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Evidence Based Commentary

India's rice fortification programme: Operational lessons from a strategic pause

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Highlights/Key Messages

- India paused fortified rice procurement in 2026 after evidence of nutrient degradation
- 2–3 year storage cycle caused 50–75% vitamin B12 losses in fortified rice kernels
- The pause reflects adaptive governance, not scientific retreat
- Minimum support price procurement architecture is incompatible with current fortification design
- Recalibration — not abandonment — is the evidence-based path forward

Background
India's rice fortification programme, launched as a pilot in 15 districts in 2019 and scaled to nationwide coverage by March 2024, distributes micronutrient-enriched rice (iron, folic acid, vitamin B12) to over 800 million beneficiaries through the Public Distribution System (PDS), Integrated Child Development Services (ICDS) anganwadi centres, and PM Poshan school kitchens. On 27 February 2026, the Government of India announced a temporary discontinuation of new fortified rice procurement under the Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY), triggering widespread media characterisation of the decision as a policy failure.

Objective
To provide an evidence-based policy analysis of the factors behind the programme pause, examine what the decision does and does not signify, and identify operational redesign priorities to guide recalibration.

Methods
Documentary review of government notifications and administrative circulars (operational guidelines of 2019, Cabinet Committee on Economic Affairs approval of 2022, Cabinet continuation order of October 2024, and the PIB release of 27 February 2026), published Food Corporation of India operational data, findings from the IIT Kharagpur shelf-life study commissioned by the Department of Food and Public Distribution, and review of international food fortification literature.

Results
The pause resulted from three systemic failures: (1) a structural mismatch between India's open-ended Minimum Support Price procurement architecture and the compressed milling season required by fortification; (2) an under-resourced testing and digital traceability regime (ForTrace) producing critical bottlenecks at scale; and (3) a storage-stability gap, with vitamin B12 losses of 50–75% possible under India's actual storage conditions, where fortified rice commonly remains in warehouses for two to three years before distribution.

Conclusions
The decision reflects responsible adaptive governance, not scientific abandonment. The evidence base for rice fortification as a population-level nutrition strategy remains intact. A recalibrated programme — addressing laboratory capacity, regulatory stability, packaging standards, distribution discipline, and alignment of fortification volumes with actual welfare scheme offtake — can deliver its nutritional mandate reliably within India's food system.

Keywords: rice fortification; food fortification; micronutrient deficiency; India; public health nutrition; food systems

Introduction

On 27 February 2026, the Government of India announced the temporary discontinuation of new fortified rice procurement under the Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY), the government's flagship food security program, and allied welfare schemes. Media characterised the decision as a 'retreat', 'withdrawal', and 'failure'. Long-standing critics declared victory.

Every one of those characterisations misreads the record. The Government did not declare rice fortification ineffective. It did not reduce the food grain entitlement of a single one of the 800 million beneficiaries who depend on the Public Distribution System. What it did — as the official Press Information Bureau release makes unambiguous — was commission rigorous scientific evidence about its own programme, receive findings that demanded honest reckoning, and act accordingly (Government of India, 2026a).

This paper argues that the pause is a case study in adaptive governance, not policy failure. It analyses the structural and operational reasons behind the decision, clarifies what the evidence does and does not support, and offers a framework for recalibration that would make the programme significantly more effective upon resumption.

Background: The Science and Policy Case for Rice Fortification

Global evidence base

Food fortification is among the most cost-effective public health interventions available to nutrition science. Salt iodisation eliminated endemic goitre and cretinism across vast populations. Wheat flour fortification with folic acid has measurably reduced neural tube defects in over 80 countries. According to a WHO meta-analysis, rice fortification with iron can reduce the risk of iron deficiency by approximately 35% (WHO, 2018a). Rice fortification has delivered documented health gains in multiple country contexts where implementation has been well designed (WHO, 2018a; Micronutrient Forum, 2022).

Unlike many other types of food fortification, rice fortification has to utilize fortified rice kernels (FRK), micronutrient-enriched, rice-shaped particles produced by an extrusion process that are blended with regular milled rice at a ratio of 1:100. Compared to spraying the nutrients directly onto grains, this approach prevents nutrient loss when the rice is washed before cooking. To verify that the correct fortification level is maintained throughout the supply chain, systematic quality monitoring is required at each stage: FRK manufacturers are tested at the point of production, blended fortified rice is sampled at the mill before dispatch, and laboratory testing at National Accreditation Board for Testing and Calibration Laboratories (NABL)-accredited facilities provides independent quality certification for each batch.

Rice is an ideal fortification vehicle in India: approximately 65% of the population consumes it as a staple food. The National Family Health Survey (NFHS-5, 2019–21) found that anaemia affects 57% of women of reproductive age and 67% of children aged 6–59 months (Ministry of Health and Family Welfare, 2021). Deficiencies in iron, vitamin B12, and folic acid underlie much of this burden. It is estimated that a fortification programme operating at scale could avert approximately 16.6 million Disability-Adjusted Life Years (DALYs) annually, with health gains equivalent to Rs 49,800 crore (approximately USD 5.9 billion at 2024 exchange rates) in GDP terms (Government of India, 2024a).

India's Decade of Programme Building: From Pilot to Universal Coverage

India's rice fortification initiative is the product of more than a decade of evidence generation, regulatory development, ecosystem construction, and carefully phased scale-up. This trajectory deserves recognition in its own right and provides essential context for understanding the challenges the programme subsequently encountered.

Evidence generation began well before the programme was formally approved. Over two decades, eighteen studies — including four conducted in India — demonstrated the efficacy of fortified rice in improving micronutrient status across infants, children, and women, showing measurable reductions in anaemia prevalence, increases in haemoglobin and iron stores, and improvements in vitamin B12 and zinc levels (Department of Food and Public Distribution, 2019). This body of evidence informed the decision to place rice fortification under the National Nutrition Mission (Poshan Abhiyan) as a complementary strategy.

The regulatory foundations were laid with equal deliberateness. The Food Safety and Standards Authority of India (FSSAI) operationalised the Food Safety and Standards (Fortification of Foods) Regulations in October 2016, establishing the first formal standards for rice fortification — including micronutrient levels, quality assurance norms, labelling requirements, and the +F logo (FSSAI, 2016). These standards were formally gazetted in August 2018 (FSSAI, 2018), providing the legal framework for programme implementation.

The programme architecture was tested through a Centrally Sponsored Pilot Scheme approved on 14 February 2019 (Government of India, 2019). Covering one aspirational district per State or Union Territory (15 districts in all), the three-year pilot — designed with technical support from the World Food Programme and PATH — tested fortification through the PDS at meaningful scale. Its operational guidelines established foundational protocols: FRK sourcing from FSSAI-licensed and NABL-accredited manufacturers, blending ratios, batch-level quality certification, state-level monitoring units, and traceability to the point of distribution. State-level monitoring units and designated NABL-accredited laboratories were established to support quality oversight. Eleven states successfully distributed fortified rice in their identified pilot districts under the PMGKAY and related schemes. The remaining four states encountered implementation challenges of varying kinds — including administrative transitions and procurement constraints — and did not complete distribution within the pilot timeframe. Their experiences nonetheless informed the refinement of national guidelines ahead of the full rollout.

The Cabinet Committee on Economic Affairs approved national scale-up in April 2022, committing Rs 4,269.76 crore with 100% central government funding for a three-

phase rollout (Government of India, 2022). Phase I (2021–22) extended coverage to Integrated Child Development Services (ICDS) centres and PM Poshan school kitchens across all of India. Phase II (2022–23) added Targeted Public Distribution System coverage across 291 aspirational and high-burden districts. Phase III (2023–24) completed the rollout to all remaining districts totalling 675 in all. By March 2024, universal coverage had been achieved: custom-milled rice (CMR) had been replaced by fortified rice under every government scheme, and 300 LMT (lakh metric tonnes; one lakh is 100,000) of fortified rice were flowing annually to over 800 million National Food Security Act (NFSA) beneficiaries (Government of India, 2024b).

The manufacturing ecosystem that supported this scale-up was itself a significant institutional achievement. Nationally, by 2024, 1,023 FRK manufacturers were registered and operational, with an annual production capacity of 111 LMT — substantially exceeding the 5.20 LMT required in the public sector for blending. A network of 232 premix suppliers, 44 NABL-accredited testing laboratories, and a growing body of trained millers constituted the human and institutional infrastructure of what had become one of the most rapidly and carefully scaled food fortification programmes at such a large scale anywhere in the world. The FSSAI +F logo framework also permits voluntary private-sector rice fortification; however, the public welfare scheme channel accounts for the overwhelming majority of fortified rice distribution in India, with commercial fortified rice representing a small and separate market. In October 2024, the Union Cabinet approved continuation of the programme through December 2028, affirming the government's long-term commitment to the nutritional security objective (Government of India, 2024b). Table 1 summarises key milestones in the programme's regulatory and implementation timeline.

This decade of programme-building is crucial context for what follows. The operational challenges that led to the 2026 pause were not evidence of a poorly conceived programme — they were the predictable growing pains of an intervention at a genuinely unprecedented scale, grafted onto a pre-existing procurement and logistics system not designed with fortification's specific requirements in mind.

Table 1. Key milestones in India's rice fortification programme: from regulatory foundations to universal coverage (2016–2024)

Year	Milestone	Key Outcome
2016	FSSAI Regulations (Oct 2016)	Fortification standards for rice operationalised; +F logo notified
2018	FSSAI Gazette Notification (Aug 2018)	Food Safety and Standards (Fortification of Foods) Regulations, 2018 formally gazetted
2019	Administrative Approval (Feb 2019)	Centrally Sponsored Pilot Scheme in 15 districts (one per State/UT) approved; 3-year mandate; WFP and PATH as technical partners
2020–22	Pilot Implementation	11 states distributed fortified rice; 4.30 LMT distributed by March 2022; ecosystem tested at sub-national scale
Apr 2022	CCEA Approval — National Rollout	Three-phase scale-up approved; Rs 4,269.76 crore committed; 100% central government funded; ForTrace traceability system initiated
Phase I 2021–22	ICDS + PM POSHAN (All India)	All ICDS centres and school kitchens covered nationwide; FRK manufacturer base established
Phase II 2022–23	291 Aspirational and High-Burden Districts	TPDS and Other Welfare Schemes added; FRK manufacturer base expanded to 1,023 units nationally
Phase III 2023–24	All Remaining Districts — Universal Coverage	All States/UTs covered; custom milled rice replaced by fortified rice; 300+ LMT distributed annually to 800M+ beneficiaries by March 2024
Oct 2024	Cabinet Continuation — July 2024–Dec 2028	Programme extended with 100% GoI funding; 1,023 FRK manufacturers, 232 premix suppliers, 44 NABL-accredited labs operational

Note. CCEA: Cabinet Committee on Economic Affairs; FRK: Fortified Rice Kernel; ICDS: Integrated Child Development Services; LMT: Lakh Metric Tonnes; NABL: National Accreditation Board for Testing and Calibration Laboratories; TPDS: Targeted Public Distribution System.

India's Grain Procurement Architecture: The Structural Context

The minimum support price framework

The Government of India announces a minimum support price (MSP) for paddy (unprocessed rice) at the start of each agricultural season, providing farmers with a guaranteed price floor. The procurement obligation is open-ended: the Food Corporation of India (FCI) and State Government Agencies are required to purchase all paddy that farmers bring to designated mandis (regulated wholesale agricultural markets) at the notified MSP. No upper limit is placed on total procurement volumes.

This open-ended obligation is a deliberate policy choice rooted in India's constitutional commitment to food security and farmer welfare. However, it creates a structural dynamic: procurement volumes are determined by farmer supply, not by the downstream demand from welfare schemes. The procured paddy is sent to rice mills under custom milling agreements — arrangements under which private millers process government-owned paddy into milled rice (referred to in India's grain management system as 'custom-milled rice', or CMR) in exchange for a milling fee, and return the CMR to the FCI for distribution.

The structural surplus and storage cycle

India procures approximately 520–540 LMT of rice equivalent per year against an annual distribution requirement of approximately 360–380 LMT under PMGKAY and allied schemes. This means procurement structurally exceeds distribution by approximately 15–18 LMT per year, even before accounting for carry-forward stocks.

Actual stocks with FCI reached a ten-year high of approximately 36.3 million tonnes in 2025 — approximately 2.5 times the prescribed buffer norm of 135 LMT. Against an annual PMGKAY allocation of 372 LMT, total availability in the central pool reached 674 LMT as of February 2026—

nearly two full years of supply (Government of India, 2026a). Rice procured in October–November may not reach beneficiaries for 18–36 months. Table 2 summarises the flow of paddy through this system.

Table 2. Flow of paddy procurement under India's minimum support price system from harvest to Public Distribution System use

Stage	Approximate Timing	Key Activity
Paddy harvesting	Sep–Nov (Kharif)	Farmers harvest and deliver paddy to mandis at MSP
MSP procurement	Oct–Nov (Punjab/Haryana); extends to Mar (eastern states)	FCI/SGAs purchase paddy; farmer payment within 48–72 hours
Custom milling	Oct–Mar (6-month window)	Millers convert paddy to CMR; deliver to FCI depots
FCI storage	Ongoing (year-round)	Central pool rice; distributed monthly to states per NFSA
PDS distribution	Monthly (year-round)	Rice reaches ration shops; distributed to 800M+ beneficiaries

Note. CMR: Custom Milled Rice; FCI: Food Corporation of India; NFSA: National Food Security Act; PDS: Public Distribution System; SGAs: State Government Agencies responsible for paddy procurement in their respective states on behalf of the central pool; MSP: Minimum Support Price — the government-guaranteed floor price for paddy

Operational Failures: What Went Wrong at Scale

The technical requirements of fortification

Fortified rice is produced by blending regular milled rice (called CMR in India) with FRK at a ratio of 1:100. The quality assurance process involves two distinct testing stages: FRK is first tested and digitally cleared before being dispatched to mills; the blended fortified rice is then tested again after milling and before acceptance by the FCI. For fortification to function correctly at the mill level, the miller must source certified FRK from an empanelled manufacturer; blend it at the prescribed ratio using an approved machine; have the batch tested at a NABL-accredited laboratory; and obtain a quality certificate before the batch can be accepted by the FCI. Prior to the introduction of ForTrace, each FRK batch of 10 tonnes was tested at a cost of approximately INR 3,000 (around USD 36) per test, with results typically returned within one week — a workable compliance burden. As described below, the introduction of ForTrace transformed this manageable step into a critical bottleneck.

Testing System Capacity: A Structural Mismatch

India's milling season is structurally bounded. Paddy stored beyond the October-to-March milling window absorbs moisture, leading to mould, discolouration, and deteriorating grain quality that renders profitable milling increasingly difficult. Millers therefore have a strong economic incentive — and, under FCI contract terms, a requirement — to complete milling within this six-month period.

The resulting testing arithmetic is daunting. If approximately 400,000 tonnes of FRK are required annually to fortify 40 million tonnes of rice, and each batch is standardised at 10 tonnes, the testing system must process approximately 40,000 samples per season — all within this six-month milling window. That is approximately 220 samples per working day, nationally, for six months.

As of early 2024, only 44 NABL-accredited laboratories were authorised to test FRK and fortified rice nationwide; a low number reflecting both the high capital cost of establishing facilities equipped for micronutrient analysis and the time required for NABL accreditation. Geographic distribution was deeply unequal: southern states accounted for nearly 35% of total testing capacity, while high-procurement northern states — Punjab, Haryana, Uttar Pradesh — had proportionally far fewer facilities relative to their testing load, with some laboratories located hundreds of kilometres from the mill yards where testing was most urgently needed. Backlogs were an arithmetic inevitability.

The ForTrace Digital Traceability System

FSSAI introduced the ForTrace (Fortified Rice Traceability) portal, linked to the Food Safety Compliance System, requiring all FRK manufacturers, millers, and distributors to log every batch in real time. The intent was sound — adulteration and quality irregularities had been reported. Under the ForTrace protocol, every batch of FRK had to be logged at manufacture, held for government sampling, tested at a NABL-accredited laboratory, and digitally cleared before it could be dispatched to any rice mill — creating a mandatory waiting period at each stage of the supply chain. The intent was sound — adulteration and quality irregularities had been reported, and a digital trail would make the supply chain auditable.

In practice, the approval cycle from FRK production to clearance for use at the mill extended to 25–30 days under the new regime, less than one week previously. In a six-month milling season where millers are handling thousands of tonnes of paddy per day, a one-month delay in in FRK availability is operationally catastrophic. Critically, unlike grain, FRK itself has a shelf life of 12–18 months and cannot be stockpiled as buffer stock in the way that paddy or CMR can. The shortage that resulted was therefore a flow problem — bottlenecks in the clearance pipeline — rather than a stock problem: even though total FRK production capacity nationally substantially exceeded programme requirements, cleared and dispatched FRK was unavailable at the mills when needed.

Quality Rejections and the Absence of a Rejection Protocol

FCI laboratories rejected stocks on quality grounds in multiple instances, including cases where inter-laboratory inconsistencies produced differing results on the same sample. Under FSSAI's quality framework, three consecutive test failures of FRK from a manufacturer render that manufacturer ineligible to supply until the quality issue is resolved — a provision intended as a safeguard but which

effectively halted milling operations for the affected mills during the resolution process. In October 2023, 44 millers in Punjab had their FRK samples fail testing three times consecutively, triggering a millers' strike at peak season.

In August 2024, FCI rejected 600 stacks (standardised storage units of approximately 100 metric tonnes each) of fortified rice from Punjab millers despite reported satisfactory retest results. Critically, no clear operational instructions existed on what millers should do with rejected rice. Export of government-procured grain requires separate FCI and Ministry approval and cannot be undertaken unilaterally by millers. Sale as unfortified rice would require de-labelling and is not provided for in FSSAI regulations. Without any such pathway, millers were unable to recover the cost of the FRK they had purchased, the blending they had performed, and the storage they were occupying with unsaleable stock—with no defined compensation or resolution mechanism. The Punjab Rice Industry Association documented 25,978 MT of rejected rice across three milling seasons.

Regulatory Churn

Rapid, sequential, poorly timed regulatory and technical changes imposed compounding costs on FRK manufacturers and millers without commensurate quality benefit. These included: a notification requiring extruders fabricated from food-grade stainless steel (replacing the mild steel standard used across the broader food processing sector); mid-season changes from static to dynamic blending machines requiring capital reinvestment; state-level empanelment conditions restricting FRK suppliers geographically — typically by requiring manufacturers to have physical production facilities within the procuring state, which in states with few or no local manufacturers created effective monopolies, supply shortages, and significant price inflation; and procurement arrangements concentrating supply through a small number of empanelled aggregators. The cumulative effect eroded the confidence and financial stability of the milling community on whom the entire supply chain depends.

The IIT Kharagpur Study: The Storage-Stability Finding

The extended storage reality described in Section 3 prompted the Department of Food and Public Distribution to commission IIT Kharagpur to conduct a systematic study of micronutrient stability in FRK and fortified rice (FR) under India's actual storage conditions across diverse agro-climatic zones.

> *The report concludes that factors such as moisture content, storage conditions, temperature, relative humidity, and packaging material critically influence the stability and shelf life of FRK and FR. They are susceptible to micronutrient reduction and shortening of shelf life during prolonged storage and routine handling. This reduction is rendering the effective shelf life shorter than expected and, in turn, limiting the intended nutritional outcomes. (Government of India, 2026a).*

The study found that losses of 50–75% of added vitamin B12 are possible over the two-to-three-year storage cycle characteristic of high-procurement states. To put this in concrete terms: a beneficiary receiving rice in which 60% of the added vitamin B12 has degraded receives only 40% of the intended micronutrient dose — potentially insufficient to achieve the programme's nutritional objective. Iron and folic acid were found to be more thermally stable, though still subject to degradation under adverse conditions. Packaging material quality emerged as a critical moderating variable: moisture-barrier packaging — multi-layer laminated bags with low water vapour transmission rates — significantly extended the effective shelf life of FRK compared to standard woven polypropylene sacks, which are the default packaging material in India's grain distribution system.

This finding is fully consistent with well-established food science: water-soluble vitamins, particularly cobalamin (B12), are known to degrade under conditions of elevated temperature, moisture, and prolonged storage (Ottaway, 2012; Watanabe, 2007). The study reveals not a flaw in the science of fortification, but a mismatch between programme design assumptions (a procurement-to-distribution cycle of 6–12 months) and India's MSP procurement realities (cycles two to three times longer).

Interpreting the Decision

What the pause signifies

The official PIB release of 27 February 2026 calls the action a 'recalibration of nutrition intervention' (Government of India, 2026a) — not withdrawal, not failure. The decision explicitly signals recognition that the testing and traceability regime was introduced at a pace and scale the system could not absorb; acknowledgement that programme storage and distribution timelines call for refinements; and a commitment to developing a more robust delivery mechanism before resumption.

What the pause does not signify

- It does not represent a scientific finding that rice fortification is ineffective. The evidence base remains intact (WHO, 2018a).
- It does not reduce food entitlements. Every NFSA beneficiary continues to receive full grain allocations under PDS, ICDS, and PM Poshan.
- It does not mean existing fortified rice will be withdrawn. The 674 LMT already in the central pool will continue to be distributed until exhausted — approximately two years of continuity (Government of India, 2026a). Notably, rejected fortified rice stocks — where the issue is nutrient degradation rather than contamination or food safety risk — could potentially be redistributed as regular grain. This option should be explicitly included in the rejection protocol the government develops.
- It does not represent permanent abandonment of fortification as a public health tool.

Critics have conflated the rice milling industry's lobbying —

Punjab processors had legitimate concerns about warehouse space and losses from unsold FRK stocks — with the government's scientific rationale. Both factors are real. But the substantive basis for the decision is the IIT Kharagpur evidence. Conflating the two misrepresents the record and discourages honest programme self-assessment.

Priorities for Recalibration

The operational failures documented above are not merely diagnostic — they are instructive. A recalibrated programme must act on several inter-related fronts.

Expand and Rebalance Laboratory Capacity

Laboratory infrastructure for testing FRK and fortified rice must match procurement volumes. High-procurement states — Punjab, Haryana, and Uttar Pradesh — bear the heaviest testing load but are underserved relative to southern states. Expanding NABL-accredited capacity in these states, with enforceable turnaround commitments of 7–10 working days, is a prerequisite for any testing regime that can function within the six-month milling season.

Rationalise the Testing and Traceability Regime

- Replace duplicative testing (NABL laboratory followed by secondary testing at central government laboratories) with a risk-based sampling regime.
- Replace mandatory testing of every 10-tonne FRK lot with a statistically adequate sampling protocol with documented risk triggers.
- Decouple the surveillance function from supply chain clearance so that masked blind sampling does not hold up dispatch of cleared batches.
- Establish enforceable turnaround timelines for laboratories, with consequences that do not fall on the manufacturer or miller.

Stabilise the Regulatory Environment

- Review technical specifications for FRK manufacturing equipment in consultation with industry, aligned with broader food processing sector standards and with transparent justification for any deviation.
- Introduce any further changes to blending technology requirements with a minimum transition period of one full milling season, with capital support for small- and medium-sized millers.
- Govern state-level empanelment conditions through national guidelines prohibiting geographic restrictions on FRK manufacturers.

Upgrade Packaging and Enforce Distribution Discipline

- Mandate moisture-barrier packaging for fortified rice as a non-negotiable standard. The 73 paise per kg incremental cost of fortification — covering FRK procurement, blending, and quality testing — is reimbursed to millers by the central government as a cost-recovery payment under the PMGKAY food subsidy mechanism. Current expenditure is below this budgeted level, leaving headroom for packaging improvement without additional overall programme cost.
- Implement first-in-first-out distribution discipline through ForTrace and FCI logistics systems, flagging stocks approaching the 12-month storage threshold and prioritising their dispatch.

Align Fortification Volumes with Actual Welfare Scheme Offtake

Calibrate the volume of fortified CMR produced in each season against the projected offtake for welfare scheme distribution within approximately 18 months. Rice procured above this threshold would be milled as non-fortified CMR and held as normal buffer stock. This would ensure that all fortified rice produced is distributed within its effective shelf life, relieve millers of obligations for volumes that will not reach beneficiaries before degradation occurs, and reduce the testing and traceability burden proportionally.

Establish Rejection Protocols and Institutionalise Stakeholder Consultation

Publish a documented rejection protocol specifying the process for retesting, the hierarchy of testing authority in case of inter-laboratory discrepancies, timelines for resolution, and compensation mechanisms where systemic factors are responsible. Any material change to technical specifications, testing protocols, or supply chain requirements should be preceded by structured consultation with industry representatives and state governments, training of industry and government actors where needed, and a minimum transition period before enforcement.

Conclusions

The current temporary halt of India's rice fortification programme is the product of a specific, diagnosable set of operational failures—failures in testing system design, laboratory capacity planning, stakeholder preparation, stock cycle management, and the accommodation of fortification requirements within India's MSP procurement architecture. None of these failures reflects on the scientific validity of rice fortification as a nutrition strategy, nor on the government's decade-long commitment to building a world-class fortification ecosystem. They reflect the predictable challenges of implementing a complex, quality-intensive intervention at unprecedented scale within a procurement and distribution system inadequately reconfigured to support it.

The decision to pause, assess, and redesign — rather than continue distribution while questions remained about whether vitamin B12 levels in long-stored rice were being maintained — is the correct one. India's 800 million NFSA beneficiaries deserve nutrition interventions that reliably improve micronutrient intake.

The government's willingness to transparently confront inconvenient evidence and commit to a more effective mechanism before resumption is precisely the kind of adaptive governance that large-scale public health programmes require. Done well, the recalibration will

produce a programme significantly more robust than what was paused — one that delivers its nutritional promise reliably, at scale, and sustainably.

Author Contributions

RS contributed to Conceptualisation, Methodology, Formal Analysis, Investigation, Writing – Original Draft, Writing – Review & Editing, and Visualisation.

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

Claude (Anthropic, claude-sonnet-4-6, April 2026) was used to assist in drafting and structuring this manuscript from source documents authored by the same author. All intellectual content, factual claims, policy positions, and editorial judgements are those of the author.

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