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Micronutrient deficiencies and metabolic disorders: A hidden crisis in urban populations.

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Introduction

Modern urban environments are often associated with prosperity, better access to food, and technological progress. However, beneath this façade lies a paradox: many urban residents suffer from micronutrient deficiencies despite consuming an abundance of calories. This phenomenon, known as "hidden hunger," is an under-recognized contributor to the growing burden of metabolic disorders, such as insulin resistance, hypertension, and dyslipidemia. In cities across both high-income and low to middle income countries, dietary patterns have shifted dramatically toward ultra-processed, nutrient poor foods, leaving significant gaps in essential vitamins and minerals that are critical for metabolic regulation. As urbanization continues, tackling these deficiencies is not just a nutritional concern it is a public health imperative [1].

Micronutrients, including vitamins, minerals, and trace elements, play key roles in even mild deficiencies can disrupt these physiological processes and contribute to chronic metabolic dysfunction. Below are some critical micronutrients linked to metabolic health. Low vitamin D levels are widespread in urban populations due to indoor lifestyles and air pollution. Deficiency is associated with magnesium is vital for glucose metabolism and insulin sensitivity. Deficiency may contribute to this trace element enhances insulin activity. Inadequate intake is linked.Zinc affects over 300 enzymatic processes, including insulin production. Low levels are tied [2].

These vitamins are crucial for methylation and DNA synthesis. Their deficiency can lead to urban diets are increasingly composed of energy dense, nutrient poor foods, such as refined grains, sugary beverages, and fast food. This "nutrition transition" contributes to. This duality is called the double burden of malnutrition a situation where the same individual or community experiences both excess and deficiency. Poor diet quality, compounded by sedentary lifestyles, leads to a higher prevalence of metabolic syndrome, particularly in low income urban households [3].

Micronutrient deficiencies can worsen the clinical course of metabolic disorders. Low vitamin D increases insulin resistance and fat deposition. Zinc deficiency in diabetics impairs wound healing, contributing to complications like foot ulcers. Folate and B12 deficiencies raise homocysteine levels, promoting atherosclerosis. Additionally, individuals with metabolic disorders may have altered micronutrient metabolism, making them more prone to depletion. Routine screening for micronutrient deficiencies is not common in urban clinical settings, but it is needed. Key markers include [4].

Urban health programs often miss these deficiencies unless symptoms are severe. Encouraging whole foods, fruits, vegetables, and legumes can help restore nutrient balance.Staple foods like flour, milk, and oils can be fortified with iron, vitamin D, or B-complex vitamins.Targeted supplements, especially for high-risk groups (e.g.,pregnant women, diabetics), can prevent comp lications.Promoting community gardens and local produce can improve access to nutrient-rich foods.Public awareness campaigns about micronutrient-rich diets are vital to change consumer behaviour [5].

Conclusion

Micronutrient deficiencies in urban populations are a silent but powerful contributor to the global surge in metabolic disorders. While cities offer more food

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and healthcare, they also create an environment ripe for nutritional imbalance. Addressing this hidden crisis through policy, education, and healthcare reform can reduce the burden of chronic disease and improve the quality of life for millions.As the world becomes more urbanized, integrating micronutrient screening and nutritional counseling into metabolic care is no longer optional it's essential.

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