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Breaking the Cycle of Malnutrition: Integrated Strategies and Global Lessons for India and the Global South

Monika Kochar

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Monika Kochar*

Introduction

Malnutrition remains one of the most pressing public health and development challenges in India. Despite notable achievements in economic growth, poverty reduction, and improvements in food grain production, the country continues to grapple with unacceptably high levels of undernutrition, micronutrient deficiencies, and, more recently, a rising burden of overweight and obesity. This double burden reflects the complex interplay of poverty, gender inequality, limited dietary diversity, inadequate healthcare, poor sanitation, food insecurity, and the growing pressures of climate change. Crucially, malnutrition cannot be understood in isolation from food systems and agricultural policies, which shape both the availability and affordability of nutritious foods. While past policies have ensured national food security through a focus on staple grains, they have often failed to deliver dietary diversity, thereby limiting progress on nutritional outcomes. Emerging approaches such as dietary diversification, fortification, and biofortification are increasingly recognized as essential to complement food security policies and improve access to micronutrient-rich foods.

The COVID-19 pandemic further compounded these challenges, serving as a litmus test for India's nutrition and public health infrastructure. Lockdowns and mobility restrictions disrupted flagship programs such as the Integrated Child Development Services (ICDS), the Mid-Day Meal Scheme (MDMS), and Poshan Abhiyaan. Between April and June 2020, the number of children receiving supplementary nutrition

* Advisor Health with DAKSHIN- Global South Centre of Excellence, RIS, New Delhi

fell by nearly 60 per cent, while school closures deprived millions of children of their primary daily meal. Maternal and child health services were similarly affected, with significant declines in antenatal care, institutional deliveries, and postnatal check-ups. These disruptions not only deepened food insecurity but also widened inequities, particularly among low-income households, tribal communities, and the urban poor. The experience highlighted the fragility of nutrition programs in times of crisis and reinforced the urgency of building resilience into welfare schemes through contingency planning, supply chain continuity, and digital monitoring systems.

The consequences of malnutrition are far-reaching. Undernutrition, particularly in the first 1,000 days of life, impairs cognitive development, weakens immunity, and increases susceptibility to infections. In the longer term, it leads to poor educational attainment and reduced productivity in adulthood, thereby perpetuating cycles of poverty and ill-health. Maternal and adolescent malnutrition remain critical concerns, with high rates of anaemia, underweight pregnancies, and low birth weight infants contributing to adverse health outcomes across generations. Government initiatives such as Anaemia Mukt Bharat, Janani Suraksha Yojana, and the Home-Based Care for Young Child (HBYC) have been designed to improve maternal and child nutrition and health outcomes, yet their impact is often constrained by systemic bottlenecks and uneven implementation, particularly in rural and tribal settings.

Against this backdrop, this paper examines the multi-dimensional determinants of malnutrition in India, exploring the intersections of health, food systems, and agricultural policies. It critically assesses the performance of key government schemes such as ICDS, MDMS, and Poshan Abhiyaan, and situates the Indian experience within the broader Global South, where similar challenges of nutrition security, climate vulnerability, and governance persist. Finally, the paper draws on evidence-based strategies and international best practices to propose a way forward for building a resilient, equitable, and future-ready nutrition ecosystem.

The State of Malnutrition in India

The Green Revolution of the 1960s marked a turning point in India's agricultural history, significantly increasing the production of rice and wheat and transforming the country into a food-surplus nation. However, this success obscured a silent nutritional crisis: hidden hunger.[1] While the calorie needs of the population were largely met, diets became less diverse, with a sharp decline in the consumption of micronutrient-rich foods such as pulses, fruits, vegetables, and millets. This dietary imbalance continues to manifest in chronic undernutrition and micronutrient deficiencies, particularly among women and children.

According to the National Family Health Survey-5 (2019–21), 35.5 per cent of children under the age of five in India are stunted, 19.3 per cent are wasted, and 32.1 per cent are underweight. These indicators have seen marginal improvement since the previous survey, suggesting stagnation in progress. Micronutrient deficiencies remain pervasive: 57 per cent of women and 67.1 per cent of children aged 6–59 months are anaemic, placing them at increased risk of illness, impaired cognitive development, and maternal and infant mortality.

The causes of malnutrition are multi-layered and interlinked. Poverty and food insecurity, gender-based discrimination, poor access to healthcare, low maternal education, and inadequate sanitation all contribute to poor nutritional outcomes. However, one of the most crucial windows for intervention is the life-cycle approach to nutrition, especially focusing on maternal, infant, and young child nutrition.

Maternal nutrition plays a foundational role in breaking the intergenerational cycle of malnutrition. Adolescent malnutrition, largely driven by poor dietary habits, early marriages, and gender inequality, sets the stage for poor maternal health. Undernourished adolescent girls face delayed physical development and are more likely to give birth to low birth weight babies. Research has established strong correlations between maternal stunting and restricted intrauterine growth, which adversely impacts newborn survival and long-term development (Black et al., 2013).

Maternal anaemia, affecting 52.2 per cent of pregnant women in India, is another pressing concern. It increases the risk of preterm births, neonatal deaths, and long-term cognitive delays in children (World Health Organization, 2019). Despite government efforts through programs like Anaemia Mukt Bharat and the Iron and Folic Acid (IFA) Supplementation Scheme, coverage and adherence remain inconsistent. Structural challenges such as supply chain bottlenecks, gaps in community awareness, and reluctance to consume supplements due to fear of side effects further impede progress.

The first 1,000 days of life,[2] from conception to a child's second birthday, are considered the most critical period for nutritional intervention. During this time, nutritional deficits can lead to irreversible damage in brain development and immune function. Interventions such as micronutrient supplementation, adequate maternal nutrition, and exclusive breastfeeding have been proven to reduce stunting and wasting (Bhutta et al., 2013). However, implementation remains a challenge: while 63.7 per cent of infants are exclusively breastfed in India, less than 11 per cent of children aged 6-23 months receive a minimum acceptable diet, reflecting gaps in complementary feeding practices (National Family Health Survey (NFHS-5), 2019-21). The IYCF[3] guidelines emphasizing breastfeeding and complementary feeding have only been partially successful due to low awareness, poverty, and inadequate implementation.

While rural and tribal communities continue to battle under nutrition, urban India faces a growing burden of over nutrition. The transition toward ultra-processed, calorie-dense, and nutrient-poor foods, often high in refined sugar, fat, and salt, has contributed to rising obesity rates, particularly among middle- and upper-income households. Lifestyle shifts, increased screen time, and reduced physical activity further compound the problem, placing children and adolescents at increased risk of type 2 diabetes, hypertension, and cardiovascular diseases later in life (Rollins, et al., 2016).

The dominance of monoculture[4] farming and the prioritization of high-yield staples have also impacted diet quality. The shift away from millets,

pulses, and indigenous crops, once staples of Indian diets, has reduced dietary diversity and contributed to micronutrient deficiencies (Pingali, 2015). Government efforts to revive these crops, such as the National Year of Millets (2023) and their inclusion in the Public Distribution System (PDS), aim to improve nutritional outcomes and build climate-resilient food systems. Additionally, promoting kitchen gardens (Poshan Vatikas) and backyard poultry under Poshan Abhiyaan seeks to enhance household access to fresh and diverse foods.

Technology also plays a growing role in nutritional governance. The Poshan Tracker, introduced under Poshan Abhiyaan, enables real-time monitoring of service delivery, growth tracking, and supply chain management across AWCs. Currently, over 1.4 million Anganwadi workers (AWW) (Ministry of Women and Child Development, 2023) use this tool to monitor nutrition outcomes for more than 101.2 million households, marking a significant shift toward data-driven interventions (Ministry of Women and Child Development, 2025).

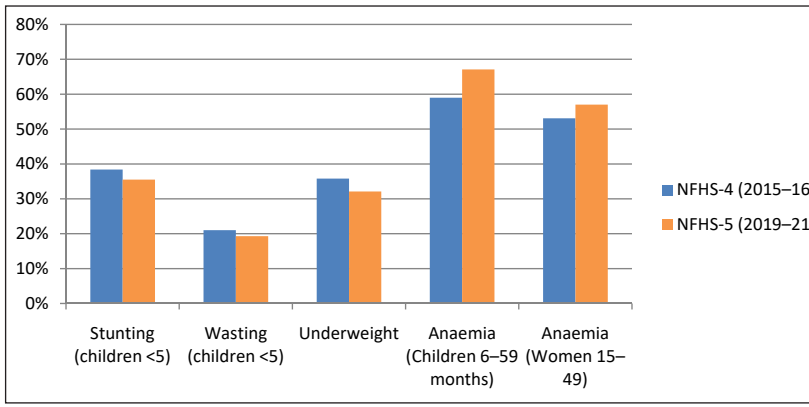
Fortification of staple foods is another strategy used to combat micronutrient deficiencies. The Food Safety and Standards Authority of India (FSSAI), has introduced standards for fortifying salt, wheat flour, rice, and edible oils with essential micronutrients. However, the uptake of fortified foods is limited by supply chain inefficiencies, low consumer awareness, and limited affordability in rural markets (Dhara et al., 2021).

Alongside these measures, biofortification provides an agricultural pathway to address hidden hunger by embedding nutrients directly into staple crops. Unlike conventional fortification, which requires industrial processing and centralized distribution, biofortification ensures that micronutrient-rich crops reach rural households more directly through farming systems. India's initiatives to mainstream biofortified varieties, such as iron-rich pearl millet, zinc-rich rice, and vitamin A-rich sweet potatoes, demonstrate the potential for integrating nutrition goals into agricultural policy and food production systems. (Bouis & Saltzman, 2017)

India's malnutrition landscape is defined by a complex mix of under nutrition, over nutrition, and micronutrient deficiencies. Despite a

robust framework of nutrition-focused programs and increased political commitment, challenges persist in terms of equitable access, behavioural change, and effective last-mile service delivery. A nuanced, region-specific, and lifecycle-focused approach is essential to build a healthier, more nourished India.

Figure 1: Indicators as per NFHS 4 and 5



***Source*:** Author's compilation

Socio- Economic Determinants of Malnutrition in India

Malnutrition in India is not merely the outcome of food shortages or poor dietary choices. It is deeply embedded in the socio-economic structure, where inequality, marginalization, inadequate access to basic services, and entrenched gender norms combine to create persistent nutritional deficits across the population. Understanding these structural determinants is essential to designing effective and equitable nutrition interventions.

One of the primary drivers of malnutrition in India is economic inequality. Despite substantial national food production, the benefits are not equitably distributed. Households in lower income quintiles, particularly those belonging to Scheduled Castes (SCs) and Scheduled Tribes (STs), experience higher rates of stunting, wasting, and underweight among children. According to recent studies, these communities often face compounded disadvantages, such as poor access to healthcare,

education, sanitation, and income-generating opportunities (Kuttiatt et al., 2024)

Data from the National Family Health Survey (NFHS-5) reveals that malnutrition is concentrated in economically backward districts, particularly in states like Bihar, Jharkhand, Madhya Pradesh, and Uttar Pradesh. Statistical analyses using concentration indices confirm that stunting and underweight prevalence correlates strongly with poverty. Children in the poorest wealth quintiles are nearly twice as likely to be malnourished as those in the richest quintile. Poverty reduces the ability of families to access nutritious food, clean water, health services, and education, reinforcing an intergenerational cycle of under nutrition.

While India produces sufficient food, food insecurity remains a widespread problem due to poor food distribution, affordability issues, and inadequate infrastructure. An estimated 40 per cent of food produced in India is wasted due to poor post-harvest storage and distribution systems. This not only drives up costs but also limits the availability of perishable, nutrient-dense foods like fruits and vegetables for vulnerable populations (Nguyen et al., 2023). A study by McKay et al. (2023) noted that while malnutrition rates suggest widespread food insecurity, direct linkages between household-level food insecurity and nutrition outcomes remain under-researched in India.

Agricultural challenges further aggravate food insecurity. Fragmented landholdings, dependence on monoculture, lack of irrigation infrastructure, and limited adoption of mechanization reduce overall productivity and dietary diversity. Additionally, climate change disrupts cropping cycles and food availability, particularly for smallholder and marginal farmers.

Beyond income and food access, sanitation and hygiene play a pivotal role in determining nutritional outcomes. Poor sanitation leads to repeated infections, such as diarrhoea and intestinal worm infestations, which impair nutrient absorption and increase nutritional needs. Access to clean drinking water, toilets, and hand washing facilities remains limited in many rural areas. The Swachh Bharat Abhiyan (SBA), launched in 2014, aimed to improve sanitation infrastructure and eliminate open defecation. Its success has shown promising impacts on health outcomes. States with

high toilet coverage, such as Kerala and Himachal Pradesh, report lower rates of child stunting and wasting, while states like Bihar and Jharkhand still lag behind (Arvind et al., 2024)

The healthcare system in India, particularly in rural areas, suffers from chronic underfunding and logistical challenges. Public health expenditure remains at just 1.84 per cent of GDP (). A shortage of frontline health workers, poor infrastructure in primary health centres, and inadequate maternal and child health services contribute to missed opportunities for early identification and treatment of under nutrition. Many rural women still lack access to antenatal care, immunizations, or growth monitoring services for their children.

Gender inequality is a critical and often overlooked determinant of malnutrition. Within households, intra-household food allocation tends to favour male members. Women are often expected to eat last and eat less, leading to chronic under nutrition, especially during adolescence, pregnancy, and lactation. These practices are culturally entrenched and reflect the low status of women in many communities (Neogy, 2010). Research shows that maternal malnutrition directly influences infant outcomes, including low birth weight and stunting.

Further compounding this is the societal preference for male children, which affects not just food allocation but also healthcare-seeking behaviour. A landmark study by Jayachandran and Kuziemko (2011) found that boys are more likely to be breastfed for longer durations and receive more healthcare investments compared to girls. This gender bias reinforces disparities in survival, development, and future economic opportunities between boys and girls.

In addition to systemic disparities, social determinants like maternal education, caste-based discrimination, and geographic isolation (particularly in tribal areas) further reduce the effectiveness of government nutrition programs. Without targeted strategies to address these barriers, even well-designed interventions often fail to reach the populations most in need.

Tackling malnutrition in India requires more than food-based interventions. It demands a multi-pronged strategy that addresses economic access, social justice, gender equity, sanitation, and healthcare

infrastructure. Long-term nutritional security can only be achieved when structural inequalities are dismantled, and policies are designed to reach the last child, last mother, and last village.

Policy Framework and Programs to Combat Malnutrition in India

Integrated Child Development Services (ICDS)

Launched in 1975, the Integrated Child Development Services (ICDS) stands as one of the world's largest and oldest early childhood development programs. Aimed at addressing the interconnected issues of malnutrition, morbidity, and early childhood development, it focuses on children under six years of age, along with pregnant and lactating mothers. The ICDS delivers a comprehensive set of services through a vast network of AWCs, including supplementary nutrition, immunization support, preschool education, growth monitoring, and health check-ups.

Under the Supplementary Nutrition Program (SNP), ICDS provides Take-Home Rations (THR) for children below three years and pregnant and lactating mothers, while Hot Cooked Meals (HCM) are provided for children aged three to six years. This dual-nutrition strategy is essential in addressing caloric and micronutrient deficiencies during critical growth periods. The program also plays a crucial role in supporting non-formal early education, which has long-term cognitive and social benefits. ICDS has been integrated into the broader POSHAN Abhiyaan framework, which leverages digital tracking systems like ICDS-CAS to monitor service delivery and outcomes. The mission targets a 2–3 per cent annual reduction in stunting, under nutrition, and anaemia (NITI Aayog, 2020).

Midday Meals

The Mid-Day Meal (MDM) Scheme is a critical component of India's school nutrition strategy. Introduced in 1995 and later codified under the National Food Security Act (2013), the MDM Scheme provides hot cooked meals to children in government and government-aided schools. With coverage extending to over 118 million children across 1.12 million schools, it is the world's largest school feeding program (Kailash Satyarthi Children's Foundation, 2021).

Meals under the scheme are designed to deliver at least 300 calories and 8–12 grams of protein per child, along with vegetables and oils to ensure dietary balance. The program not only combats classroom hunger but also enhances enrolment, retention, and attendance, particularly among children from marginalized communities. Studies have noted improved learning outcomes, as well as enhanced social equity through the employment of 2.4 million cook-cum-helpers, most of whom are women and individuals from SC, ST, and OBC groups. Data from the Annual Status of Education Report (2010) and research conducted by the Pratichi Research Team in West Bengal affirmed the program's success in improving educational access and nutrition among vulnerable populations (Mid-Day Meal Scheme: Achievements and Challenges, 2014).

Poshan Abhiyaan

To address India's persistently high rates of under nutrition, the government launched Poshan Abhiyaan in 2018. The mission adopts a convergent and technology-enabled approach to tackle malnutrition by unifying existing programs like ICDS, the Mid-Day Meal Scheme, Anaemia Mukt Bharat,[5] and the Pradhan Mantri Matru Vandana Yojana (PMMVY).[6] Its central premise lies in integrating health, nutrition, and sanitation services while promoting behavioural change at the community level.

The deployment of ICDS-CAS, a mobile-based digital tracking system, enables real-time monitoring by AWWs and supervisors for over 98 million households. The campaign-driven model of Poshan Maah (Nutrition Month) and Poshan Pakhwada (Nutrition Fortnight) ensures community engagement through home visits, village health days, and media outreach. States such as Odisha, Tamil Nadu, and Gujarat have demonstrated successful implementation by combining programmatic efficiency with improvements in maternal education and sanitation. Furthermore, 29 states have developed Convergence Action Plans (CAPs), aligning services across ministries like Women and Child Development, Health, and Rural Development to target the first 1,000 days of life (National Portal of India, 2018).

Agriculture Initiatives and Nutrition

The linkage between agriculture and nutrition has gained significant attention in policy discourse. Recognizing this, the Government of India has initiated several programs aimed at food security, dietary diversity, and sustainable agriculture. The National Food Security Mission (NFSM) seeks to enhance the production of staples like rice, wheat, and pulses. The Rashtriya Krishi Vikas Yojana (RKVY) promotes horticulture and high-value crop cultivation, while the Paramparagat Krishi Vikas Yojana (PKVY) encourages organic farming to minimize pesticide exposure and preserve soil health (ICAR, 2020).

To improve irrigation access and drought resilience, the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been implemented. Additionally, the National Mission on Edible Oils–Oil Palm (NMEO-OP) aims to increase the domestic availability of edible oils. The Indian Council of Agricultural Research (ICAR) has also pioneered the development of bio fortified crops such as zinc-rich wheat and iron-rich pearl millet, addressing micronutrient deficiencies in vulnerable populations (ICAR, 2021). Complementary interventions like Poshan Vatika, promoting kitchen gardens and backyard poultry, are integrated with the Poshan Abhiyaan to enable household-level food and nutrient access.

These agricultural interventions, when integrated with health and nutrition programs, contribute significantly to reducing malnutrition and ensuring long-term food security in India.

Other Initiatives and Cross-Sectoral Support

A number of health sector interventions complement India's nutrition efforts. The Home-Based Care for Young Child (HBYC), launched in 2018 under the National Health Mission (NHM) and POSHAN Abhiyaan, targets children aged 3–15 months through regular visits and parental counselling to reduce early childhood morbidity and mortality (Ministry of Health and Family Welfare, 2025). Initiatives such as Janani Suraksha Yojana, Janani Shishu Suraksha Karyakram, and the Mothers' Absolute Affection campaign aim to improve maternal healthcare and breastfeeding rates.

Programs like Anaemia Mukt Bharat, National De worming Day, and Micronutrient Supplementation have attempted to correct widespread nutrient deficiencies, although implementation varies across states. Sanitation programs like the Swachh Bharat Abhiyan (SBA) have shown a strong correlation with nutrition outcomes, especially in states with high toilet coverage such as Kerala and Himachal Pradesh. According to NFHS-5, these states report significantly lower levels of stunting and underweight children compared to states like Bihar and Jharkhand (Ministry of Health and Family Welfare, 2019–21).

Social protection schemes also play an indirect but vital role. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) enhances rural income stability, which in turn improves food affordability. A study conducted in Tamil Nadu found a statistically significant improvement in women's health and dietary intake when MGNREGS was combined with nutrition education (Parameshwari, 2022).

Public-private partnerships (PPPs) have emerged as crucial catalysts. The Food Safety and Standards Authority of India (FSSAI), through the Eat Right India movement, collaborate with private stakeholders to implement large-scale campaigns focused on food fortification, hygiene, and awareness. A World Bank study (2020) noted a six-fold increase in FSSAI's resource allocation, and emphasized that effective local leadership positively influences the uptake and impact of such initiatives (The World Bank et al., 2020).

Table 1: Key Nutrition Schemes in India – Objectives, Target Groups, and Challenges

Scheme	Objectives	Target Group	Key Challenges
ICDS	Improve nutritional status, reduce mortality and school dropouts	Children 0–6 years, Pregnant/ Lactating women	Staff shortages, inadequate infrastructure, declining SNP coverage, poor dietary diversity

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Mid-Day Meal (MDM)	Combat malnutrition and improve school attendance	Primary and upper primary school children	Budget constraints, food safety issues, caste-based discrimination, quality concerns
Poshan Abhiyaan	Convergent action for reducing stunting, wasting, anaemia	Children, women of reproductive age	Low fund utilization, poor digital literacy, limited capacity in some states, weak convergence
Anaemia Mukt Bharat	Reduce anaemia through IFA supplementation and deworming	Children (6–59 months), Adolescents, Women	Supply chain gaps, poor compliance, low awareness
MGNREGS + Nutrition	Improve household income and nutrition through rural employment and education	Rural women	Uneven implementation, focus often more on employment than integrated nutrition efforts
Eat Right India (FSSAI)	Promote food safety, healthy eating, and food fortification	General population, school children	Uptake varies by local leadership, reach to vulnerable groups remains limited

***Source*:** Author's compilation

Challenges in the Implementation of Nutrition and Welfare Policies in India

Challenges in ICDS Implementation

One of the most pressing challenges facing ICDS is the shortage of adequately trained and well-compensated personnel. The program relies heavily on AWWs and Child Development Project Officers (CDPOs) to deliver essential services at the grassroots level. However, a significant proportion of these sanctioned positions remain unfilled. As of 2018-19, nearly 30.1 per cent of CDPO positions and 27.7 per cent of AWW Supervisor positions were vacant across the country (NITI Aayog, 2023). This shortage puts immense pressure on the existing workforce, leading to overburdened AWWs who are often required to manage multiple

responsibilities, including supplementary nutrition distribution, preschool education, immunization support, and data reporting.

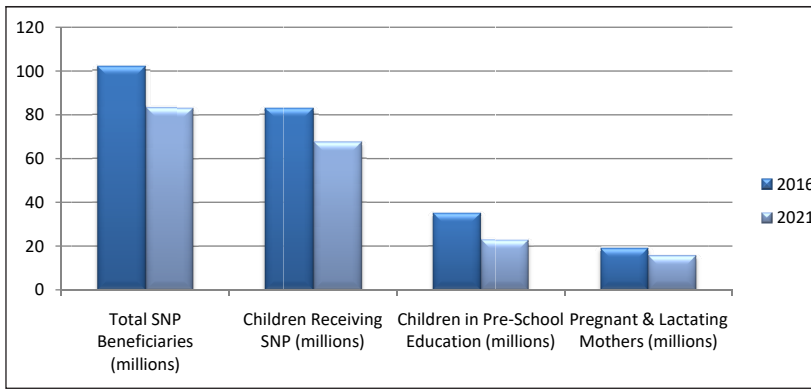
Additionally, AWWs receive low honorariums, which fail to match the workload they undertake. This lack of adequate financial compensation contributes to low motivation and job dissatisfaction, reducing the efficiency of service delivery. A significant proportion of AWCs across India operate without access to electricity, safe drinking water, and sanitation facilities. At the national level, only 86 per cent of operational AWCs report having drinking water facilities, and only 69 per cent have toilet facilities (NITI Aayog, 2020). These inadequacies severely impact the ability of AWCs to provide a safe and hygienic environment for children and mothers.

Despite its vast reach, ICDS struggles with coverage inconsistencies, particularly in ensuring that its services reach all eligible beneficiaries. Over the years, the number of beneficiaries availing services under the Supplementary Nutrition Program (SNP) of ICDS has declined significantly. According to IndiaSpend (2022), between March 2016 and March 2021, the total number of SNP beneficiaries dropped by 19 per cent, from 102 million to 83.2 million. Specifically, the number of children receiving supplementary nutrition fell from 82.9 million to 67.5 million, a decline of nearly 18.6 per cent. This is despite an estimated 7.6 per cent increase in the population of children aged six months to six years during the same period. The decline was even steeper in the provision of pre-school education (PSE) services, which fell by 34 per cent, from 35 million to 23 million.

A similar pattern was observed for pregnant and lactating mothers. Their participation in the SNP dropped from 19.1 million in 2016 to 15.7 million in 2021, representing a 17.8 per cent reduction in service coverage during the same period (IndiaSpend, 2022). These trends indicate not only declining coverage but also underline systemic inefficiencies in last-mile delivery, funding utilization, and monitoring mechanisms. These findings are further supported by evaluations from NITI Aayog (2023), which emphasize the need to address both quantitative and qualitative gaps in the implementation of SNP.

Furthermore, the meals provided under the program often fail to meet the necessary nutritional requirements, as they rely heavily on cereal-based hot-cooked meals with limited inclusion of protein-rich foods such as milk, eggs, and fruits. Some states, such as Andhra Pradesh, have introduced eggs and milk into SNP meals, but other states have discontinued such practices due to budgetary constraints (NITI Aayog, 2020).

Figure 2: Decline in SNP Beneficiaries 2016-2021



***Source*:** Author's compilation

Persistent Gaps in the Mid-Day Meal Scheme (MDM)

Despite its numerous successes, the MDM scheme continues to face several persistent challenges that hinder its effectiveness. Budget allocations for MDM have not kept pace with inflation, and many states struggle with fund shortages. In 2021-22, the budget for the scheme stood at 115 billion, which was an 11 per cent decline from the previous year's Revised Estimate (RE) and failed to adequately address rising food and operational costs (Kailash Satyarthi Children's Foundation, 2021).

Cases of food poisoning and poor food quality have been reported across various states. A tragic incident in Bihar in 2013, where 23 children lost their lives due to contaminated food, highlighted the urgent need for stricter quality control measures (Parmar, n.d.). Reports indicate widespread mismanagement, including inflated enrolment figures, diversion of food grains, and financial irregularities. Performance audits

have documented instances where the number of children reported to be benefiting from the scheme was significantly higher than the actual number of meals served (Kailash Satyarthi Children's Foundation, 2021).

Instances of caste-based discrimination in the distribution of mid-day meals have been reported in several states. Studies have found that in some schools, perceived lower caste children were served meals separately or discouraged from eating food prepared by perceived lower caste cooks (Parmar, n.d.). Additionally, opposition to employing cooks from marginalized communities has been observed, further reinforcing social inequities.

Bottlenecks in Poshan Abhiyaan

As per Niti Aayog 2021 report, despite its ambitious vision, the implementation of Poshan Abhiyaan has faced multiple operational and systemic challenges. One of the most significant barriers is low fund utilization by states and union territories. By March 2020, only 40 per cent of the total allocated funds had been utilized nationally, with sharp disparities. States like Nagaland (87 per cent) and Meghalaya (78 per cent) demonstrated efficient spending, while Odisha (8 per cent) and Arunachal Pradesh (9 per cent) reported extremely low utilization (NITI Aayog, 2021).

Additionally, poor digital literacy and inadequate training among AWW hinder the effective use of digital platforms like the Poshan Tracker. Many frontline workers lack the necessary skills to operate smartphones and growth monitoring devices, resulting in inconsistent or incomplete data entry. This undermines the mission's objective of real-time monitoring and targeted intervention.

Limited administrative capacity in several states, particularly in terms of human resources, infrastructure, and inter-departmental coordination, has further constrained the program's effectiveness. The failure to recruit adequate staff or organize timely training sessions weakens service delivery at the grassroots level.

Another major gap lies in weak convergence among key departments such as Health, Women and Child Development, and Rural Development. Although the Abhiyaan mandates the formation of Convergence Action Plans (CAPs) at state, district, and block levels, many regions have

struggled to establish effective coordination mechanisms. For instance, states like Assam, Puducherry, and Delhi were yet to fully constitute District Resource Groups (DRGs) even by 2020 (NITI Aayog, 2021).

Structural Challenges in Related Sectors

Agricultural Sector Challenges

Agricultural policies have historically prioritized staple crops like rice and wheat, leading to inadequate diversification and neglect of nutrient-rich crops such as millets, pulses, and horticultural products, which are essential for dietary diversity (Pingali et al., 2019). Excessive use of chemical fertilizers has degraded soil quality, reducing the micronutrient content of food crops and exacerbating malnutrition (Gupta et al., 2021).

Additionally, post-harvest losses due to poor storage and inefficient supply chains result in the wastage of nearly 30-40 per cent of fruits and vegetables annually, limiting their availability and increasing costs (FAO, 2020). Climate change further disrupts food security by affecting agricultural productivity through erratic monsoons and extreme weather events, while efforts under the National Adaptation Fund for Climate Change (NAFCC) have not been sufficient to build resilience among smallholder farmers (Rao et al., 2022).

Despite bio fortification initiatives introducing nutrient-enriched crops, adoption remains slow due to lack of farmer incentives and consumer awareness (Bouis and Saltzman, 2017).

Health Sector and Other Challenges

Persistent gaps in maternal and child healthcare continue to undermine India's fight against malnutrition. In rural areas, many women still lack access to essential prenatal services, resulting in widespread maternal undernutrition and a high incidence of low birth weight infants (NFHS-5, 2021). Although food fortification initiatives are intended to mitigate micronutrient deficiencies, their reach is limited due to inconsistent compliance among food manufacturers and affordability challenges faced by low-income households (Fiedler et al., 2019).

Community-based healthcare programs like the Rashtriya Bal Swasthya Karyakram (RBSK) are further constrained by workforce

shortages and inadequate infrastructure, particularly in remote and tribal regions, hampering early identification and management of childhood illnesses (Singh et al., 2020). Micronutrient supplementation programs, particularly iron-folic acid (IFA) and vitamin A, are plagued by supply chain disruptions, inconsistent coverage, and low adherence rates, often driven by misinformation about side effects, logistical bottlenecks, and weak monitoring systems (Ahmad et al., 2023; Mathias et al., 2025). These systemic weaknesses continue to limit the effectiveness of national nutrition strategies and underscore the urgent need for improved delivery, data accuracy, and community engagement.

Malnutrition in Global South Countries

Malnutrition remains a persistent and multifaceted challenge across low- and middle-income countries (LMICs), particularly in Asia, Sub-Saharan Africa, and parts of Latin America. According to global nutrition assessments, approximately 22 per cent of children under five are stunted and 7 per cent are wasted, with Asia and Africa accounting for over 90 per cent of these burdens. Malnutrition contributes to nearly 45 per cent of under-five child deaths worldwide, underscoring the severity of the crisis (Corley, 2021).

An emerging concern is the coexistence of under nutrition and overweight, commonly referred to as "stunted overweight children." A cross-national study of 79 LMICs reports that the prevalence of this phenomenon ranges from 0.3 per cent to 11.7 per cent, revealing complex dietary and health patterns shaped by both poverty and food transition (Bates et al., 2017).

The geography of malnutrition-related deaths shows a concentration in fragile states and conflict-affected zones like Ethiopia, Mali, Kenya, Sierra Leone, Bangladesh, and South Africa, where stunting alone accounts for over 60 per cent of child malnutrition deaths (Madewell et al., 2024).

Food insecurity is a central driver of malnutrition in the Global South. Climate shocks, such as prolonged droughts and floods, have drastically reduced crop yields, leading to food shortages and inflation. In regions like the Sahel and parts of Latin America, millions are pushed into hunger

due to environmental and political instability. A 2024 report notes that 187.6 million people in Latin America and the Caribbean experienced food insecurity driven by climate disruptions and weak governance (FAO et al., 2025).

Armed conflict further exacerbates hunger and nutrition crises. In Yemen, for instance, over 2.2 million children under five suffer from acute malnutrition, one of the highest burdens globally, compounded by a collapsing health system and ongoing violence (UNICEF, 2023). Displaced populations also strain food systems in host communities, as seen in parts of Nigeria and South Sudan, where forced migration disrupts livelihoods and access to essential services (Mia, 2025).

Addressing malnutrition in Global South countries requires a holistic approach that encompasses not only immediate nutritional interventions but also systemic and resilient changes to tackle food insecurity, economic instability, and the impacts of climate change.

Challenges and Gaps in Addressing Malnutrition in Global South

Despite efforts to reduce under nutrition and food insecurity, several persistent gaps hinder effective intervention. Current child malnutrition estimates often double-count children who are both stunted and overweight, leading to inflated statistics. This miscalculation affects policy-making and resource allocation (Bates et al., 2017). Global supply chain issues, worsened by the COVID-19 pandemic and geopolitical conflicts, have made nutritious food scarce and expensive (Jagtap, S., et al. 2022). The reliance on food imports in many Global South nations further exacerbates the problem, as fluctuations in global markets directly impact local food availability and affordability. Many LMICs rely on foreign aid, which is often insufficient or politically influenced (D'Amour and Anderson, 2020). Without sustained financial commitments from both national governments and international donors, critical programs, such as school feeding initiatives, maternal health services, and agricultural development, struggle to make a lasting impact. While many countries in the Global South have nutrition policies, implementation often falls short due to weak governance, lack of intersectoral coordination, and

insufficient political commitment. A study points out the difficulty in translating scientific evidence into effective policymaking, particularly in addressing climate change-induced malnutrition (Colombi and Vineis, 2025).

The challenge of malnutrition in the Global South is far from a simple issue of food scarcity; it is a deeply rooted problem that intersects with policy failures, economic instability, gender disparities, climate change, and limited healthcare access.

Global Best Practices in Tackling Malnutrition and Lessons for the Global South

Addressing these gaps requires a multi-faceted and sustained effort that includes stronger governance, better food distribution networks, increased investment in nutrition programs, and education initiatives that empower communities to make healthier choices. For instance, Ghana's School Feeding Programme has demonstrated how government-supported initiatives can improve nutrition and educational outcomes. By sourcing food from local farmers, the program not only enhances children's dietary intake but also strengthens local economies, ensuring a more sustainable food supply (Torvikey and Marfo, 2025).

Brazil's Zero Hunger (Fome Zero) programme exemplifies how comprehensive governance can effectively combat malnutrition. Launched in 2003, the initiative combined conditional cash transfers (Bolsa Família), agricultural subsidies, and community-based food security programs to reduce poverty and food insecurity. Through this integrated approach, the programme improved dietary diversity, caloric intake, and access to protein-rich foods among low-income households (de Castro et al., 2016). The programme also included procurement from smallholder farmers, enhancing local agricultural economies and making nutritious food more accessible (Figueiredo de Albuquerque et al., 2023). While Bolsa Família significantly improved household food security, evaluations found that agriculture-linked interventions, such as PRONAF, had even stronger impacts on child malnutrition reduction and poverty alleviation (Figueiredo de Albuquerque et al., 2023).

One of the earliest and most successful examples of food fortification is the introduction of iodized salt in the United States. In the early 20th century, iodine deficiency caused widespread goitre, particularly in the Great Lakes and Appalachian regions. In 1924, the U.S. implemented a voluntary iodization program, beginning in Michigan, which led to a dramatic decline in iodine deficiency disorders. Today, iodized salt is a global standard, significantly reducing the prevalence of goitre and related conditions (Leung et al., 2012; Pretell and Pearce, 2024).

Costa Rica has been a pioneer in flour fortification as a means to combat micronutrient deficiencies. Since the 1970s, the country has mandated the addition of iron, folic acid, and other essential vitamins to wheat and maize flour. This initiative led to a sharp decline in anaemia rates among children and pregnant women (Martorell, R, et al., 2014). The program's success is attributed to strict regulatory enforcement and widespread public awareness campaigns, making fortified flour a staple in Costa Rican households.

The Philippines has effectively tackled Vitamin A deficiency, a leading cause of childhood blindness and weakened immune systems. In the 1990s, the government mandated the fortification of cooking oil with Vitamin A. Complemented by community-level interventions such as Vitamin A supplementation programs; this policy has significantly reduced Vitamin A deficiency, particularly among vulnerable populations. The success of this program demonstrates the effectiveness of combining mandatory food fortification with targeted supplementation efforts (Howson et al., 1998)

West Africa has faced persistent micronutrient deficiencies, particularly in iron and vitamin A intake, across countries such as Nigeria, Ghana, and others in the ECOWAS bloc. In response, the West African Health Organization (WAHO) and the Economic Community of West African States (ECOWAS) launched a regional food fortification initiative targeting staple foods like wheat flour, vegetable oil, and salt—with mandatory fortification standards (e.g., vitamin A in oil and iron/folic acid in flour) (Mannar and Hurrell et al., 2018). The regional approach facilitated through frameworks like the “Faire Tache d’Huile

en Afrique de l'Ouest" campaign, coordinated harmonized regulations across national borders and supported national fortification alliances (NFAs) in countries like Nigeria and Ghana. These efforts led to measurable improvements in nutrition indicators—particularly reductions in anaemia and increased dietary iron and vitamin A among children and pregnant women in participating countries.This unified regional strategy underscores the effectiveness of cross-border collaboration, regional regulatory harmonization, and coordinated governance in delivering large-scale micronutrient interventions.

Ethiopia, once among the countries with the highest child malnutrition rates globally, has made notable progress over the last two decades through targeted policy interventions. The National Nutrition Program (NNP), launched in 2008 and revised in subsequent years, placed strong emphasis on community-based interventions. A key feature was the deployment of Health Extension Workers (HEWs), who operated in rural and underserved communities to deliver nutritional counselling, promote exclusive breastfeeding, and distribute micronutrient supplements. These efforts contributed significantly to improvements in child health outcomes. According to recent estimates, the prevalence of stunting among children under five in Ethiopia declined from 47.9 per cent in 2000 to 35.9 per cent by 2019, demonstrating a tangible impact of localized and sustained public health strategies (Woldeamanuel et al., 2023).

Indonesia has implemented a suite of innovative digital and policy-driven strategies to combat child malnutrition and stunting. A notable example is the Electronic Community-Based Nutrition Reporting App (EPP-GBM), used in over 330,000 Posyandu (community health posts) to record monthly child and maternal nutrition data. This has helped validate stunting data and improve monitoring accuracy (Antara News, 2024). Similarly, the country uses DHIS2 Android Capture for village-level tracking, where trained facilitators report real-time nutrition indicators, aiding in timely responses and intervention planning (DHIS2, 2022). In addition, the Zero Stunting initiative leverages AI-enabled WhatsApp messaging to nudge parents toward daily egg consumption for their children. The pilot program has shown 70-80 per cent compliance,

highlighting how behavioral nudges and digital tools can enhance nutrition outcomes (Newsylist, 2023). Complementing these digital solutions, Indonesia launched its ambitious Free Nutritious Meal Program in 2025, aiming to provide nutritious meals to 83 million school children and pregnant women by sourcing food from local farmers and operating 30,000 regional kitchens by 2027 (AP News, 2024).

Rwanda's Smart Simplicity Initiative exemplifies the effective integration of digital health tools with community-based healthcare. The initiative leverages mobile health (mHealth) technology to support community health workers (CHWs) in monitoring child growth, detecting malnutrition early, and ensuring timely intervention. A quasi-experimental study found that the implementation of a mobile application in pediatric development clinics significantly improved the completeness of nutritional assessments among infants under six months, supporting the initiative's effectiveness (Nemerimana et al., 2021).

Between 2015 and 2020, Rwanda recorded a decline in childhood stunting from 38 per cent to 33 per cent, as reported in the Rwanda Demographic and Health Survey 2019–2020 (National Institute of Statistics of Rwanda, 2020). The initiative also aligns with the country's National Strategy for Transformation (NST1), which sets an ambitious goal of reducing stunting to 19 per cent by 2024 through a multisectoral approach involving ministries of health, education, and agriculture in partnership with international organizations like the World Bank and UNICEF (World Bank, 2018). This collaboration facilitates real-time nutrition data integration, enabling rapid response mechanisms and improving the efficiency of service delivery nationwide.

Lessons from successful initiatives highlight the importance of strong regulatory frameworks and public-private partnerships. Additionally, policy-driven interventions underscore the significance of governance and community involvement. For the Global South, scaling up these best practices while adapting them to local contexts will be critical in overcoming malnutrition and improving public health outcomes.

Table 2: Global Best Practices in Tackling Malnutrition- Key Features and Outcomes

Country/ Program	Strategy/ Intervention	Notable Outcomes	Lesson for Global South	Alignment with Strategy Pillars
USA (Iodized Salt)	Voluntary fortification to eliminate iodine deficiency	Eradication of goiter in high-risk areas	Strong regulation + public awareness can achieve large-scale impact	Regulatory enforcement and public awareness
Costa Rica (Flour Fortification)	Mandatory iron and folic acid fortification	Reduced anaemia in children and women	Regulatory enforcement and public awareness are critical	Regulatory enforcement and public awareness
Brazil (Bolsa Família, Zero Hunger, PRONAF)	Conditional cash transfers linked to school and health visits, smallholder procurement, community food security programs	Reduced child stunting and malnutrition, improved household food security, enhanced rural livelihoods	Link social protection with agricultural policies	Cross-sector integration of welfare and agriculture
Ethiopia (NNP)	Community-based interventions with HEWs, micronutrient distribution	Stunting dropped from 47.9% to 35.9% (2000–2019)	Community health workers are effective change agents	Community-based last-mile delivery
Philippines (Vitamin A Fortification)	Mandatory fortification of cooking oil; supplementation programs	Significant decline in Vitamin A deficiency among children	Combine mandatory policies with grassroots outreach	Regulatory enforcement and supplementation outreach
Ghana (School Feeding Programme)	School meals sourced from local farmers	Improved child nutrition and strengthened local agriculture	Link nutrition with local economic development	Cross-sector integration of welfare and agriculture

Continue...

Continued...

West Africa (WAHO–ECOWAS Fortification)	Regional harmonization of food fortification (e.g., iron in flour, vitamin A in oil)	Reduction in anaemia and improved micronutrient intake	Regional collaboration enhances policy impact and scalability	Collaborative governance and policy harmonization

***Source*:** Author's compilation

Sustainable and Inclusive Strategy for the Global South

Promoting local food baskets with indigenous crops is an effective and sustainable approach to addressing malnutrition. Crops like millets, pulses, and leafy greens are not only rich in essential nutrients such as iron, calcium, protein, and vitamins but are also well-adapted to local climatic conditions. For example, millets- often referred to as "nutri-cereals", are high in dietary fibre, protein, and micronutrients like zinc and iron (DeFries et al., 2018). Their resilience to drought and poor soils makes them ideal for ensuring food security in countries like India which has arid and semi-arid regions. Incorporating these crops into national food security programs can significantly enhance dietary diversity while reducing dependency on water-intensive crops like rice and wheat.

Agricultural diversification is critical for improving dietary diversity and ensuring sustainable food systems. Encouraging farmers to move beyond monoculture cropping systems—dominated by rice and wheat, to include pulses, oilseeds, fruits, vegetables, and biofortified crops can significantly impact nutrition outcomes. Policy incentives such as minimum support prices, improved market linkages, and direct financial support for cultivating diverse crops can facilitate this transition. Additionally, integrating agricultural extension services with nutritional goals can ensure that farmers receive guidance on the benefits of cultivating nutrient-rich crops.

A key component of this transition is leveraging technology to bridge the gap between agricultural knowledge and rural communities. Mobile applications, SMS-based health alerts, and AI-driven platforms enable real-time data collection, dietary guidance, and awareness generation. These digital tools can enhance farmers' understanding of sustainable

agricultural practices, weather forecasts, pest control, and market trends, ultimately supporting informed decision-making.

Fostering cross-sectoral collaboration among agriculture, health, education, and technology is essential for sustainable food security. Agricultural policies must be aligned with nutritional outcomes, ensuring that food systems contribute positively to public health. This requires Behaviour Change Communication (BCC) initiatives to create awareness about sustainable nutrition practices, particularly in rural and marginalized communities. Community-based programs that educate families on the importance of dietary diversity and nutrient-rich foods can significantly improve nutrition outcomes.

Technology-driven solutions have the potential to revolutionize malnutrition prevention strategies. Digital tools such as nutrition-tracking applications, precision agriculture platforms, and mobile health (mHealth) solutions help provide real-time, data-driven interventions. AI-powered analytics can track malnutrition trends, predict food shortages, and recommend policy actions based on real-time data. For instance, digital farmer advisories can offer personalized guidance on soil health, crop rotation, and sustainable irrigation techniques, ensuring better productivity and food security.

Moreover, e-learning platforms can improve knowledge transfer among rural healthcare workers, enhancing the capacity of local health systems to address malnutrition. Governments and NGOs should invest in scaling up these digital interventions to ensure that even the most remote communities benefit from technological advancements.

Achieving sustainable and inclusive nutrition strategies requires collaboration between governments, civil society, academia, and international organizations. NGOs play a crucial role in mobilizing communities, implementing grassroots-level programs, and advocating for policy changes. Universities and research institutions contribute by conducting studies on food security, climate resilience, and nutritional epidemiology, ensuring evidence-based policymaking. Multilateral partnerships facilitate knowledge exchange, capacity building, and resource mobilization, ensuring that best practices are adapted across different regions in the Global South.

Several nutrition and food security programs already exist in the Global South, but they require scaling up, improved coordination, and better monitoring mechanisms. Their impact can be enhanced by incorporating data-driven policymaking, community engagement, and targeted interventions for vulnerable populations.

Policies addressing malnutrition must transcend sectors and adopt an integrated approach. Food security, public health, education, and social protection policies should be interlinked to ensure holistic development. For example, integrating school meal programs with local agricultural supply chains can support farmers while providing nutritious meals to children.

Additionally, environmental policies should encourage climate-resilient farming methods, such as agroecology, organic farming, and permaculture, to enhance food security without degrading natural resources. Water management strategies, including rainwater harvesting and efficient irrigation systems, should be prioritized to mitigate climate risks affecting food production.

Data-driven policymaking is essential for effective nutrition and agricultural strategies. Governments should invest in robust data collection frameworks to monitor food security trends, malnutrition rates, and agricultural productivity

Public-private partnerships can drive innovation in food processing, biofortification, and supply chain management. Research on sustainable agricultural techniques, indigenous crop varieties, and dietary habits can provide insights into developing targeted nutrition policies.

Way Forward

Building on the evidence and insights presented, it is clear that addressing malnutrition requires moving beyond piecemeal interventions toward a system-wide transformation. Strengthening nutrition systems calls for strategies that are not only evidence-based but also adaptable to diverse socio-economic and cultural contexts across India and the Global South.

As highlighted in Table 2, global best practices in tackling malnutrition are anchored in four strategy pillars- regulatory enforcement and public awareness, cross-sector integration of welfare and agriculture,

community-based last-mile delivery, and collaborative governance and policy harmonization. Adapting these pillars to India and the Global South provides a clear roadmap for transforming fragmented efforts into a coherent and resilient nutrition system.

1. Regulatory Enforcement and Public Awareness

Stronger regulations combined with mass awareness are essential to scaling up fortification and biofortification. Fortified foods must be affordable and accessible, supported by behaviour change communication (BCC) campaigns to build trust and acceptance. India can emulate models like Costa Rica's mandatory flour fortification and complement them with biofortification, ensuring that nutrition-rich staples directly reach rural households through farming systems.

2. Cross-Sector Integration of Welfare and Agriculture

Nutrition goals must be embedded in welfare schemes and agricultural policies. Linking biofortified crops with the Public Distribution System, mid-day meals, and farmer incentives can replicate the dual benefits seen in Brazil's Zero Hunger and Ghana's School Feeding Programme—improving both nutrition outcomes and rural livelihoods. Aligning agriculture and social protection in this way ensures sustainability and equity.

3. Community-Based Last-Mile Delivery

Community engagement is critical to ensure that policies translate into impact on the ground. Region-specific approaches—such as promoting millets in arid areas and integrating pulses and vegetables into state nutrition schemes—should be scaled up. Local health workers, self-help groups, and farmer cooperatives can act as delivery agents, much like Ethiopia's Health Extension Workers, to strengthen dietary diversity and behaviour change at the grassroots.

4. Collaborative Governance and Policy Harmonization

Fragmented nutrition governance remains a barrier. Responsibilities scattered across multiple ministries result in inefficiencies and duplication. Establishing an integrated policy ecosystem that unites

agriculture, health, women and child development, and education under one strategic framework will foster accountability and coordination. Drawing from West Africa's harmonized fortification standards, India and other Global South countries can also explore regional collaboration to scale solutions across borders.

In a nutshell, the way forward lies in operationalizing these four pillars through context-sensitive interventions: robust regulation and public awareness, stronger agriculture–welfare linkages, empowered community delivery systems, and harmonized governance. By adapting global lessons to domestic realities, India and the Global South can build resilient nutrition systems capable of sustainably reducing hidden hunger and malnutrition.

Conclusion

Malnutrition remains a persistent challenge in India and across the Global South, despite economic growth and numerous policy interventions, largely due to entrenched socioeconomic inequalities and structural gaps in food systems, agricultural diversification, healthcare access, and dietary awareness. Addressing this issue requires a holistic, integrated approach that moves beyond calorie sufficiency to ensure dietary diversity, adequate micronutrient intake, and sustainable consumption patterns. Drawing lessons from global best practices, this entails four key pillars: robust regulation and public awareness to ensure access to safe, nutrient-rich foods; cross-sector integration of agriculture, welfare, and social protection programs; community-driven last-mile delivery supported by local health workers and farmer networks; and collaborative governance to harmonize policies across ministries and, where relevant, across borders. By operationalizing these strategies in a context-sensitive manner, India and other Global South countries can build resilient, equitable nutrition systems capable of sustainably reducing hidden hunger and malnutrition.

Endnote

[1] lack of essential micronutrients like iron, iodine, and zinc without overt signs of food shortage

[2] The period from a woman's pregnancy to her child's second birthday

[3] Infant and Young Child Feeding (IYCF) in India provide guidelines on breastfeeding, complementary feeding, and the use of safe infant foods

[4] Monoculture practices in agriculture involve cultivating a single crop species in a field at a time. This approach simplifies planting, managing, and harvesting, often through the use of machinery. However, it can lead to soil depletion, increased pest and disease outbreaks, and reduced biodiversity.

[5] This mission aims to reduce the prevalence of anaemia among children, adolescents, and women which includes prophylactic iron and folic acid supplementation, deworming, intensified year-round behaviour change communication campaigns, and testing and treatment of anaemia across all age groups.

[6] This maternity benefit program provides cash incentives to pregnant and lactating women for the first live birth.

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About the Authors

Dr. Monika Kochar is an Advisor (Health) with DAKSHIN – Global South Centre of Excellence, hosted at the Research and Information System for Developing Countries (RIS), New Delhi.She holds a Master of Public Health from the Johns Hopkins University and has nearly three decades of professional experience in public health systems, health policy analysis, and health system strengthening, particularly in resource-limited settings.

She has held senior leadership and technical roles within government health programs, including leading the Ayushman Bharat–PMJAY initiative in Haryana, where she was responsible for large-scale program implementation, quality assurance, and system-level reforms. Her work spans national health initiatives, digital health strategies, and cross-country collaborations. Dr. Kochar has contributed to peer-reviewed research and serves in editorial roles with international journals. Her current work focuses on advancing equitable, efficient, and resilient health systems through South–South cooperation across the Global South. Email: monika.kochar@dakshin.org.in

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Core IV-B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi-110 003 India., Tel. 91-11-24682177-80
Fax: 91-11-24682173-74, Email: dgoffice@ris.org.in
Website: http://www.ris.org.in