Proceedings of FICCI Conference on

Advancing Nutrition through Science, Policy & Partnerships

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FICCI Federation House, New Delhi

Executive Summary

The FICCI Conference on "Advancing Nutrition through Science, Policy & Partnerships", held on 16th October 2025 at the FICCI Federation House, New Delhi, brought together leading experts, policymakers, nutritionists, researchers, and industry representatives to deliberate on the critical challenges of malnutrition in India, with a specific focus on Iron Deficiency Anaemia (IDA) and the growing Protein Gap. The conference aimed to bridge the dialogue between science, policy, and implementation by highlighting evidence-based strategies and fostering partnerships across sectors to improve nutritional outcomes for all population groups.

While India has made significant progress in achieving food security, the dual burden of malnutrition, characterised by undernutrition and micronutrient deficiencies, continues to impede the nation's overall health and productivity. The launch of the White Paper on Iron Deficiency Anaemia in Women and Children further strengthened the call for a coordinated national response to combat anaemia through improved dietary diversity, fortified foods, effective supplementation, and behavioural change communication.

The panel discussion on Iron Deficiency Anaemia brought together eminent experts who shared valuable insights into the trends reflected in the NFHS-4 and NFHS-5 surveys, the heterogeneity in anaemia prevalence across states, and the need for data-driven interventions. The discussion highlighted that despite decades of targeted programmes, anaemia rates remain high due to gaps in awareness, compliance, and inter-sectoral coordination.

The session on the Protein Paradox addressed India's low protein intake and stressed that the issue extends beyond quantity to include digestibility, bioavailability, and nutrition literacy. Experts emphasized the importance of promoting protein awareness, encouraging culturally relevant diets, and incorporating nutrition education into the school curriculum.

The conference concluded that India must move from food security to nutrition security through a multi-pronged approach combining science, policy, and partnerships. Strengthening data systems, fostering public awareness, and ensuring convergence among government, academia, and industry were identified as essential steps toward achieving sustainable nutrition for all.

Welcome Address and Context Setting: Mr Siraj Hussain, Former Secretary, Ministry of Food Processing Industries and Ministry of Agriculture and Farmers Welfare, GOI & Advisor, Food Processing, FICCI



Mr. Siraj Hussain, Former Secretary, Ministry of Food Processing Industries and Ministry of Agriculture and Farmers Welfare, Government of India, and Advisor, Food Processing, FICCI, extended a warm welcome to all distinguished guests and participants. In his address, he acknowledged Dr. Deepak Savant, chairman of the Maharashtra State Malnutrition Education Task Force, and commended the government for choosing a professional with deep expertise to lead such an important initiative. He underscored that malnutrition is a complex, multi-dimensional issue influenced by both economic and non-economic factors, including food access, sanitation, healthcare, and women's status.

He highlighted the persistent challenges faced in addressing malnutrition despite improved health infrastructure, citing findings from the National Family Health Survey and field experiences in tribal regions such as Gujarat. He emphasized the need for robust data, professional insight, and continued government action to overcome these challenges. He commended the authors and partners, for entrusting the development of the report to seasoned professionals. He encouraged all attendees to actively participate and make the session rewarding and informative.

Release of White Paper ‘Iron Deficiency Anemia in Women and Children’



Dr Deepak Sawant, Chairman, Task Force Malnutrition Eradication, Government of Maharashtra released the White Paper ‘Iron Deficiency Anemia in Women and Children’

Keynote Address by Guest of Honour: Dr Deepak Sawant, Chairman, Task Force Malnutrition Eradication, Government of Maharashtra

Dr. Deepak Sawant, Chairman of the Task Force for Malnutrition Eradication, Government of Maharashtra, began by expressing his appreciation to FICCI for inviting him to the launch of the white paper on iron deficiency anemia. He acknowledged the input and participation of fellow dignitaries, highlighting their collaboration aimed at advancing nutrition through science, policy, and partnership.



He described iron deficiency anemia as a prevailing and urgent health concern that affects women and children disproportionately in India. He shared alarming statistics stating anemia prevalence among children aged 6 months to 59 months is about 67%, adolescent girls face a 59% prevalence, adolescent boys 31%, women of reproductive age 57%, and pregnant women

52%. These figures underscore the magnitude of the challenge Maharashtra and the country face, despite ongoing government programs such as Anemia Mukt Bharat, which he praised for its wide reach. Focusing on diagnosis, he cautioned that while non-invasive hemoglobin measurement techniques offer convenience, they may pose risks of inaccuracies. He stressed the importance of reliable diagnostics to avoid misclassification and ensure appropriate treatment.

He elaborated on the social determinants of anemia, such as early marriage, maternal health, poor diet, and nutritional deficiencies, while drawing attention to the condition of women in tribal areas with extremely low haemoglobin levels leading to adverse pregnancy outcomes and infant mortality. He highlighted the crucial role of local health workers like ASHA and Anganwadi workers in rural outreach and the need for enhanced community-level awareness and counselling. He also discussed the challenges of supplement compliance, noting practical barriers such as side effects from iron supplements and sociocultural factors that lead to poor adherence. He urged research institutions such as ICMR to deepen investigations into nutrient absorption and explore interventions like probiotics or prebiotics to improve effectiveness.

Recognizing dietary habits as a key factor, he advocated for the development of culturally acceptable, locally sourced nutritional supplements that are palatable and easily digestible to encourage consumption. He emphasized the importance of “tongue-tested” foods that align with regional preferences and available foods to improve acceptance. Urban malnutrition, especially in populous cities like Mumbai and Pune, was highlighted as an emerging concern alongside rural issues. He called for targeted policies and awareness campaigns addressing urban malnutrition and anemia.

He also expressed his concerns of the impact of global warming on agricultural productivity and food nutrient quality, referencing the decline in protein and micronutrient content in staples caused by environmental degradation. He called for a holistic approach to nutrition that factors in climate change and sustainable food production. He concluded by expressing hope that this white paper would illuminate pathways forward and serve as a “lamp post” guiding policymakers, researchers, and practitioners in the collective effort to eradicate iron deficiency anemia and improve nutritional outcomes for future generations.

Panel Discussion on Iron Deficiency Anaemia



Moderator: Dr Lekha Sreedharan, National Vice President (Nutrition), IAPEN India

Panelist: Dr Raj Bhandari, Senior Paediatrician and Government Advisor

Question: What was your first impression when analysing the latest NFHS-4 and NFHS-5 data, particularly with the rising prevalence of anaemia?



Dr Bhandari noted that the comparison between NFHS-4 (2015–16) and NFHS-5 (2019–21) revealed several concerning trends. Despite numerous ongoing programs, the prevalence of anaemia showed an increase, which he described as "worrisome". He highlighted that wasting among children also rose from 19% to 21%, indicating persistent nutritional challenges. He explained the heterogeneity across states. For instance, while Assam recorded an increase of up to 32% prevalence in anaemia, Meghalaya showed a marginal decrease of 2.3%. This variation, he suggested, reflects differences in dietary patterns, socio-economic factors, programmatic implementation and a statistical anomaly called "regression to the mean".

He observed a paradox wherein states like Rajasthan, with limited iron-rich food intake, and West Bengal, with greater access to animal sources, both reported high anaemia prevalence. This, he explained, points towards multiple contributing factors such as deficiencies of vitamin B12, folic

acid, vitamin A, and zinc, as well as poor gut health and chronic systemic inflammation that hinder the conversion of stored ferritin into functional haemoglobin. He further emphasised that anaemia in urban upper wealth quintiles is primarily linked to iron deficiency, while in rural and lower wealth groups, it results from a combination of nutritional and non-nutritional factors. He also pointed to higher prevalence rates among Scheduled Castes, Scheduled Tribes, and other tribal populations.

To address these gaps, he mentioned ongoing government-led study, the Diet and Biomarker Study (DABS), which aim to provide more robust data through venous sampling and detailed dietary intake analysis using 24 hour recall. These efforts, he said, will help identify the multiple micronutrient deficiencies contributing to anaemia and guide targeted interventions for vulnerable groups such as preschool children, adolescent girls, and pregnant women.

Question: The paper discusses several government initiatives such as the National Nutrition Anaemia Prophylaxis Programme and Anaemia Mukt Bharat. Based on your experience, what key lessons have we learned from these programmes? How can we further improve their effectiveness?

Dr Bhandari, reflected on India's decades-long journey of combating anaemia from the launch of the National Nutritional Anaemia Prophylaxis Programme in 1970, to the Weekly Iron and Folic Acid Supplementation (WIFS), the National Iron Plus Initiative (NIPI), and finally the Anaemia Mukt Bharat (AMB) strategy.

He described anaemia as an "invisible war" that has persisted over generations despite multiple national efforts. According to him, the core challenge has been poor compliance (side effects such as stomach upset, vomiting and constipation) of Iron Folic Acid (IFA) tablets, with participation rates historically as low as 30%. Vertical programmes, he noted, often fail to reach the most underserved populations due to uneven supply chain gaps, stockouts, and lack of last-mile delivery mechanisms. Using a clinician's analogy, he remarked that even when IFA syrup reaches the child, "half of it stays on the spoon and only a little goes in", underscoring the difficulty of effective implementation.

He emphasised that to truly address anaemia, dietary counselling, deworming, and a strong communication strategy are critical. He praised the current era of collaboration among academia, industry, policymakers, and development partners, highlighting that the coming together of diverse stakeholders can make interventions more impactful.

Citing successful models from states, he shared that in Gujarat, the combination of free health camps and robust IFA supplementation led to measurable improvement. Further in Odisha, conditional cash transfers alongside IFA distribution and education yielded significant success. He also noted the achievement of Madhya Pradesh, which topped the Anaemia Mukt Bharat Index after revising its formulation to ferric ascorbate, demonstrating that the right iron compound and delivery mechanism can significantly improve outcomes.

On improving programme effectiveness, he introduced the acronym DEIA standing for Dietary diversity, Equity, Inclusivity and Accessibility as guiding principles for future interventions. He called for a shift towards smart foods, especially millets and pulses, which naturally provide rich micronutrient content. He highlighted that a single meal combining millets and legumes can deliver nearly 30% of the RDA for zinc and fibre, 40% for iron, and 60% for calcium. Proper processing and storage, he added, are essential to maintain taste and quality, making these foods more acceptable to consumers.

He elaborated on the 6×6×6 Anaemia Mukt Bharat strategy six target beneficiary groups, six interventions, and six institutional mechanisms commending it as a well-structured and multidimensional approach. He also noted the Government of India's advisory on using single dose ferric carboxymaltose (FCM) injections for cases requiring intravenous iron therapy who have not responded to iron supplementation, as a means of addressing iron deficiency more efficiently.

He further stressed the importance of implementation research to refine strategies and address emerging factors such as ultra-processed food & High Fat, High Salt Sugar (HFSS) consumption, which contributes to low grade systemic inflammation and hampers nutrient absorption, storage and mobilization for hemoglobin synthesis.

Concluding his remarks, he urged that India must strive not only for "Smart Cities" but for "Iron Smart Cities", symbolising communities fortified against anaemia through better nutrition, awareness, and access. He cited data from the Journal of Family Medicine and Primary Care, noting that approximately more than 2/3rd of severe anaemia and moderate anaemia cases are attributable to iron deficiency. Hence, he underscored the need for a holistic, multisectoral approach to effectively reduce the national burden of anaemia.

Question: In the face of the persistent challenge of anaemia, what would be the recommended one top policy intervention to the government?

Dr. Bhandari emphasized that a strong, actionable policy approach should revolve around a "Screen and Treat" strategy for anaemia reduction. He highlighted the need for screening at the point of care, enabling frontline health workers to both identify and treat anaemia immediately, without requiring patients to travel to distant healthcare facilities. With advancements in technology, he suggested leveraging digital hemoglobinometers and non-invasive diagnostic tools connected to a central server. This would allow automated, accurate, and prompt guidance on appropriate dosages and types of iron supplements to be administered. He also drew attention to the dietary dimension, recommending improvement in the cereal-to-pulse ratio and promoting dietary diversity, which remains a major gap in India only one in nin children currently receives a minimum acceptable diet. Reducing the cereal pulse ratio to 1:5, he noted, would help ensure a more balanced intake of complementary nutrients.

He further emphasized integrating nutrition-specific and nutrition-sensitive interventions through regular health check-ups and biomarker assessments, including ferritin and transferrin saturation, to identify subclinical anaemia.

In conclusion, he underscored the importance of convergence among ministries and stakeholders, referencing the Mission Poshan 2.0, which unifies Anganwadi Services, the Pradhan Mantri Matru Vandana Yojana, and Anaemia Mukt Bharat under a single framework. He reiterated that overcoming anaemia requires collaborative efforts across multiple ministries that include department of health and family welfare, women and child development, agriculture and others. Beyond that, professional bodies and development partners must work in unison to achieve meaningful impact.

Panellist: Dr B. Sesikeran, Former Director, ICMR-National Institute of Nutrition, Hyderabad

Question: Could you elaborate on the characteristics of the current state of iron deficiency anaemia in our country, and why this issue should be treated as a national priority?

Dr Sesikeran highlighted that iron deficiency anaemia (IDA) remains the largest micronutrient deficiency worldwide, affecting nearly 2 billion people, with India contributing almost one-fourth of the global burden. Given its magnitude, he emphasised that IDA represents not just a clinical concern but also a major public health and economic challenge. He compared data from NFHS-4 and NFHS-5, noting the significant rise in anaemia prevalence from 59% to 67%, and also referenced findings from the Comprehensive National Nutrition Survey (CNNS). Interestingly, while NFHS data indicated 67% prevalence among children under five, CNNS reported 41%, a discrepancy of nearly 20 percentage points. He explained that this difference primarily arises from variations in blood sampling methodology peripheral blood sampling (used in NFHS) showing higher prevalence compared to venous sampling (used in CNNS). It was also data from adolescent boys and girls.



However, he asserted that earlier NFHS data remain largely reliable, given the rigorous calibration and training under the National Nutrition Monitoring Bureau (NNMB). He noted that upcoming studies such as DABS-1 will further clarify these differences but cautioned that venous sampling may not be feasible in large-scale public health surveys due to ethical and operational constraints.

He underscored the economic impact of anaemia, estimating a 1–1.3% loss in India's GDP due to reduced productivity, illness, and healthcare costs. Citing World Bank estimates, he noted that every $1 invested in anaemia reduction yields a $12 return, reinforcing the economic rationale for urgent action.

He also addressed controversies surrounding iron fortification, particularly following the announcement of the national rice fortification programme. While some concerns were raised about potential adverse effects, he emphasised that fortification remains the most sustainable, low-dose, population-level strategy to combat anaemia, with fewer side effects compared to supplementation, especially for women and children. Further, he cautioned that only about 30% of anaemia cases are purely due to iron deficiency, as inflammatory conditions can elevate ferritin levels, leading to misinterpretation of iron adequacy. Since ferritin is an acute phase protein, he advised against relying on it as a single biomarker, calling instead for a more comprehensive, science-based approach to diagnosis and intervention.

He concluded by stressing the need for scientific consensus and methodological consistency to guide evidence-based policymaking and ensure effective national strategies to reduce the anaemia burden.

Question: What are your views on food fortification, and what measures can be taken to address the concerns that arise regarding taste and cultural acceptance?

Dr Sesikeran, elaborated on the science, process, and challenges of staple food fortification, particularly in rice and wheat. He began by highlighting that food-based approaches are always preferable to supplementation with tablets, as fortified staple foods ensure universal reach and higher acceptance in daily diets.

He explained that rice and wheat flour fortification are being implemented on a large scale through the Public Distribution System (PDS), in a targeted manner. Detailing the fortification process, he described how broken rice grains are softened and infused with a micronutrient premix containing iron, folic acid, and vitamin B12, after which these are extruded into rice-like kernels. These fortified kernels are then blended with regular rice typically in the ratio of 1 part fortified to 99 parts regular rice ensuring no difference in appearance, taste, or cooking quality.

However, he noted a few operational challenges in the fortification process. Since three separate industries are involved one manufacturing fortified rice kernels (FRK), another producing the micronutrient mix, and a third handling blending and packaging standardisation issues have occasionally arisen. At present, while standards exist for fortified rice, specific standards for FRKs are still being formalised. If substandard broken rice is used for FRK production, the kernels may break or lose nutrients, leading to inconsistencies. This, he assured, is being addressed through new regulatory standards and quality controls.

Another technical issue observed was that fortified rice kernels have lower density than normal rice grains. During washing, the lighter grains often float, leading families to discard them

unintentionally. To solve this, premier institutes such as IIT Delhi, IIT Kharagpur, and NIFTEM are developing improved formulations to ensure fortified grains remain stable during washing and cooking.

Addressing concerns about taste and acceptability, he cited multiple studies showing no perceptible difference between fortified and regular rice. He noted that such concerns tend to arise only in isolated cases and are typically resolved once producers, distributors, and implementers align on standards and processes. He clarified that even when considering fortified rice, dietary supplements, and iron-fortified processed foods together, iron intake does not exceed the tolerable upper limit (45 mg/day). In fact, rice fortification contributes only about 10 mg/day, while tablet-based supplementation can exceed 60 mg/day, which is more likely to approach toxicity thresholds.

He further explained that the human body's natural absorption mechanism ensures safety iron absorption is self-regulated, and only the required amount binds to transferrin and enters circulation. Hence, fears of over-supplementation are scientifically unfounded. He also addressed concerns about gut health, explaining that changes in gut bacteria are normal and reflect daily dietary variations rather than harmful effects. There is no evidence linking fortified foods to adverse gut outcomes, he noted.

Concluding his remarks, he asserted that from a public health perspective, policy decisions must weigh benefits versus risks. Even if a very small proportion of individuals experience minor side effects, the broader population benefits significantly outweigh the risks. Therefore, he advocated for the continued expansion of fortification initiatives as a safe, sustainable, and culturally acceptable approach to addressing micronutrient deficiencies in India.

Question: In the face of the persistent challenge of anaemia, what would be the recommended one top policy intervention to the government?

Dr. Sesikeran stressed that the foundation of any effective policy lies in robust, continuous data. He underscored the urgent need for regular food intake surveys to provide real-time insights into dietary patterns across the population. Such data, he noted, is essential not only for designing appropriate interventions but also for assessing the effectiveness of existing programmes.

He expressed concern over the discontinuation of the National Nutrition Monitoring Bureau (NNMB), which had previously supplied valuable data on food intake and nutritional status. Current large-scale surveys like NFHS or CNNS, he pointed out, do not provide the same level of detail on actual food consumption.

He further highlighted the importance of the newly introduced Diet and Biomarker Study, which aims to bridge this gap by generating comprehensive evidence on dietary intake and biochemical indicators. The findings from such studies will be critical in determining whether current interventions are achieving the desired impact or if new strategies are required.

He added that while overall dietary intake in India is improving, the quality and balance of diets remain areas of concern, particularly regarding inadequate fruit and vegetable consumption. Policymakers, he suggested, must identify whether these gaps stem from issues of accessibility or affordability and then design corrective measures accordingly.

In conclusion, he emphasized that data-driven policymaking is crucial. Without consistent and accurate data, he remarked, "we are essentially throwing a stone in the dark, hoping it hits the target.

Panellist: Dr Seema Puri, Former Professor, Institute of Home Economics, University of Delhi

Question: Earlier discussions around malnutrition primarily focused on undernutrition and obesity. However, the concept of 'hidden hunger' has now gained importance. Could you please elaborate on this?

Dr Puri explained that hidden hunger refers to forms of malnutrition that are not visibly apparent, primarily caused by micronutrient deficiencies. Despite achieving national food security and adequate availability of food grains, India continues to face high levels of micronutrient malnutrition, with iron deficiency anaemia being one of the most widespread manifestations.

She observed that India has had an iron and folic acid supplementation programme since 1975, yet nearly two-thirds of the population remains anaemic, indicating that supplementation alone has not been sufficient. Anaemia, she noted, results from multiple causative factors, among which dietary patterns play a crucial role. As India predominantly follows a cereal-based diet, the presence of absorption inhibitors in cereals further reduces the bioavailability of iron. In addition, deficiencies in zinc, vitamin B12, folic acid, and protein also contribute to the problem, underscoring the importance of improving dietary diversity. She highlighted that the highest prevalence of anaemia is seen among infants and young children aged 12–17 months, coinciding with the age group having the lowest diet diversity. National data show that only 11% of children in this age group meet the minimum acceptable diet standard, which requires intake from at least four different food groups.



She emphasised that strategies such as food fortification, biofortification, and deworming must be complemented by strong behaviour change communication (BCC). Sharing field-level observations, she pointed out that pregnant women often receive iron–folic acid tablets from

multiple sources such as Anganwadi centres, ASHA workers, primary health centres, or private practitioners leading to confusion due to different packaging or tablet appearance and resulting in poor adherence and wastage of resources. She stressed that effective communication, counselling, and trust-building are vital for improving compliance with supplementation programmes.

Citing findings from recent analysis on mother child diets, she mentioned that 37% of mother–child pairs in India are anaemic, with the highest prevalence reported from Delhi. The study identified key contributing factors such as poor maternal education, low dietary diversity, inadequate consumption of green leafy vegetables and non-vegetarian foods, low use of government health services, delayed antenatal care, poor sanitation, and limited media exposure.

She concluded by emphasising the need for multi-sectoral collaboration rather than working in silos. She expressed optimism that with the government's renewed focus on behaviour change under Poshan 2.0, a more integrated and community-driven approach will help improve outcomes in future national surveys.

Question: From a healthcare professional's perspective, how can concerns regarding iron absorption and gastrointestinal discomfort be maintained through dietary advice and patient management?

Dr Seema Puri, emphasised that iron absorption varies widely among individuals, depending on dietary composition, physiological needs, and underlying health conditions. Hence, she highlighted the importance of adopting a personalised, patient-centric approach when addressing iron deficiency and supplementation.

She noted that iron supplementation often causes gastrointestinal side effects such as diarrhoea and black stools, which are particularly concerning among pregnant women. These symptoms frequently lead to poor adherence to iron therapy, as many women discontinue supplements out of fear or discomfort. She stressed that healthcare professionals must counsel patients about these temporary effects and clarify that they are normal physiological responses, not signs of complications.

Supporting the earlier discussion, she agreed that gut absorption efficiency and tolerance differ across individuals and that gut health plays a crucial role in determining iron status. She mentioned that prebiotics, whether obtained from natural food sources or supplements, can positively influence gut flora and thereby enhance iron absorption.

She further pointed out that chronic infections and inflammatory conditions can also impede nutrient absorption, making it essential to identify and treat such underlying issues alongside dietary interventions.

Turning to dietary strategies, she emphasised the inclusion of iron absorption enhancers, notably vitamin C, in daily meals. She cautioned against common dietary habits that inhibit iron uptake,

such as consuming tea or coffee immediately after taking iron supplements, due to the presence of phytates and oxalates in cereals, millets, and tannins in tea that reduce bioavailability.

She cited an interesting study conducted by the National Institute of Nutrition (NIN) led by Dr Madhavan Nair, which found that guava acts as an effective enhancer of iron absorption. Even a small portion of guava consumed with a meal significantly improves iron bioavailability.

In conclusion, she reiterated that promoting dietary diversity and simple, culturally acceptable practices such as combining meals with vitamin C rich fruits can substantially improve iron absorption and complement national efforts like fortification and supplementation. These simple, behaviour-based dietary adjustments, she noted, are crucial to sustaining long-term success in combating iron deficiency anaemia.

Question: In the face of the persistent challenge of anaemia, what would be the recommended one top policy intervention to the government?

Dr. Puri emphasized that tackling anaemia requires a multi-pronged and integrated approach. While numerous interventions are already in place such as iron supplementation, fortified foods, and antenatal care services she underscored that each intervention must be accompanied by strong awareness and education components.

According to her, awareness among recipients is critical for the success of any public health programme. Whether it involves understanding the benefits and possible side effects of iron-folic acid (IFA) supplementation, the purpose of antenatal checkups, or the value of fortified rice, informed participation ensures better compliance and long-term sustainability.

She further highlighted the need to focus on early life stages, particularly adolescent girls and preconception nutrition. She stated that improving the iron status of girls and women before pregnancy is essential to breaking the intergenerational cycle of anaemia. Women entering pregnancy with adequate iron stores not only safeguard their own health but also ensure that their children are born with better iron reserves and developmental outcomes.

She concluded by noting that early intervention and awareness-driven implementation will be the key to achieving a sustained reduction in anaemia prevalence and improving the nation’s overall nutritional status.

Panellist: Dr Ashok Gupta, Dean and Principal, Geetanjali Institute of Medical Sciences

Question: Could you highlight the early warning signs that parents should look for to identify anaemia in their children?

Dr Gupta shared insights from his extensive clinical experience, emphasising that awareness among parents regarding anaemia remains extremely low. Most families, he noted, are accustomed to monitoring only their child's height and weight, and occasionally vital signs such as heart rate, respiratory rate, and blood pressure but rarely haemoglobin levels. As a result, anaemia often remains undetected until it becomes severe.



He stressed that one of the most important steps forward is to sensitise parents and communities about the significance of haemoglobin assessment as a part of routine health check-ups. Dr Gupta proposed that, similar to national immunisation drives such as the Pulse Polio campaign, periodic haemoglobin screening initiatives could be introduced to create large-scale awareness and early detection. He emphasised that such a measure would not only improve child health but could also significantly enhance the intellectual, emotional, and cognitive potential of the next generation.

Describing the clinical manifestations, he referred to anaemia as a "silent killer" since it often presents no immediate or alarming symptoms. Families tend to seek medical attention only when the child appears visibly pale or fatigued, by which time the condition may have become severe, with haemoglobin levels as low as 3–4 g/dL.

He detailed the short-term and long-term effects of anaemia on children, wherein short-term impacts include mood changes, irritability, poor concentration, memory issues, and reduced attention span, all resulting from impaired enzymatic and metabolic function due to iron deficiency and Long-term impacts include weakened immunity, frequent infections, muscle fatigue, and in severe cases, congestive heart failure. Anaemic children, he noted, also display abnormal eating behaviours such as pica (eating mud or non-food items).

He also highlighted the neurological consequences, explaining that iron deficiency affects myelination of the brain, leading to impaired neurocognitive development. Such children may have reduced learning ability, diminished productivity, and long-term developmental deficits, ultimately resulting in a loss of human capital and national productivity.

He concluded by asserting that anaemia must be recognised as a topmost public health priority, not only for its medical implications but also for its far-reaching effects on the nation's developmental and economic potential.

Question: In the face of the persistent challenge of anaemia, what would be the recommended one top policy intervention to the government?

Dr. Gupta emphasized that early identification and awareness are the first critical steps in combating anaemia. He noted that there is a pressing need to create greater sensitivity and awareness both within the community and across the healthcare delivery system regarding the signs of anaemia, especially among children and women.

He stressed that frontline health workers, particularly ASHA workers, must be adequately sensitized and trained to recognize the early symptoms of anaemia at the grassroots level. This, he explained, would ensure that potential cases are detected promptly and managed before they become severe.

The second key element, he highlighted, is the availability of point-of-care diagnostic tools. He advocated for the use of non-invasive diagnostic technologies to assess haemoglobin levels, noting that such approaches would help reduce hesitancy among the population. Drawing a parallel with rising vaccine hesitancy, he emphasized that minimizing discomfort and fear associated with blood tests is essential for ensuring broad participation in screening programmes.

Non-invasive diagnostics, he explained, also help avoid unnecessary blood wastage and make it easier to conduct mass screenings, particularly for individuals who may not perceive themselves as ill and therefore are unlikely to visit healthcare facilities for testing.

Dr. Gupta outlined a three-step approach as the cornerstone of effective anaemia management:

- Create suspicion and awareness – build sensitivity at all levels to recognize early signs.
- Enable point-of-care diagnosis – deploy non-invasive technologies for screening at the community level.
- Ensure compliance and monitoring – strengthen follow-up to confirm that prescribed interventions are being implemented and adhered to.

He concluded that an integrated system combining awareness, early detection, and sustained compliance would be key to effectively addressing anaemia in India.

Fireside Chat on ‘Protein Paradox’



Moderator: Dr Shilpa Varma, Chief Program Officer for Nutrition and Diabetes (IAPEN)

Panellist: Dr Eram Rao, Professor of Food Technology, Bhaskaracharya College of Applied Sciences, University of Delhi

Question: India is a country where food is celebrated, but nutrition is often misunderstood. Referring to the recent ICMR-India 2025 study the largest of its kind with over 1.2 lakh adult participants across 36 states it was found that nearly 62–63% of daily calories come from carbohydrates, while protein contributes only about 12%. Compared to countries like Japan (20%) and the United States (15–17%), India faces a significant protein deficit. Given this magnitude, what is your interpretation of this data and its implications for public health?

Dr. Rao expressed deep concern over India’s low protein consumption patterns, emphasizing that while carbohydrate-heavy diets have been a traditional feature of Indian meals, their nutritional quality has declined over time. She observed that earlier generations consuming similar staple-based diets still achieved better protein adequacy, suggesting that modern dietary shifts and food processing practices may have diluted overall nutrient density. A particularly alarming insight, Dr. Rao highlighted, comes from the nutrition literacy gap revealed in the ICMR study. When mothers and primary caregivers were asked to identify protein-rich foods, most could name only milk and green leafy vegetables. Other vital sources such as eggs, pulses, nuts, seeds, and dairy products were largely overlooked. This points to a fundamental misunderstanding of basic nutrition concepts, even among educated populations.

She noted that while educational literacy in India has improved, nutrition literacy has simultaneously declined, leading to a disconnect between knowledge and food choices. Traditionally, Indian diets were balanced through natural combinations of cereals and pulses, ensuring complementary amino acid profiles. However, this balance is now being lost, with diets becoming increasingly refined and less diverse. She stressed the urgent need to rebuild nutrition awareness at the household level, especially among women and caregivers who are primary decision-makers for family meals. She concluded that correcting this misunderstanding of protein sources and restoring traditional dietary wisdom are essential steps toward addressing India's growing "protein paradox" and ensuring better public health outcomes.

Question: What are the consequences of a protein deficiency?



Dr. Rao emphasised the role of protein in human nutrition that had long been established, serving as a fundamental building block necessary for growth, repair, maintenance, and immunity. She noted that proteins also aided in the absorption of micronutrients and played a crucial role in fat and carbohydrate metabolism.

She highlighted that even a small dietary modification such as replacing 5% of the total energy derived from carbohydrates with protein could significantly reduce the number of individuals progressing towards prediabetes or diabetes. It was further mentioned that the consequences of protein deficiency extended beyond inadequate intake to include poor digestibility and processing losses. Improper or harsh processing methods were said to reduce the bioavailability of proteins, hindering their absorption and utilization by the body.

She further explained that animal-based proteins generally possessed superior bioavailability due to their complete amino acid profile, whereas plant-based proteins required suitable preparation methods such as soaking, heating, and proper cooking to enhance digestibility. She concluded that traditional practices, such as roasting nuts to improve their digestibility, reflected the food science wisdom embedded in Indian culinary culture, which must be revisited and revived to address contemporary nutritional challenges.

Question: Considering the protein gap across different life stages from adolescence to the elderly how can supplementation and dietary strategies be effectively utilized to improve long-term metabolic health and overall well-being?

Dr. Rao acknowledged that while supplementation could be an option for certain groups, such as athletes or individuals with higher physical activity levels, a sustainable and population-wide solution must be rooted in a food-based approach. It was emphasized that nutrition literacy formed

the foundation of such an approach, as misinformation often prevented families from meeting daily protein requirements.

Drawing attention to findings from various studies, she noted that many mothers remained unaware of good protein sources or held misconceptions such as believing that protein intake led to weight gain or was only necessary for physically active individuals. She stressed that balanced meals must include adequate protein in all three daily meals, accompanied by nutrients that aid absorption, such as vitamin C. She further explained that simple household practices like soaking, germination, and malting could enhance protein bioavailability by reducing anti-nutritional factors. Biofortification was cited as another promising avenue, with examples including high-protein millets, wheat, and pulses being developed and promoted.

For vegetarian populations, she highlighted the importance of combining complementary foods to improve amino acid profiles such as pairing cereals with pulses and advocated for greater awareness of underutilized protein sources like soy. Traditional Indian eating habits were presented as practical solutions, with examples such as ending meals with curd, avoiding tea or coffee immediately after eating, and incorporating nuts or seeds into daily recipes. She underscored that communication around nutrition must remain positive, as restrictive or prohibitive messaging often created mental resistance. Instead, she called for campaigns that promote India's traditional food wisdom and encourage simple, actionable dietary changes.

She concluded by stressing the need to integrate nutrition education into school curricula, describing it as an essential life skill on par with academic learning. She suggested that regional food diversity and indigenous practices offered ample opportunities to improve protein consumption sustainably. Encouraging a culture of "each one teaches one," she emphasized that empowering the younger generation with sound nutritional understanding would be key to addressing protein deficiency and promoting lifelong health.

Question: Given India's predominantly vegetarian population, would you say that the quantity of protein consumed is more important than its quality? Additionally, how can we enhance the bioavailability of proteins, and what practical steps can be taken to ensure that both quality and absorption are maintained?

Dr. Rao explained that while protein quantity is important, ensuring the quality and bioavailability of protein is even more critical, particularly in a country where the majority of the population is vegetarian. She noted that animal proteins are considered complete proteins using egg as the reference standard while most plant-based sources are deficient in one or more essential amino acids. To address this, she emphasized the importance of appropriate cereal-pulse combinations, such as a 3:1:2.5 ratio with the inclusion of milk, paneer, or soy, which together can help achieve a balanced amino acid profile.

She highlighted that factors like gastric acidity, cooking methods, and complementary nutrient intake play significant roles in improving protein absorption. For instance, finishing a meal with

vitamin C-rich fruits such as guava, or adding lemon juice to salads and lentils, can enhance protein bioavailability. Similarly, she cautioned against harsh cooking methods like deep frying or barbecuing, which can reduce digestibility.

She stressed that protein consumption must be consistent throughout life, and that quality intake should be prioritized over mere quantity. She pointed out that many mothers tend to rely heavily on milk for children's nutrition, while overlooking the role of protein in growth, muscle mass development, and micronutrient utilization. Protein, she explained, works synergistically with micronutrients such as iron, zinc, vitamin D, and folic acid, contributing to overall metabolic health and immunity.

She also underscored the need for broader public education and awareness. According to her, food literacy is essential for helping families understand and plan balanced meals. She suggested that including pulses and legumes in the Public Distribution System (PDS), alongside cereals and millets, could be a major step toward improving national protein intake in an affordable and sustainable manner.

She further highlighted that traditional Indian diets already contain region-specific combinations that naturally balance amino acids for example, missi roti in the north, sattu-based meals in the east, and fermented foods with sambar in the south. She added that soy remains an underutilized yet excellent and cost-effective source of protein.

In her concluding remarks, she reiterated that nutrition literacy must begin early. According to her, such experiential learning, combined with formal nutrition education in school curricula, can transform dietary habits and health outcomes nationwide. She emphasized that nurturing an informed, health-conscious youth population is essential for building a strong, responsible, and metabolically healthy nation.

Question: As healthcare professionals and policymakers, how can we ensure a faster transition of awareness about protein consumption to the public? We often recall growing up in an era when the message "drink milk every day for calcium" was widely promoted even among schoolchildren. Could a similar approach be taken today with messages such as "have your cup of dal every day"? Are there efforts to engage schools, change tiffin box patterns, or influence school canteen menus to help this generation build sustainable protein habits? How can such behavioural changes be effectively implemented and scaled through policy?

Dr. Rao emphasized that the foundation for dietary behaviour begins at the family level and that meaningful change can start with simple, consistent actions within households. She noted that awareness about the quantity and quality of protein consumed can easily begin with self-assessment and conscious daily choices. According to her, social and behavioral change will occur more rapidly when supported by digital innovation and communication tools that engage people where they already are on television, social media, and mobile apps.

She proposed that digital technology could be leveraged to create accessible applications that help individuals non-invasively estimate their protein requirements based on age, weight, and height, and provide suggestions for fulfilling them through everyday foods. Such tools, she suggested, could bridge knowledge gaps and personalize awareness in a user-friendly manner.

Dr. Rao further recommended introducing simple screening mechanisms in healthcare settings to assess protein deficiency alongside anaemia and other nutritional issues. Early detection, she noted, would enable timely dietary advice and interventions at both individual and community levels.

She also encouraged people to cultivate a social norm around asking, "Did you have your protein today?" a shift from traditional messages centered only on milk. Highlighting practical dietary habits, she pointed out that the sequence of food consumption matters; beginning breakfast with protein rather than carbohydrates helps improve alertness and satiety. Likewise, finishing meals with milk or fruit rather than tea or coffee supports better nutrient absorption.

Concluding her remarks, Dr. Rao underscored that nutrition literacy and mindful eating practices reinforced by education, digital tools, and family-level engagement can drive sustainable, long-term improvements in the nation's protein nutrition.

Panellist: Dr Manjari Chandra, Senior Consultant - Nutritional Medicine

Question: India is a country where food is celebrated but nutrition is often misunderstood. Referring to the recent ICMR-India 2025 study the largest data set with over 1.2 lakh adult participants across 36 states it shows that nearly 62–63% of daily calories come from carbohydrates, while only about 12% are derived from protein. Compared to countries like Japan (20%) and the United States (15–17%), this indicates a significant protein deficit in the Indian population. How does this translate into human health outcomes, and how do you interpret this magnitude of deficiency?

Dr. Chandra agreed that India faces a serious protein gap but emphasized that the problem extends beyond just food choices to include digestive health, absorption, and overall physiology. Drawing on her clinical experience, she highlighted that many patients report bloating, discomfort, or indigestion after consuming protein-rich foods such as dals, nuts, or cruciferous vegetables. This suggests that digestive inefficiency and a sluggish gastrointestinal system often linked to sedentary lifestyles may also be contributing to poor protein assimilation. She explained that modern dietary habits, reduced physical activity, and widespread use of antacids and proton pump inhibitors (PPIs) have collectively weakened the body's ability to digest proteins effectively. "Every time you take an antacid," she noted, "the stomach acid reduces, preventing the



activation of enzymes like pepsin, which are essential for protein breakdown." Over time, this leads to a cycle of low stomach acidity, poor digestion, and decreased protein absorption, further worsening nutritional outcomes.

Dr. Chandra also pointed out that there is a perception problem surrounding protein consumption. Many people associate protein intake solely with supplements, dairy, or meat-based foods, overlooking the diverse plant-based and traditional Indian sources such as lentils, legumes, nuts, seeds, and ancient grains. She emphasized that true dietary adequacy lies in balance and diversity, not in reliance on isolated protein products like whey powders.

In conclusion, she urged that addressing India's protein deficiency requires a multifactorial approach one that combines nutrition education, digestive health awareness, and the revival of traditional, balanced Indian eating patterns that naturally provide sufficient and diverse sources of protein.

Question: What are the implications of protein deficiency among children and adolescents, and how can this issue be effectively addressed, especially considering its link to iron absorption and overall growth?

Dr. Chandra observed that protein deficiency among children and adolescents had become an increasing concern, as dietary choices in these age groups were often skewed towards snack-based, carbohydrate-rich, and sugar-dense foods. It was highlighted that protein intake during these formative years was crucial for growth, hormonal balance, neurotransmitter development, and immunity.

She noted that inadequate protein consumption could lead to fatigue, poor muscle development, and compromised physical and cognitive performance. With changing food habits, convenience and taste had emerged as major determinants, often leading to the exclusion of nutrient-rich foods.

It was also mentioned that many parents, concerned about their children's growth and stamina, had turned to protein supplements or fortified beverages. However, these were viewed as short-term solutions, unable to replace the benefits of a balanced and wholesome diet. She emphasized that the focus should instead be on improving everyday dietary practices by incorporating protein-rich foods such as pulses, dairy, nuts, and seeds. She further pointed out that there existed a significant opportunity for the food industry to develop protein-rich and convenient options such as nut-based, millet-based, and yogurt-based snacks and beverages that would appeal to younger consumers while meeting their nutritional needs.

Concluding her remarks, Dr. Chandra stressed that addressing protein deficiency early in life could reduce the long-term risk of non-communicable diseases. Ensuring adequate protein intake during childhood and adolescence was seen as essential for achieving healthy growth, metabolic balance, and stronger immunity.

Question: Given India's vast cultural and dietary diversity where every state has its own traditional foods and eating patterns how can this diversity be effectively integrated into national policies and healthcare systems to promote better nutrition outcomes?

Dr. Chandra acknowledged that India's diverse food cultures and traditional dietary practices offer a wealth of nutritional knowledge. However, she noted that there has been a gradual shift away from traditional home-cooked meals, with a growing number of people now depending on food prepared outside the home due to work commitments, long travel hours, and urban lifestyles. As a result, the typical Indian thali is no longer a daily reality for many. She emphasized the need to ensure that food consumed outside the home, whether from restaurants, canteens, or packaged options is both culturally appropriate and nutritionally dense. According to her, this includes not only ensuring adequate protein content but also maintaining the right fatty acid profile, micronutrient balance, and antioxidant composition. Using examples from everyday life, she pointed out that most public food environments, such as airport eateries or workplace cafeterias, rarely offer balanced, protein-rich, and wholesome meals.

Drawing parallels with countries like Japan, Dr. Chandra suggested that India must strive to make food available outside the home as healthy and balanced as home-cooked meals. She stressed that individuals could be educated about healthy eating, but without access to nutritious food options, their choices remain limited. This, she argued, should be a key consideration in policymaking and national health planning.

She also discussed the crucial role of nutrition in managing chronic and metabolic diseases. Based on her clinical experience, particularly in oncology, she observed that patients with cancer and other chronic conditions often suffer from severe protein deficiency, muscle loss, and poor appetite. Despite these challenges, she found that patients and their families frequently lacked awareness of how to use food strategically to support recovery, prevent sarcopenia, and improve treatment outcomes. She further highlighted that nutrition is still viewed reactively addressed only after illness sets in rather than proactively as part of preventive healthcare. She emphasized that food and nutrition are central to the development and progression of a wide range of diseases, including cancer, metabolic disorders, autoimmune conditions, and neurodegenerative diseases.

Concluding her remarks, she called for a shift in mindset from treating nutrition as a secondary concern to recognizing it as a foundational determinant of health. She underscored that better education, informed food choices, and supportive public policies could collectively transform population health and resilience in the long term.

Question: How do you view India's nutrition landscape and its future trajectory, particularly in the context of changing dietary patterns, awareness, and health behaviors?

Dr. Chandra observed that while policies play a vital role in shaping nutrition priorities, in today's environment it is largely social media that drives dietary behaviors and perceptions, especially among the youth. She noted that platforms like Instagram have become a primary source of

information, often replacing scientific guidelines, which most people do not actively seek out or read. This, she emphasized, creates both opportunities and challenges: the potential to reach millions instantly, but also the risk of misinformation influencing public choices.

Elaborating further, she explained that two dominant and opposing narratives around protein currently circulate online. One advocates for excessive protein consumption to enhance muscle mass and aid weight loss, while the other warns that high protein intake may lead to health issues such as kidney and liver dysfunction, hormonal imbalance, or metabolic disturbances. She clarified that both extremes are misleading and highlighted the need for balanced, evidence-based understanding of protein requirements.

Citing the latest ICMR recommendations, Dr. Chandra stated that adults with sedentary to moderate activity levels require approximately 0.8 grams of protein per kilogram of ideal body weight not actual weight. She emphasized that this requirement is achievable through a diverse Indian diet that includes millets, pulses, legumes, dairy and fermented products, soy, nuts, and certain nutrient-dense foods such as drumsticks, edamame, avocados, and Brazil nuts.

Looking ahead, Dr. Chandra predicted that convenience-driven, protein-enriched products such as protein bars and no-sugar snack options will continue to grow in popularity as they offer accessible ways to improve daily intake. However, she cautioned that the focus must remain on balanced, home-cooked meals that integrate adequate protein, fiber, and healthy fats. She reiterated that beginning the day with these macronutrients instead of carbohydrates can help stabilize insulin sensitivity and reduce post-meal glucose spikes.

She also underscored that protein cannot be viewed in isolation. Its effectiveness depends on multiple factors such as cooking methods, food processing, and the presence of complementary nutrients and phytochemicals. Using dairy as an example, Dr. Chandra noted that protein quality varies across forms Greek yogurt, for instance, provides higher protein density compared to diluted curd.

Concluding her remarks, Dr. Chandra emphasized that the human body’s ability to utilize dietary protein depends not only on intake but also on efficient physiological processes such as digestion, amino acid synthesis, and cellular protein formation. Factors like micronutrient adequacy, genetic makeup, and the presence of essential cofactors particularly B vitamins and antioxidants play a critical role in ensuring that dietary protein is effectively converted into functional proteins essential for hormones, enzymes, neurotransmitters, and immune regulation.


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