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MICRONUTRIENT GAPS IN THE DIETS OF URBAN MIDDLE CLASS EMPLOYED WOMEN IN INDIA – A REVIEW

Dr. Y. Shanti Prabha
Sr. Lecturer in Zoology, Dr. V S Krishna Government Degree and PG College (A), Visakhapatnam

Abstract

A rising number of urban middle-class working women in India are dealing with the dilemma of both nutritional fragility and economic advancement. Significant gaps exist in this population's intake of vital micronutrients, including iron, calcium, vitamin D, vitamin B12, folate, zinc, and magnesium, despite increased employment and changing lifestyle choices. Time restrictions, dietary monotony, irregular eating patterns, a greater reliance on processed or convenience foods, a lack of sun exposure, and ongoing job stress are some of the factors that contribute to these deficiencies. The health effects of micronutrient deficiencies among metropolitan working women, such as fatigue, anemia, poor bone health, mood swings, and heightened vulnerability to non-communicable illnesses, are examined in this article along with the multifactorial causes of these deficiencies. It also assesses how these disparities are exacerbated by cultural dietary preferences, work-life imbalance, and a lack of workplace nutrition understanding. Drawing from extant literature and nutritional surveys, the study suggests a multifaceted approach to tackle this public health issue, with a focus on dietary diversification, the inclusion of foods high in micronutrients, supplementation where required, and workplace and policy-level interventions. In addition to enhancing women's personal health outcomes, closing these dietary disparities is crucial for boosting worker productivity and advancing long-term societal well-being.

Key Words: Micronutrient deficiencies, nutritional gaps, dietary patterns in India, workplace nutrition interventions.

Introduction:

A rising public health concern in India is the nutritional status of urban middle class working women, which is a result of changing lifestyle habits, socioeconomic pressures, and gender norms. Women's employment has grown dramatically in recent decades, resulting in both positive social and economic change. But this change has also brought up new difficulties, especially when it comes to reaching and sustaining appropriate nutrition. Employed women, especially those in urban middle-income households, often juggle multiple responsibilities including professional work, domestic chores, and caregiving duties. This multitasking leaves limited time for planning and consuming balanced meals, leading to irregular eating habits, meal skipping, increased reliance on convenience or processed foods, and insufficient intake of essential macro and micronutrients. Despite adequate food availability, dietary choices among working women may lack diversity, contributing to hidden hunger micronutrient deficiencies that are not always apparent but have serious long-term health implications.

Several studies have consistently highlighted the widespread presence of deficiencies in essential macro and micronutrients among employed Indian women, particularly in urban and semi-urban settings. These deficiencies are not merely a result of economic constraints but are largely influenced by time poverty, irregular meal patterns, insufficient dietary diversity, and limited nutritional awareness.

Protein-energy malnutrition, though traditionally associated with undernutrition in lower socioeconomic groups, is now emerging in a subtle form among urban working women as well. This is particularly evident in those who consume calorie-dense but protein-poor diets. Low protein intake affects muscle mass, metabolic rate, and immune function, thereby reducing resilience to stress and illness (Swaminathan et al., 2012).

Moreover, sedentary lifestyles associated with desk-based jobs significantly reduce physical activity levels. The World Health Organization (WHO, 2020) has acknowledged physical inactivity as a leading risk factor for non-

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communicable diseases. In Indian urban women, sedentary behavior is often compounded by poor dietary habits, leading to a dual burden of over-nutrition (obesity) and micronutrient under-nutrition. According to a cross-sectional study by Anjana et al. (2011), over 35% of urban Indian women are either overweight or obese, which substantially increases their risk for type 2 diabetes, cardiovascular disease, and metabolic syndrome.

Chronic occupational stress, another hallmark of modern employment, particularly affects nutritional status through altered eating patterns, increased consumption of caffeine or fast food, and physiological changes in appetite-regulating hormones. Cortisol dysregulation due to chronic stress not only affects metabolism but also contributes to central obesity, insulin resistance, and inflammation, further deteriorating the nutritional and metabolic profile of working women (Björntorp, 2001).

These intersecting nutritional challenges demand immediate public health attention. Interventions such as workplace nutrition programs, micronutrient supplementation, targeted dietary counseling, and awareness campaigns must be prioritized. Furthermore, there is a need for policy frameworks that support women's health holistically by addressing both occupational and nutritional determinants.

Research has shown that this group is more susceptible to diseases including anaemia, osteoporosis, exhaustion, metabolic problems, and weakened immunity due to shortages in essential nutrients like iron, calcium, vitamin D, vitamin B12, folate, and protein. Additionally, chronic stress and sedentary office work exacerbate dietary risks, increasing the prevalence of cardiovascular, diabetes, and obesity among working women. In addition to the health of individual women, closing these nutrient gaps is essential for the economic stability and productivity of families as well as the larger community. This calls for a better comprehension of the dietary habits, obstacles to eating healthily, and sociocultural background that influence the nutritional profile of working Indian women.

Micronutrient deficiencies:

Iron deficiency, one of the most prevalent among Indian women, is particularly alarming. According to the National Family Health Survey-5 (NFHS-5, 2021), more than 57% of non-pregnant women aged 15–49 years in India are anemic, a figure that includes a significant proportion of working women. Iron-deficiency anemia contributes to chronic fatigue, reduced physical performance, impaired cognitive function, and increased susceptibility to infections (Kassebaum et al., 2014). The etiology is multifactorial, including poor intake of heme iron, low bioavailability of non-heme iron in vegetarian diets, and increased losses during menstruation.

Calcium deficiency is another critical issue, particularly in women with low dairy intake and sedentary lifestyles. It has been estimated that more than 70% of Indian adults, especially women, do not meet their recommended daily calcium intake (ICMR-NIN, 2020). Prolonged calcium deficiency, when coupled with inadequate vitamin D levels, significantly increases the risk of osteopenia and osteoporosis in women, particularly postmenopausal working women who often have low sun exposure due to indoor occupations (Harinarayan et al., 2013). Vitamin D deficiency, in fact, has been reported in over 70–90% of urban Indian women (Marwaha et al., 2011), exacerbated by limited outdoor activity, pollution, and skin coverage due to cultural dress norms.

Vitamin B12 and folate deficiencies are commonly observed in Indian women who follow vegetarian or poorly planned diets. Studies such as by Antony (2001) and Yajnik et al. (2008) have reported a high prevalence of B12 deficiency, which can lead to megaloblastic anemia, neuropathy, and in severe cases, irreversible neurological damage. Folate insufficiency, on the other hand, has implications not only for hematological health but also for reproductive outcomes, including increased risk of neural tube defects in offspring.

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The rapid urbanization and increasing participation of women in the workforce have significantly altered dietary and lifestyle patterns in India. While these changes reflect socio-economic progress, they also contribute to emerging nutritional challenges. Among these, zinc and magnesium deficiencies are particularly noteworthy due to their widespread prevalence and under-recognition among urban working women. These micronutrients are essential for maintaining immune health, metabolic function, neurological balance, and reproductive wellbeing. However, hectic work schedules, stress, irregular meals, and over-reliance on processed foods have created a nutritional gap, predisposing women in urban settings to deficiencies of these critical nutrients (Ghosh, Suri, &Uauy, 2020).

A crucial trace element, zinc is involved in many physiological functions, including enzyme activity, cell division, DNA synthesis, and immunological response. Additionally, it is essential for skin integrity, wound healing, and reproductive health. Because phytates in grains and legumes prevent absorption, zinc's bioavailability is frequently low in Indian diets, especially vegetarian diets (Brown, Peerson, Rivera, & Allen, 2001). About 51% of Indian women of reproductive age do not consume enough zinc in their diets, according to the Comprehensive National Nutrition Survey (2016–18) (MoHFW, 2019). Increased vulnerability to infections, hair loss, irregular menstruation, poor wound healing, and infertility are all linked to zinc deficiency (Priya, Babu, & Naik, 2022).

Similar to this, magnesium is a cofactor in more than 300 enzymatic processes in the human body and is necessary for hormone regulation, protein synthesis, glucose metabolism, and neuromuscular function. Magnesium supports bone health, controls blood pressure, and affects mood and stress. However, research indicates that urban Indians' consumption of magnesium is often insufficient since they consume fewer green leafy vegetables, nuts, legumes, and whole grains (Volpe, 2013). Moreover, the risk of magnesium insufficiency is increased by lifestyle factors such smoking, excessive caffeine use, chronic stress, and alcohol consumption, which are prevalent among urban workers (Cinar & Dede, 2020). Muscle cramps, exhaustion, anxiety, sadness, premenstrual syndrome (PMS), and difficulties sleeping have all been associated with magnesium insufficiency in women (Hruby & Meigs, 2015).

Urban working women are at risk for these inadequacies due to a variety of sociobehavioral variables. Poor meal planning, meal skipping, and a greater reliance on ready-to-eat foods are all consequences of long work hours. Furthermore, it is known that high levels of physical and psychological stress at work affect how well nutrients are utilized and raise the body's needs for magnesium and zinc (Cinar & Dede, 2020). The use of popular drugs that can affect the absorption and metabolism of these nutrients, such as diuretics, oral contraceptives, and proton pump inhibitors (PPIs), is another factor that is often disregarded. It has been demonstrated that long-term use of these medications can cause or worsen magnesium and zinc shortages, especially when dietary consumption is already impaired (Ogunleye, Ajayi, & Bolarinwa, 2022).

Deficits in zinc and magnesium, whether prominent or mild, can affect physical performance, erode immunity, and raise the risk of long-term illnesses like metabolic syndrome, heart disease, and mental health issues. Long-term, this nutritional burden could lower healthcare expenses, lower employment participation, and jeopardize the welfare of families that rely on women's economic contributions. (Ghosh and others, 2020)

Addressing the nutritional gaps that exist among Indian working women is not only a health necessity but also a multifaceted social need that has connections to gender equity, intergenerational well-being, and economic productivity. Women are an essential part of the country's workforce and play a major role in the socioeconomic development of communities and families. This population's poor nutritional status has been demonstrated to impair immunity, physical endurance, cognitive function, and general work performance, which lowers productivity, raises absenteeism, and puts more strain on healthcare systems (Black et al., 2013). Further contributing to a generational cycle of poor nutrition include undernutrition and micronutrient deficiencies in women, especially during their reproductive years, which have significant effects on mother and child health outcomes (Bhutta et al., 2013).

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According to World Bank estimations, among global development strategies, investing in women's nutrition has some of the highest returns in terms of economics. It also has a major positive impact on national GDP and labour participation (World Bank, 2021). Nutritional resilience is crucial for economic stability at both the micro and macro levels in India, where a sizable minority of women labour in unorganised or semi-formal sectors with little access to health care.

The dietary habits and obstacles to healthy eating that are specific to Indian working women must be thoroughly examined in order to comprehend and close these nutritional disparities. According to a number of studies, working women are forced to make quick, frequently unhealthy food choices, skip meals (especially breakfast), and rely largely on energy-dense convenience foods due to time constraints, work-related stress, lengthy commutes, and the combined demands of employment and household duties (Ghosh, 2014; Chopra et al., 2020). Over time, these behaviours jeopardize metabolic health in addition to lowering food quality.

Moreover, sociocultural elements significantly influence dietary choices and access. Even among educated working women, societal norms in many Indian households still demand that women eat last or give other family members access to better food (Gupta et al., 2022). Internalized caregiving duties and gendered food hierarchy frequently lead to nutritional self-neglect. Furthermore, dietary taboos, food myths, and regional customs can restrict the use of fortified products and nutrient-dense animal-based foods (such as meat and eggs), especially for low-income or vegetarian groups (Minocha et al., 2019).

In terms of nutrition literacy, there is also a significant knowledge gap. Research indicates that even well-educated urban women could not fully comprehend portion control, micronutrient requirements, or the long-term effects of dietary deficits (Verma et al., 2021). The relentless marketing of highly processed foods and the lack of workplace nutrition education programs make this situation even worse.

Potential Health Hazards:

Women's health can be subtly compromised by micronutrient deficiencies, which are frequently mild in beginning. This is particularly true for those who are balancing the demands of caring, employment, and home life. Iron deficiency, which causes anemia, is one of the most common and serious deficiencies among Indian women. This illness impairs physical stamina and cognitive function in addition to causing headaches, paleness, and persistent weariness. This means that working women are less productive, more irritable, and less able to balance their duties to their families and their careers.The effects worsen during pregnancy, when low levels of iron and folate greatly raise the risk of low birth weight, early delivery, and maternal problems. Bone demineralization is also a result of calcium and vitamin D deficits, which are commonly seen in women who work sedentary occupations and receive little sun exposure. This eventually results in osteopenia and osteoporosis, which can go undiagnosed until a painful fracture or persistent backache happens. Additionally, these impairments affect neuromuscular coordination, which raises the risk of falls and bad posture, particularly after age 35.

Micronutrient deficiencies directly endanger mental and emotional health in addition to musculoskeletal and reproductive issues. Zinc, magnesium, vitamin D, and B-complex vitamins are essential for mood control and neurotransmitter production. Anxiety, melancholy, mood swings, insomnia, and even cognitive impairment are becoming more and more linked to inadequate levels of essential nutrients. Women who work in stressful jobs or take care of the home might not be aware that something as simple as diet might have an impact on their emotional stability or mental clarity. For instance, megaloblastic anemia and neurological symptoms including tingling, numbness, and memory loss can be caused by deficiencies in vitamin B12 and folate.Additionally, migraines, irritability, and menstrual disorders like premenstrual syndrome (PMS) have been found to be made worse by magnesium shortage. A woman's quality of life can be significantly reduced by these neurological and psychological symptoms, which can also impact resilience, decision-making ability, and interpersonal connections.

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Long-term metabolic and reproductive health are further endangered by micronutrient deficits. Zinc, selenium, iodine, and magnesium deficiencies can affect insulin sensitivity, thyroid regulation, and immunological function. These factors are linked to increased prevalence of hypothyroidism, metabolic syndrome, and polycystic ovarian syndrome (PCOS) in urban Indian women. Infections, persistent inflammation, and delayed wound healing are also more common in women with low nutritional profiles. These impairments impact ovulatory cycles, egg quality, and conception rates during the reproductive years.A phenomenon known as the intergenerational cycle of malnutrition, poor nutrition during pregnancy not only causes problems for the mother but also puts the unborn child at risk for stunting, delayed cognitive development, and a higher chance of developing chronic illnesses as an adult. It is obvious that the effects of hidden hunger are not temporary or silent. Women's nutritional status should be given top priority as a fundamental component of public health, workplace policy, and family well-being because they span generations and life stages.

Conclusion:

In order to solve these problems, a multisectoral strategy encompassing not only healthcare systems but also employment regulations, urban planning, food environments, and educational systems is required. These gaps could be significantly reduced with targeted interventions such nutritional counselling, workplace subsidized healthy meals, flexible work schedules, fortification of commonly consumed foods, and digital platforms that encourage healthy eating habits (Rao et al., 2019). In particular, SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-Being), and SDG 5 (Gender Equality) cannot be achieved at the policy level without incorporating women's nutrition into larger agendas of economic development, workforce health, and gender empowerment (UN SDG Report, 2022).

Resolving these shortcomings calls for a multifaceted strategy. The main tactic is dietary diversity, which encourages the use of foods high in zinc and magnesium, including whole grains, dairy, legumes, nuts, seeds, leafy greens, and fortified foods. Another important factor in closing the gap is the development of biofortified crops with a greater mineral content and food fortification programs. Under medical supervision, tailored supplementation may be required in high-risk populations. In order to address the underlying lifestyle factors that contribute to these deficits, urban public health policies should incorporate workplace nutrition programs, awareness campaigns, and stress reduction activities.

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