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Editorial

Maternal nutrition at a crossroads in India

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Highlights/Key Messages

- India faces a triple burden of undernutrition, micronutrient gaps, and obesity
- Maternal diet quality and gestational weight management remain inadequate
- Supplementation must be complemented by improved dietary diversity strategies
- Triple-duty, life-course approaches are essential for maternal nutrition impact
- Preconception care is critical to break intergenerational malnutrition cycles

Abstract

Maternal nutrition in India faces a triple burden of undernutrition, micronutrient deficiencies, and rising overweight. Although state-led supplementation and fortification efforts have expanded, dietary quality and gestational weight management remain insufficiently addressed. In addition, addressing overweight among women of reproductive age will require a broader approach than simply focusing on women's behaviours. A shift toward a triple-duty, life-course approach that includes preconception care is essential to strengthen maternal and child health outcomes.

Introduction

Globally, 9.1% of women are underweight, and 32.5% are overweight, with anaemia affecting nearly one-third (29.9%) (Dalmiya et al., 2022). South Asia bears a disproportionate burden, with one in five women underweight and nearly half anaemic (UNICEF, 2023). Micronutrient deficiencies, including iron, folate, vitamin B12, vitamin D, iodine, and zinc, remain pervasive across BMI categories (Stevens et al., 2022). Reflecting the broader nutrition transition, the number of children and adolescents aged 5–19 years living with overweight has doubled globally from 194 million in 2000 to 391 million in 2022, with obesity prevalence (9.4%) now surpassing underweight (9.2%) for the first time (UNICEF, 2025), signaling an accelerating intergenerational risk environment.

India mirrors this global paradox. Maternal nutrition in India stands at a decisive inflection point. For years, policies have focused on reducing undernutrition. However, emerging evidence reflects a far more complex epidemiological landscape characterized by the coexistence of underweight, micronutrient deficiencies, and rising overweight and obesity among women of reproductive age. The National Family Health Survey (NFHS-5) reports that 19% of women of reproductive age are underweight, 24% are overweight or obese, and 57% are anaemic (IIPS & ICF, 2021). Evidence from Indian pregnancy cohorts indicates that gestational weight gain among normal-weight women averages only about 60% of recommended levels (Chowdhury et al., 2022). At the same time, maternal diets remain cereal-dominated and inadequate in protein and micronutrient-rich foods (Nguyen et al., 2021). These findings suggest not merely persistent deprivation, but also a broader nutrition transition marked by poor dietary quality across the weight spectrum. Importantly, India is also experiencing a parallel rise in overweight and obesity across age groups, alongside increasing consumption of ultra-processed and energy-dense foods. With an estimated 56% of the national disease burden attributable to unhealthy diets, the country now faces a dual and increasingly triple burden of malnutrition - undernutrition, micronutrient deficiencies, and diet-related non-communicable diseases (ICMR-NIN, 2024). Together, these patterns reflect not merely persistent deprivation, but a deeper and more complex nutrition transition characterized by poor dietary quality across the entire weight spectrum, including among women before, during, and after pregnancy.

Keywords: Maternal nutrition, triple-duty, life-course, preconception care, dietary diversity, India, obesity prevention

The current situation requires urgent action, and India, along with most other countries, has made commitments to global accountability. At the 78th World Health Assembly in 2025, WHO Member States recognized that the world was not on track to meet 2025 global nutrition targets and therefore extended the targets until 2030 (National and Food Safety, 2025). The extended targets include a 40% reduction in stunting, a 50% reduction in anaemia in women of reproductive age, a 30% reduction in low birth weight, compared to the 2012 baseline, maintaining overweight and wasting in children below 5%, and increasing exclusive breastfeeding to at least 60% (National and Food Safety, 2025). Achieving these targets is inseparable from improving maternal nutrition before and during pregnancy. Anaemia reduction, prevention of low birth weight, and breastfeeding outcomes are deeply linked to maternal dietary adequacy and gestational health.

India's maternal nutrition architecture has evolved significantly over the past decade. The Supplementary Nutrition Programme under ICDS and Poshan 2.0 have achieved near-universal provision of fortified take-home rations (THR) to pregnant women, lactating women, adolescent girls, and children under six years of age. Multiple states have developed new food programs that include millets, eggs, and fortified oils, together with fortified milk and hot-cooked meal models. Food supplementation and fortification are cost-effective strategies that improve maternal weight gain during pregnancy and reduce negative birth outcomes (Black et al. 2008; Tabrizi et al. 2019). The integrated hot-cooked meal models provide better results for dietary intake, haemoglobin levels, and gestational weight outcomes (Kachwaha et al., 2021).

However, supplementation alone does not address the quality dimension of diets. Low dietary diversity during pregnancy is strongly associated with maternal anaemia and low birth weight (Seid et al., 2023). Dietary diversity measures have demonstrated consistent associations with micronutrient adequacy (Savy et al., 2007). Despite this evidence, structured interventions explicitly targeting dietary diversity remain limited across states.

Several community-driven models demonstrate promising directions. Initiatives such as Matri Amrit Ahar in Assam, Udita Yojana in Madhya Pradesh, Pukar meetings in Rajasthan, and Suposhan Diwas in Andaman and Nicobar Islands illustrate how social mobilisation and behaviour change communication can address food taboos, improve knowledge, and engage families in maternal dietary decisions. Research indicates that household power dynamics, cultural norms, and intra-family decision-making significantly shape maternal nutrition outcomes (Nguyen et al., 2021). Thus, maternal nutrition must be understood as socially mediated rather than purely biomedical or based only on individual choices.

A critical policy gap, however, is insufficient attention to overweight and obesity during pregnancy. NFHS trends indicate rising overweight prevalence among women entering pregnancy (IIPS & ICF, 2021). Overweight and obesity increase the risk of gestational diabetes, hypertensive disorders, operative delivery, and long-term

metabolic disease in offspring (Black et al., 2008). Current schemes largely remain undernutrition-centric, with obesity addressed primarily through NCD screening rather than integrated maternal nutrition strategies.

In addition, India needs to move beyond even the “double-duty” interventions that simultaneously address undernutrition and overweight, toward a triple-duty action approach. Triple-duty actions simultaneously prevent undernutrition, reduce micronutrient deficiencies, and help prevent overweight and diet-related non-communicable diseases. In practical terms, this requires reformulating THR menus to improve protein quality without excessive refined carbohydrates, embedding dietary diversity assessment within routine antenatal care, strengthening adherence to iron-folic acid and multiple micronutrient supplementation, integrating gestational weight gain monitoring into digital maternal health platforms, and aligning maternal programmes with broader food system reforms addressing ultra-processed foods and unhealthy dietary environments.

Cash transfer schemes represent another critical lever but need to be modified. Conditional maternity benefits aim to enhance purchasing power, yet evidence suggests that financial transfers alone do not guarantee improved dietary outcomes if behavioural and cultural barriers persist (Nguyen et al., 2021). Rajasthan is leading the way with a modified version, as explained below.

NFHS-5 data showed that 31.8% of children under five in Rajasthan were stunted, 27.6% underweight, and 16.8% wasted (IIPS & ICF, 2021). Meanwhile, pandemic-related disruptions to maternity schemes revealed that their cash transfers were often delayed or diverted for non-nutritional purposes.

In response, Rajasthan converged existing maternity benefit schemes and piloted a Cash Plus approach in five tribal districts. The model paired direct benefit transfers with a structured social and behaviour change communication strategy. Frontline workers were trained using a customised counselling guide to conduct home visits and group sessions; Auxiliary Nurse Midwives delivered individualized antenatal counselling; Accredited Social Health Activists mobilized community platforms; and multimedia campaigns addressed gender norms and the need for shared responsibility for maternal nutrition (Government of India, 2025). The intervention extended beyond mothers to include husbands and mothers-in-law, acknowledging intra-household power structures. Reported outcomes demonstrated measurable behavioural and nutritional shifts following the implementation of the intervention. Compared to 2022, 54 per cent more women reported using cash specifically for nutrition-related purposes, and the proportion utilizing cash for food expenditure increased markedly from 30 per cent to 89 per cent by 2025. Additionally, 35 per cent more women gained over 6 kg during pregnancy, although this threshold remains below optimal gestational weight gain recommendations for several BMI categories, indicating that gaps in maternal nutrition persisted despite improvements. Dietary quality also improved substantially: 49 per cent more women reported incorporating locally available foods into their diets, contributing to greater dietary diversity, and

complementary feeding practices among children older than six months became more varied. Importantly, behavioural indicators shifted significantly over the same period. Prevailing food myths and taboos surrounding maternal nutrition declined by 35 per cent between 2022 and 2025, while male awareness of maternal nutrition increased sharply from 18 per cent to 62 per cent, suggesting greater household engagement in maternal health and nutrition decisions (Government of India, 2025). Collectively, these findings highlight that when cash support is combined with structured social and behavioural change communication, it can influence household decision-making, improve dietary practices, and enhance the likelihood that financial benefits are translated into nutritionally meaningful outcomes for women and young children.

Aligning India's maternal nutrition strategy with the 2030 Global Nutrition Targets requires strengthening such convergence models. Reducing anaemia by 50% and low birth weight by 30% demands not only supplementation coverage but improved dietary diversity, structured gestational monitoring, and obesity prevention within antenatal platforms (National and Food Safety, 2025). Digital tools such as ANMOL, TeCHO+, and state-specific maternal health platforms offer opportunities for systematic BMI and gestational weight gain tracking, but these must be institutionalized and linked to actionable counselling protocols.

However, obesity prevention cannot be effective if focused only on women of reproductive age. In particular, optimizing infant and young child feeding positions a population for a good start. Measures that could increase breastfeeding include expanding paid maternity leave, training and deployment of lactation counsellors at health facilities, the implementation of the Baby Friendly Hospital Initiative, and the expansion of India's excellent version of the International Code of Marketing of Breast-Milk Substitutes, passed in 1992 and amended in 2003 -- the Infant Milk Substitutes, Feeding Bottles, and Infant Foods Act). It prohibits the promotion/advertising of commercial formula and other baby foods up to two years of age, but it now needs to prohibit online marketing of these foods as well.

Attention to children of school age has also been excellent, but needs to be universalised. The Ministry of Women and Child Development has recommended banning junk food in school canteens and restricting its sale within 200 metres of school premises, including controls on vendors during school hours. Separately, the Food Safety and Standards Authority of India (FSSAI) has issued regulations restricting the sale and marketing of high fat, salt, and sugar foods within school premises and within 50 metres of schools, along with curbs on advertising, branding, and sponsorship targeted at children. Several states have adopted complementary measures: Uttar Pradesh banned junk food and carbonated beverages inside and outside school campuses; Odisha prohibited the sale of junk food in the vicinity of schools through state directives; Punjab restricted junk food in schools and discourages children from bringing such foods from home; and Maharashtra introduced

“sugar boards” to increase awareness about high sugar content and associated health risks. Consistent implementation and enforcement of these measures across states would help create healthier school food environments and reinforce a comprehensive life-course strategy for obesity prevention.

In addition, there are few examples of effective obesity prevention that do not include government action on taxation of unhealthy foods and ingredients, measures to restrict and reduce industry influence on diets through promotion and inducing conflicts of interest in scientists and policymakers, and other measures aimed to reduce the promotion and consumption of high-sugar, high-salt, and high-saturated fat foods, as well as ultra-processed foods in general (Mialon and Naik, 2023). India is one of the few countries that has had the political will to stand up to the global processed food industry, and it has produced one of the world's strongest codes protecting breastfeeding. This kind of activism, focused on the need for healthy, natural foods for the entire population by protecting against the activities of the global ultra-processed food industry, could bring substantial dividends in the battle against the growing global epidemic of obesity and non-communicable diseases. India's states have demonstrated administrative capacity, decentralized production through women's self-help groups, and innovative monitoring systems. However, moving from coverage to measurable impact requires improved implementation fidelity, consistent monitoring of gestational weight trends, operational dietary indicators, and cross-state learning mechanisms tied to 2030 accountability benchmarks.

Maternal nutrition is foundational to human capital development. It shapes birth weight, early growth trajectories, cognitive outcomes, and long-term metabolic risk. Addressing only one dimension of malnutrition during pregnancy will not suffice. India must transition from a supplementation-centric paradigm to a comprehensive triple-duty maternal nutrition framework that integrates dietary quality, micronutrient adequacy, healthy weight management, behavioural transformation supported by appropriate government action, and supportive food environments.

Crucially, this shift must extend beyond pregnancy to embrace a life-course and preconception care perspective. Nutritional vulnerability does not begin at conception. Adolescent undernutrition, early marriage, short interpregnancy intervals, and pre-existing overweight or anaemia substantially influence pregnancy outcomes. Screening for BMI, anaemia, and dietary risk among women before conception, combined with structured counselling, weight management support, and micronutrient optimization, can interrupt the intergenerational cycle of malnutrition. Embedding maternal nutrition within a continuum that spans adolescence, preconception, pregnancy, lactation, and early childhood aligns directly with the 2030 Global Nutrition Targets, particularly the reduction of anaemia and low birth weight. The extension of global targets to 2030 provides an opportunity, but also a narrowing timeline, for accelerated and integrated action.

Whether maternal nutrition becomes a driver of India's demographic dividend or remains a persistent structural vulnerability will depend on how decisively this life-course transition is undertaken.

Declaration of Generative AI and AI-Assisted Technologies in Scientific Writing

The authors used ChatGPT (OpenAI, version 5.2) to assist with language refinement, structural editing, and manuscript formatting. The AI tool was used to improve the clarity, organization, and grammar of the text and to support APA-style reference formatting. No AI tools were used for data generation, data analysis, interpretation of findings, or development of original scientific arguments. The author takes full responsibility for the content of the manuscript.

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All relevant data are available within the manuscript

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