irritability, and sleep disturbances. Magnesium-rich foods include nuts, seeds, whole grains, and leafy greens, but soil depletion and processed diets may reduce magnesium intake [5].

B vitamins, including B12, B6, and folate, are essential for energy metabolism and brain health. Vitamin B12 is unique because it is primarily found in animal products, putting vegans and vegetarians at risk for deficiency. Low B12 levels can cause neurological issues and anemia. Folate, found in leafy greens and legumes, is especially important during pregnancy to prevent neural tube defects [6].

Zinc supports immune function, wound healing, and DNA synthesis. A deficiency can lead to impaired growth, taste disturbances, and increased susceptibility to infections. Zinc is found in meat, shellfish, legumes, and seeds but may be limited in vegetarian diets [7].

Vitamin C is a powerful antioxidant that helps protect cells from damage, supports collagen formation for skin and connective tissue, and boosts immune defense. Citrus fruits, strawberries, bell peppers, and broccoli are excellent sources. Severe deficiency leads to scurvy, though milder deficiencies can impair immune function [8].

Iodine is critical for thyroid hormone production, which regulates metabolism. Deficiency can cause goiter and developmental issues, especially during pregnancy. While iodized salt is a common preventive measure, people avoiding processed

foods or using non-iodized specialty salts may miss out on adequate iodine [9].

Micronutrient deficiencies often occur silently but can have wide-ranging effects on health, energy, mood, and development. Symptoms may be subtle or mistaken for other conditions, which is why balanced nutrition and, in some cases, testing and supplementation are important [10].

Conclusion

In conclusion, while we often focus on calories and macronutrients, it's essential not to overlook micronutrients. Ensuring you get enough vitamins and minerals supports your body's complex functions and protects against chronic disease and deficiency-related illnesses. Paying attention to micronutrient intake can help you feel your best and maintain long-term health.

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Citation: Laaraj K. Micronutrients that matter: Essential vitamins and minerals you might be missing. *J Food Nutr Health*. 2025;8(3):273.