

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

Aarav Chokhani

Ascend International School

ABSTRACT: Since the Green Revolution corresponded to initiating the kind of fertilizers used on India's farms, the subsidy program has contributed to agricultural growth and food supply to farmers across India through use of diverse varieties of fertilizer in various areas. However, despite significant increases in production of food grains via fertilizer subsidies, India continues to suffer from insufficient food security. Because of this lack of food security, resolution of some key elements of food security has become problematic (availability, access, use, stability). The study utilized multiple types of data sources to assess the overall effectiveness of India's fertilizer subsidy program. Overall, the fertilizer subsidy program achieves the intended objective of achieving food security in India with only a portion of what was intended by the FAO's verification framework (availability, access, use, stability) and additional reforms are required in order to enhance overall long-term sustainability and inclusive development (given that approximately 63% of the benefits were provided to large farmers, 43% of fertilizer benefits were received by small-scale producers).

1. INTRODUCTION

In India agriculture is the major contributor sector of the economy. It employs around 42% of population and contributes 18% of GDP in India. Since independence, food security has been a major concern for Indian policy makers along with ensuring adequate agricultural production of food for the population of over 1.4 billion. Food security (as defined by the United Nations Food and Agriculture Organisation (FAO) – the physical and economic access to adequate, safe, and nutritious food to meet the food and nutrient requirements for an active healthy life at all times is a fundamental developmental challenge in India (FAO, 1996). One of the most important tools that have been used to this end is the fertilizer subsidy, first introduced during the Green Revolution of the late 1960s.

In the post-Green Revolution era, about 50-60 per cent of yield gains are attributable to fertilizers (Pingali, 2012). Knowing this, the Government of India has been subsidizing fertilizers since the early 1970s, and has slowly been expanding the program into a multi-thousand-crore fiscal commitment. The subsidy bill for fertilisers stood at the highest level of INR 225,220 crore in FY 2022-23, which was the highest ever subsidy amount, before declining to INR 1,88,894 crore in FY 2023-24 (Ministry of Finance, GoI, 2024). With these numbers, India is among the most generous fertilizer subsidising countries in the world (OECD, 2021).

However, effectiveness of this policy in terms of food security is challenged. The critics cite leakages, an excessive and environmentally harmful use of nitrogenous fertilizers, regressive distributional effects and the failure to take the demand side and nutrition side aspects of food security into consideration (Gulati & Banerjee, 2015; World Bank, 2022). Opponents, on the other hand, say that the subsidy has helped India to post record yields and buffer stocks, and prevents the type of famines that plagued the pre-Green Revolution decades (Swaminathan, 2010).

The Indian government provides subsidies on the fertilizers in two ways- (i) a Maximum Retail Price (MRP) for urea, which has been kept at Rs. 242 per 45 kg bag since 2018, and the MRP is paid to the farmer while the difference between MRP and the cost of production is credited to the government; and (ii) a Nutrient Based Subsidy (NBS) scheme for non-urea phosphatic and potassic (P&K;) fertilizers, first introduced in April 2010.

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

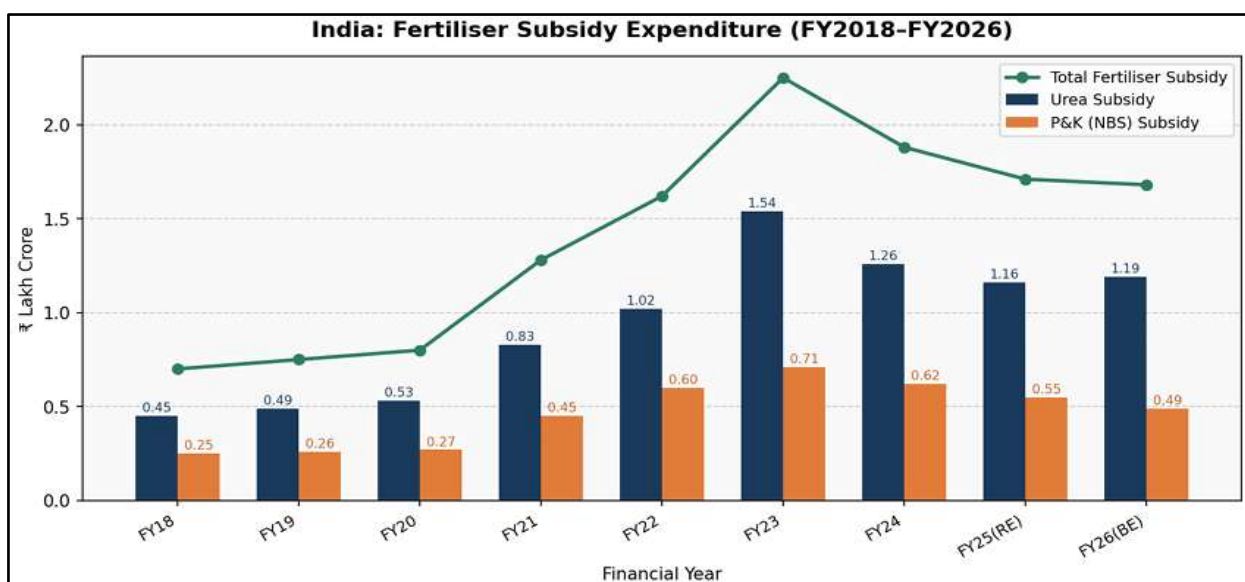


Figure 1: India's Fertilizer Subsidy Expenditure (FY2018 - FY2026, in Lakh Crore)

Sources: Department of Fertilizers Union Budget documents; Business Standard (2024, 2025); PIB (2025)

The total fertilizer subsidy spending between FY2018 and FY2026 is shown in the above figure (Figure 1). This steep rise in FY2022-23 (2.25 lakh crore) is directly attributed to the geopolitical turmoil triggered by Russia's invasion of Ukraine which jacked up the prices of natural gas, ammonia and phosphoric acid, which are the key feeds for urea. Since then, international commodity prices have eased, resulting in a decreasing subsidy bill but one which is still structurally higher than pre-2021.

2. HISTORICAL EVOLUTION OF INDIA'S FERTILIZER SUBSIDY POLICY

2.1 Green Revolution Origins (1960s–1970s)

The fertilizer subsidy programme was introduced in India in response to the need for high-yield variety (HYV) seeds during the Green Revolution, which had much higher chemical nutrient inputs to produce the promised yields. In 1965-66, when near famine conditions prevailed, the government had to find a way to encourage the use of fertilizers. By 1957 the Fertiliser (Control) Order had been modified to allow for price controls and by 1977 the Retention Price Scheme (RPS) had been established to pay the manufacturer the difference between the controlled price for retailing and his cost of production (Sharma, 2011). The underlying rationale was straightforward: cheap fertilizers leading to higher yields leading to food self-sufficiency. Though the rationale was confined to a narrow validity, it became the “frame” that governed the expansion of the subsidy for the next fifty years.

2.2 Retention Price Scheme to Nutrient-Based Subsidy (1977–2010)

This RPS was sustained with only minor adjustments until 2003, when world energy prices started to break the cost-of-production norms that were the basis of this RPS. A committee led by Y.K. Alagh (2001) highlighted a growing burden on subsidy and suggested decontrol of phosphatic and potassic (P&K); fertilizers, which was partially done in 1992 but then reversed because of retail price hikes and drop in consumption. A more significant reform was the Nutrient Based Subsidy (NBS) scheme, announced in 2010, which marginally allows for some market signals for the prices of P&K while maintaining the Urea policy, which provides subsidy per kg of nutrient (N, P, K, S) for all fertilizers, excluding Urea (Ministry of Chemicals & Fertilizers, 2012). Despite the international price of urea rising to USD 900 per tonne in 2021-22 (World Bank Commodity Markets, 2022), urea's retail price in India remains at INR 5922 per tonne, unchanged since 2012. This split has increased the effective subsidy on urea to an estimated 80-85 per cent of the market price (OECD, 2021).

2.3 Post-2010 Reforms and Digital India Initiatives

Thereafter, the reform efforts were aimed at decreasing leakage and enhancing targeting, following NBS. The introduction of the mFMS (mobile Fertilizer Management System) in 2011 and the requirement of the Aadhaar linked Point of Sale (PoS) machines at the retail outlets (2017) were aimed at ensuring that farmers using real fertilizer are excluded from subsidised fertilizers. Direct Benefit Transfer (DBT) for fertilizers was piloted in few districts since 2017 and has yet to be fully operational in 2024 (Ministry of Chemicals & Fertilizers, 2024). The neem coating requirement of urea (2015) was initiated to control the industrial utilization, which is said to have reduced the usage of urea in non-agricultural sector by about 10-12 per cent (NITI Aayog, 2016).

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

3. CONCEPTUAL FRAMEWORK: THE FOUR PILLARS OF FOOD SECURITY

According to the United Nations Food and Agriculture Organization (FAO) food security is defined as "when, in any given period, all people have physical and economic access to food sufficient for an active and healthy life, and can afford food that is safe and nutritious, and culturally appropriate" (FAO, 1996). This definition is based on four pillars;

Availability: Physical presence of adequate amount of food at the national, regional and local level, which relies on production, imports and food stock management.

Accessibility: The availability of foods to people and households, acquired from the market, through self-production or redistribution, influenced by income availability, market prices and food distribution infrastructure.

Utilization: The ability to use food to feed, nutrition education, health care status, water quality, and food diversity.

Stability: The ability to maintain the other three pillars over time, in the event of shocks including droughts, price surges and geopolitical events.

This four-pillar approach is a stringent tool to review the Indian fertilizer subsidy policy. A food security policy really needs to make a positive contribution in all four dimensions. This paper shows that India's subsidy programme is not performing well. It is strong in terms of its availability, but not so much so for the other three pillars.

4. WHAT THE POLICY HAS ACHIEVED: EVIDENCE OF SUCCESS

4.1 Food Grain Production

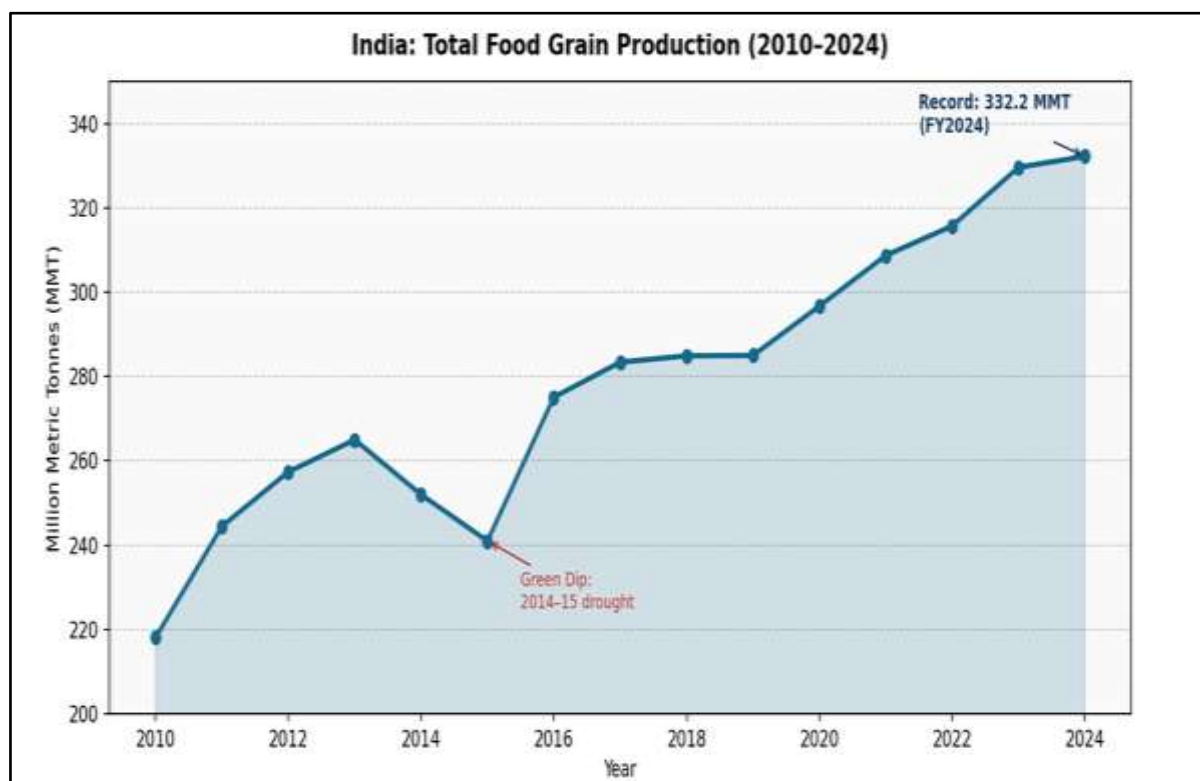


Figure 2: India's Total Food Grain Production, 2010-2024 (Million Metric Tonnes)

Sources: Ministry of Agriculture, Government of India; Statista (2024); Deccan Herald (2024)

Sustainable and impressive growth in food grain production is the most compelling argument for India's fertilizer subsidy. As seen in the Figure 2, total food grain production in India has increased by about 52 percent from 218.1 million metric tonnes (MMT) in 2010 to a record 332.22 MMT in FY2023–24 over a span of 14 years.

India's rice production stood at a record high of 137.82 MMT in FY23-24 compared to 135.75 MMT in FY22–23, and wheat production was 113.29 MMT. The volumes provide the foundation of India's agro-economic standing as one of the top agro-producers and exporters in the world. Most importantly, although the population has increased more than threefold since 1961, per capita food grain availability has increased in tandem, a true feat that could only have been achieved if the massive gains in food grain production with the Green Revolution and the decades thereafter had been driven by the use of huge amounts of fertilizer.

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

4.2 The Fertilizer-Production Correlation

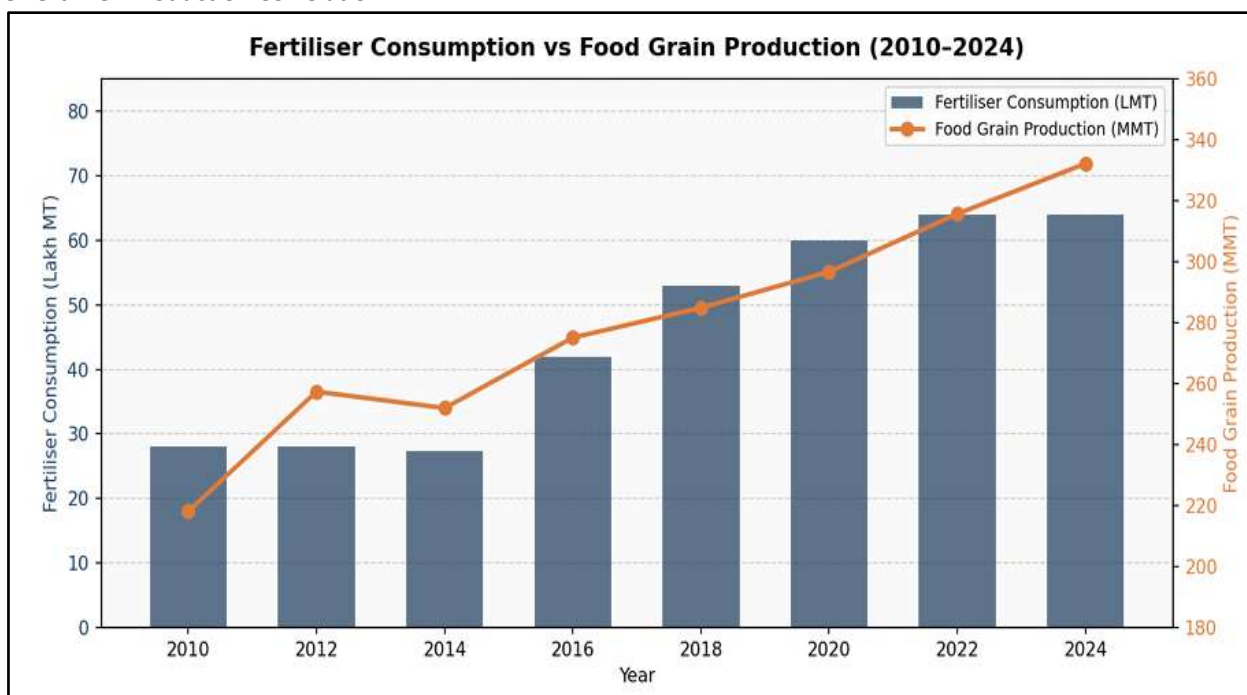


Figure 3: Fertiliser Consumption vs Food Grain Production, India (2010–2024)

Sources: ABC Live (2025); Ministry of Agriculture; Knowledge4Policy / Springer (2025)

The relationship between fertilizer use and food grain production has been largely demonstrated to be positively correlated (see Figure 3). Overall fertilizer consumption increased from roughly 28 lakh metric tons (LMPT) in 2010-2012 to 60-64 LMT in 2022-2024. This relationship is corroborated by academic research: the peer-reviewed journal *Springers' regional environmental change* (2025) shows the growth in food grains has been accompanied by similar increases in fertilizer use, allowing India to maintain its per capita level of food availability, even as its population has grown.

4.3 Price Stability and Farmer Cost Relief

The government has kept the urea MRP at the comparatively low rate of Rs. 242 per 45 kg bag (much the same price, since March 2018, compared to global urea prices that were over Rs. 4,000 per bag equivalent during 2022). This price protection has allowed farmers, especially small and marginal farmers, to be protected from a very large degree of input cost volatility to support farmgate profitability and buffer food prices in the downstream distribution chain through PDS under the Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY).

Government subsidies enable rural livelihoods in rain-fed, low productivity areas with few alternatives to income; they have also been a small contributor towards rural equity and poverty reduction; therefore, these outcomes are aligned with the National Food Security Act's welfare mandate.

4.4 Buffer Stocks and National Self-Sufficiency

Agricultural productivity, which is supported by fertilizer, was a central component of the development of food buffer stock reserves in India through the efforts of the Food Corporation of India (FCI). Food buffers are maintained with the use of strategic procurement of wheat and rice which allows for the maintenance of stability against potential disruptions due to either monsoonal failures or commodity shocks, and directly contribute to the "stability" of food security. The emergence from being a food deficit nation that received wheat shipments via the US PL480 program (from the US) in the 1960's to being a food surplus nation exporting food is one of the largest success stories of the early 21st century and fertilizer policy has played a significant role in achieving this.

5. CRITICISMS

5.1 Equity and Distributional Concerns

Equity is a key measure in assessing the fairness of any subsidy focused on welfare that is, who really benefits? India has about 146 million farm households, but they are stratified in terms of operational landholding size. The Agriculture Census 2015-16 shows that marginal (<1 hectare) and small farmers (1-2 hectares) make up 86.1% of all operational holdings, but only 47.3% of the area under cultivation (MoAFW 2017).

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

Through a price-support type of subsidy like that of India, the benefits received from this subsidy are directly proportional to the amount of the good consumed and that amount consumed is related to the size of the farm operation (i.e. larger farms consume more than smaller farms). In estimating the benefits of these subsidies, the World Bank (2022) estimates that approximately 29% of the total estimated value of the subsidy will be received by large farmers (>10 hectares), 33% by medium farmers (2-10 hectares), and approximately 24% by marginal and small farmers—the group the policy was intended to serve. The study also estimates that 14% of the total value of the subsidy will be lost due to leakages, including diversion for industrial use (using the subsidy to produce cheaper inputs for manufacturing explosives), bulk purchases by traders, and undocumented movement across borders (Gulati & Banerjee 2015). Hence, the structure of incidence of benefit distribution is regressive; the group that receives the largest benefit (in absolute dollars) is the group that has the least need for income support.

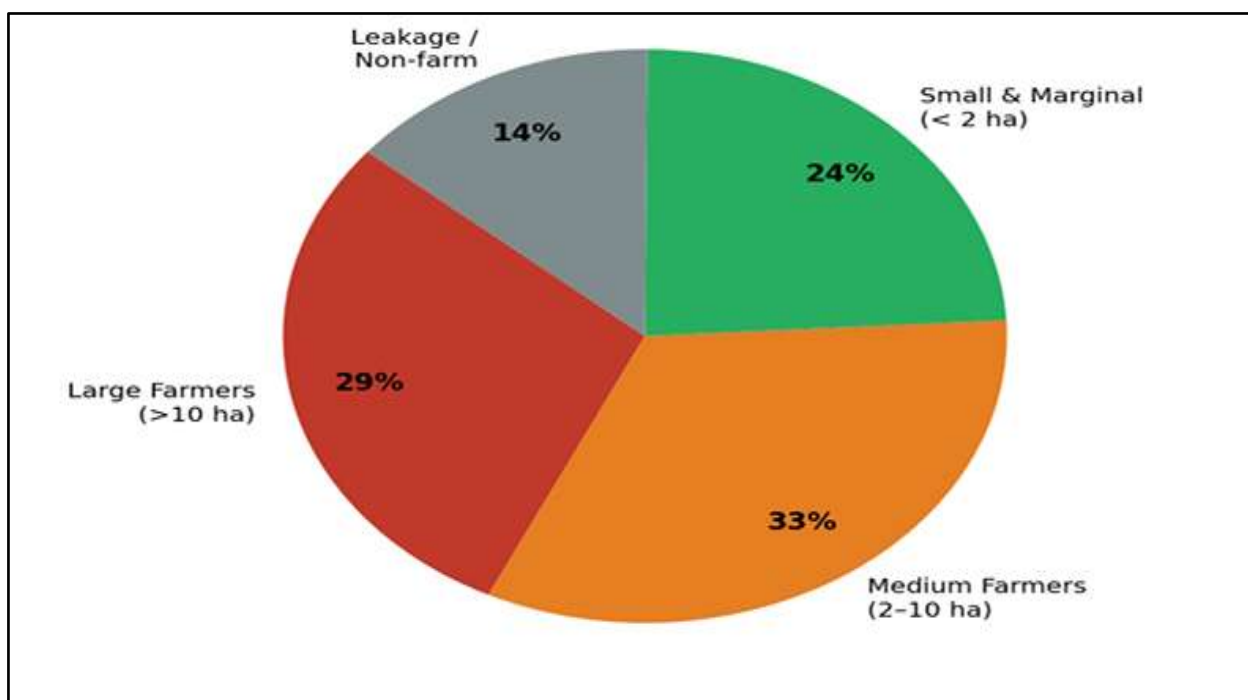


Figure 4: Distribution of Subsidy Fertilizer Benefits Across Farmer Categories (%)

Sources: World Bank (2022); Gulati & Banerjee (2023); OECD (2021)

In addition to the inequality of farm acreage, the geographic relationships of subsidies to crop production also follow the same trends. For example, Punjab and Haryana are two of India's richest states with year-round irrigation that use a much higher percentage of fertiliser subsidies than their population would suggest or any of their food insecure households. In contrast, rainfed states like Jharkhand, Odisha, and Rajasthan have higher rates of child malnutrition, but only receive lower percentages of fertiliser subsidies than their population.

The exclusion of tenant farmers from accessing formal fertiliser distribution systems because they do not own land is the primary reason that these farmers (who make up about 20% of the total agricultural area in India) are outside the "safety net," which is provided by the subsidy to primarily landowners.

5.2 Nutrient Imbalance and Agronomic Consequence

The economic distortion created by keeping the price of Urea artificially low has resulted in severe and well documented NPK imbalances across the country. This distortion has been exacerbated by the partial decontrol of P&K fertilizers under the NBS scheme. The Indian Council of Agricultural Research (ICAR) has suggested that a ratio is 4:2:1 for the application of N;P;K in order to produce healthy soils, the actual national average (4:2:1) has deteriorated significantly and is currently estimated at a ratio of approximately 8.2:3.2:1, demonstrating systematically excessive nitrogen usage compared to phosphorus and particularly potassium (ICAR 2021; FAI 2022).

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

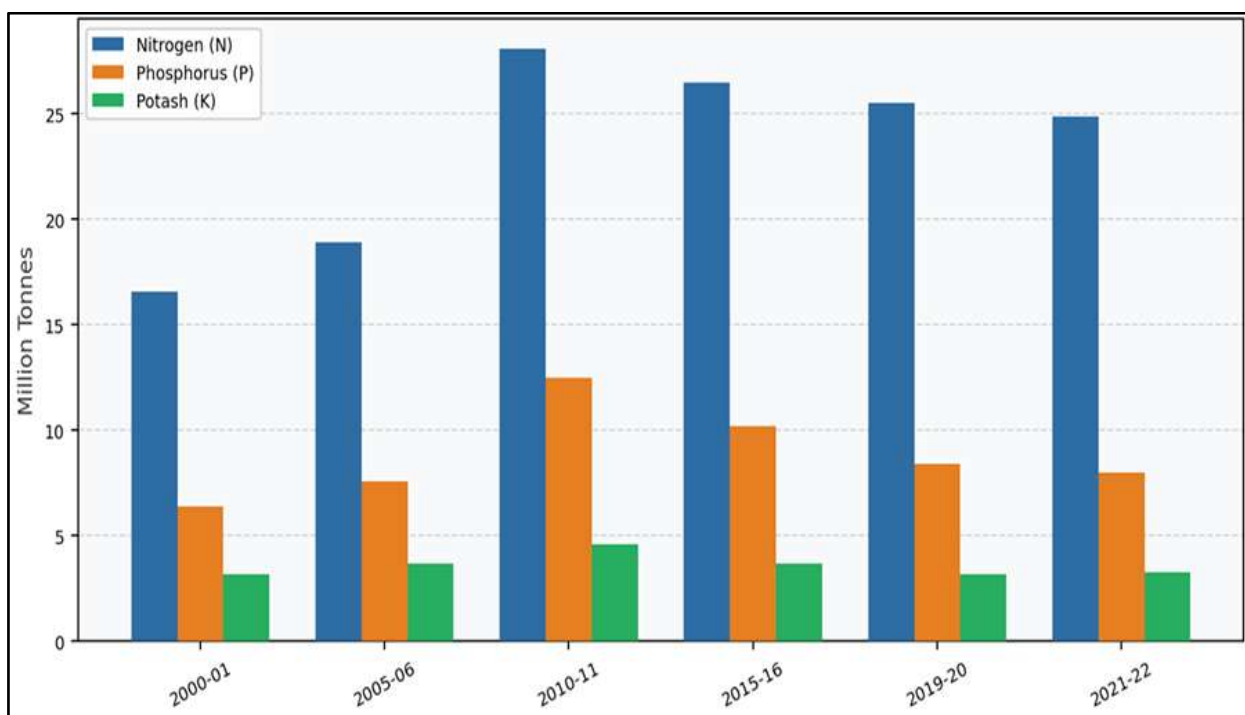


Figure 5: NPK Fertilizer Consumption - Nutrient Imbalance (Million Tonnes)

Sources: Fertiliser Association of India (FAI) Statistics (2022); FICCI (2022)

The agronomic impacts of these imbalances are widely recognized. Nitrogen that plants cannot utilize is lost through volatilisation (ammonia or nitrous oxide), leaching into ground water (elevating nitrates to well above the World Health Organization (WHO) standard of 50 mg nitrate-N/L in some districts) and by run-off into surface water (Mukherjee & Kathuria 2017); excessive nitrogen fertilization as a result of poor crop rotations, particularly when plants do not have sufficient potassium available, frequently reduces the drought tolerance and disease resistance of plants and leads to yield reductions that result in less than had been gained in the short term from the application of nitrogen (ICAR 2021). The work of Singh & Benbi (2018) in assessing rice-wheat cropping systems across the Indo-Gangetic Plain found that nitrogen use efficiencies (NUE), defined as kg grain produced for every kg N applied, were approximately 65 kg/kg in the 1980s and less than 35 kg/kg by 2015, the result being that the return on investment on urea has progressively decreased over time, to such an extent that farmers have reported that they cannot justify further investments in urea for their crop production.

Researchers from ICAR (2021) have concluded that, over the long term, poor soil health is prevalent across many of India's agricultural states in the form of 70% of soils exhibiting deficiencies in micronutrients such as zinc, boron and iron, as well as experiencing a decrease in organic carbon levels. Monocropping has greatly contributed to these declining conditions through the incentives provided by both fertilizer and Minimum Support Price (MSP) policies promoting the growing of rice and wheat. The long-term health conditions of the soil will have an immediate impact on maintaining today's current level of agricultural productivity; NITI Aayog (2020) estimates that; if remedial action is not taken immediately, the yield levels in the Indo-Gangetic plain will struggle to maintain their current levels of production, and possibly drop by 2030-35. This clearly undermines one of the pillars of food security which is stability.

5.3 Environmental Externalities

The impact of excessive fertilizer subsidies on the environment is extensive and can be categorised into three major environmental areas: greenhouse gases, groundwater depletion, and eutrophication of surface water. The agriculture sector contributes about 18.1% of GHG emissions to India, and there is currently no GHG emission with a greater growth rate than that produced by the use of fertilizer on agricultural land. It is estimated that between 2005 and 2022, the emission of nitrous oxide (N₂O) from fertilized soils in India's agricultural sector has grown by nearly 63% based on a calculation made using the IPCC's Climate Change 2022 report as a reference. N₂O has a global warming potential of approximately 265 times that of CO₂ over a 100-year time period; therefore, the rapid growth in N₂O emissions will have an enormous environmental impact.

Groundwater depletion is another result of excessive fertilizer subsidies and is related to fertilizer and groundwater use in Punjab and Haryana, which is a drought-prone region of India. The total quantity of groundwater extracted through the use of groundwater for irrigation purposes is about 28.3 billion cubic metres (BCM) per year, while the total volume of groundwater that

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

can be recharged to this aquifer is only about 18.4 BCM per year, hence it is expected that the current rate of extraction from this aquifer is not hydrologically sustainable within a period of 25 to 30 years (Central Ground Water Board [CGWB], 2022). The nexus of fertilizer subsidies, groundwater, and electricity subsidies (which enable unlimited quantities of water to be pumped from this aquifer for irrigated paddy) as well as the minimum support price (MSP) offered for paddy reward paddy production with excessive or unsustainable groundwater extraction and the provision of cheap urea makes growing paddy economically attractive. The challenges posed by excessive fertilizer subsidies are well documented in the literature (Shah, 2009; NITI Aayog, 2020).

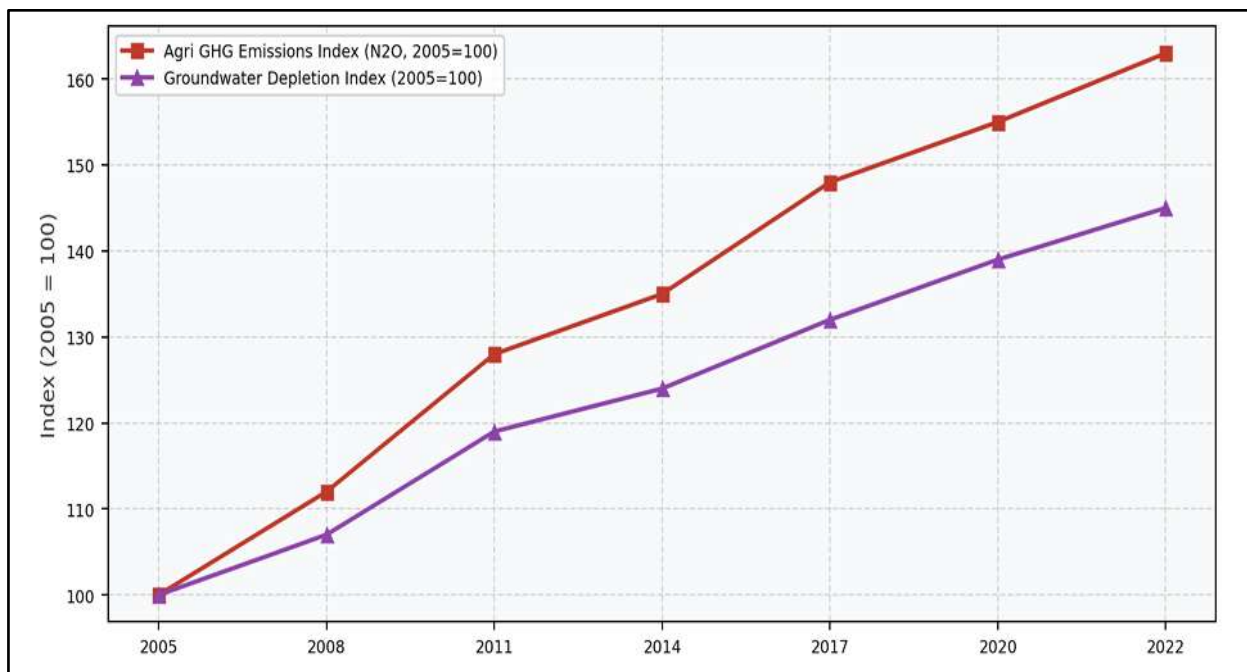


Figure 6: Environmental Pressure Indices from Fertilizer Overuse

Sources: IPCC (2022); Mukherjee & Kathuria (2017); Central Ground Water Board (2022)

Nitrogen runoff eutrophicates water bodies in the Ganga-Yamuna basin and coastal Odisha, resulting in harm to fisheries and ecosystems (Mukherjee and Kathuria, 2017). Negative externalities created by these externalities have not been included in calculating a subsidy for fertilizers; OECD (2021) estimates India's fertilizer policy has created ecological externalities worth USD 7.9 billion (approximately 14% of total 2019 fertilizer subsidy expenditure). Internalizing these costs lowers significantly to official estimates of the subsidy and net social benefits produced by the subsidy.

5.4 Fiscal Efficiency and Leakage

From a public financing perspective, the fertilizer subsidy incurs a significant opportunity cost. In FY2023-24, the INR 1,88,894 crore disbursed in subsidies far outweighed the combined allocation to the Ministry of Health & Family Welfare (INR 89,155 crore) and the Department of School Education (INR 68,804 crore). The Economic Survey (GoI, 2023) projects substantial net social welfare gains through addressing the market failures related to healthcare, education and roads rather than product markets by eliminating the fertilizer subsidy and reallocating proceeds to targeted welfare transfers and rural infrastructure.

Leakage estimates vary considerably; however, each references large amounts of inefficiency. The Comptroller and Auditor General's report (CAG, 2018), determined that 10-12% of subsidized urea was diverted for non-agricultural purposes or smuggled out of India to Bangladesh or Nepal, where their prices were higher. An earlier Tata Energy Research Institute (TERI) report (2004), indicated that total aggregate leakage (this includes over-reporting by manufacturers under RPS) was in the range of 18-21% of total subsidies expended. Although the implementation of more capable PoS and mFMS systems have likely decreased this leakage (NITI Aayog, 2016), the initial motivation for the DBT (Direct Benefit Transfer) initiative was to reduce leakage; NITI Aayog's simulations (2016) project that once fully implemented, DBT could save between INR 10,000-15,000 crore annually while better targeting smallholder farmers.

6. INTERNATIONAL COMPARISONS

Putting India's fertilizer subsidy in comparison with its peer economics offers good benchmarks. At 1.8 percent of agricultural GDP, India's fertilizer subsidy is highest among the major economic groups (OECD, 2021). China, frequently cited as a benchmark, has

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

supported a comparable amount historically but has been rationalizing its subsidies since 2010, transitioning from fertilizer price subsidy towards soil testing and balanced nutrition programs, and reducing its subsidy intensity to around 1.1 percent of agricultural GDP as of 2020 (FAO, 2023). Of importance is the fact that during the period from 2015 to 2020, China had a -5.8 percent decline in nitrogen fertilizer use and simultaneously maintained or improved its crop yields due to improved NUE. India has not followed a similar path (FAO, 2023).

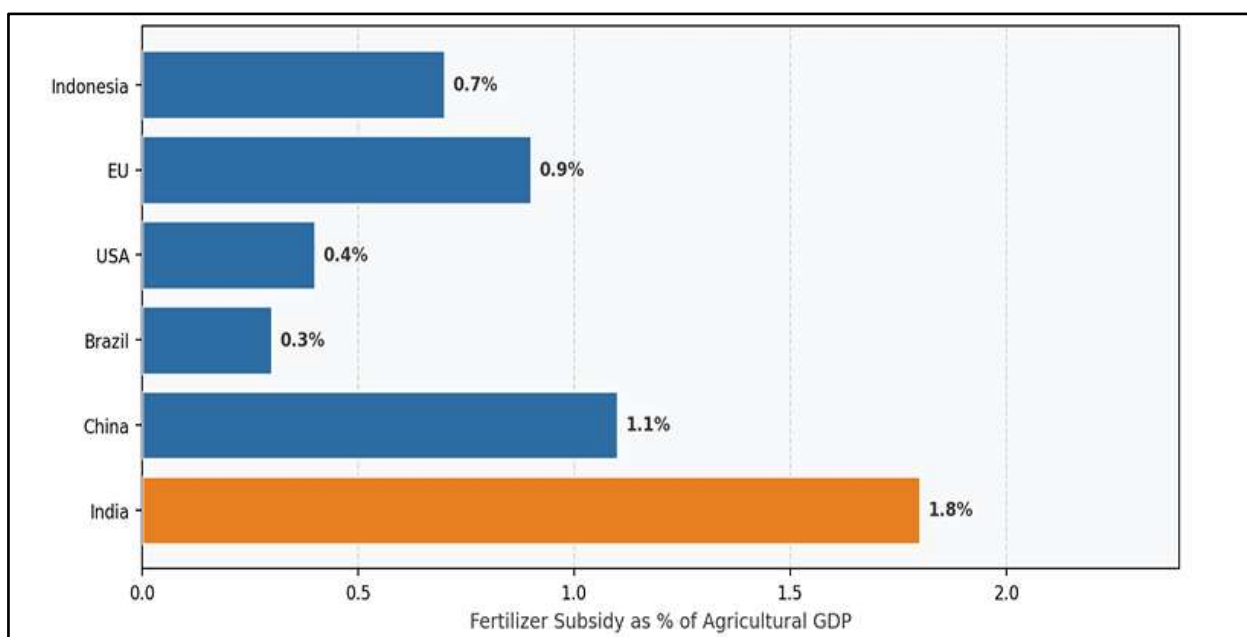


Figure 7: International Comparison - Fertilizer Subsidy as % of Agricultural GDP

Sources: OECD (2021); World Bank (2022); FAO (2023); Ministry of Finance, GOI (2024)

Indonesia's fertilizer subsidy reform in 2018 supports positive practice: Using targeted vouchers for registered smallholders instead of blanket price subsidies allowed for a 22 percent reduction of total subsidy spending while directing a higher percentage of the available subsidy to the food-insecure (World Bank, 2022). Brazil's complementary production support systems offer a moderate level of input subsidy along with both research investment (EMBRAPA), rural credit, and market access infrastructure leading to an agricultural economy with great diversification, without dependence on one heavily subsidized input (OECD, 2021). Europe has adopted a more environmentally focused approach to agricultural support: farm support will not occur without compliance with nutrient management, habitat, and soil conservation standards (European Commission, 2023).

The neighbouring economies of Bangladesh and Pakistan have similar agricultural conditions and have tried liberalising the price of fertilizers partially in each country. In Bangladesh, the government has implemented a targeted cash transfer scheme to assist farmers in purchasing fertilizers (starting in 2008). The result was improved equity in the distribution of fertilizers and a reduction in total fertilizer over-consumption by approximately 15% in the first three years with no significant change in yields (IFPRI, 2018). The various examples of these types of programs confirm that there is no need for high levels of undifferentiated price subsidies to achieve food security. By providing more targeted and/or environmentally based assistance, food security can be achieved with much lower fiscal costs than from the use of price subsidies.

7. POLICY IMPLICATIONS AND RECOMMENDATIONS

The analysis above shows that while India's fertiliser subsidy partly contributes to food security through production/availability, it also has major negative effects which detract from India's ultimate goal of food security. Based on the studies reviewed, the recommendations for further policy reform are as follows:

7.1 Extend Nutrient-Based Subsidy (NBS) to Urea

The largest reform regarding structure that can be created is that urea should be included in the NBS framework and not linked to the fixed Maximum Retail Price, but that a subsidy be put in place on nitrogen in urea per kilogram of nitrogen which is neutral across all fertilizer types. Consequently, there would be less incentive for farmers to over-apply nitrogen, the relative ratio of the NPK would rebalance over the long-term, and the amount of nitrogen lost from non-agriculture uses would be reduced. Phased-

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

in over a period of 5 – 7 years and with compensatory cash transfers made to farmers during the transition phase for income support, this will help facilitate the adjustment process.

7.2 Scale and Strengthen Direct Benefit Transfer (DBT)

Currently, India is transitioning its fertilizer program to a partial DBT (Direct Benefits Transfer) set-up which subsidies transferred from the post-sale manufacturer to company through point of sale (PoS) biometric authentication. The standing committee on chemical & fertilizers 2020 has repeatedly recommended DBT be made towards per unit direct transfer to farmers account, with the intention of removing the manufacturer(s) from receiving producer subsidy (or manufacturer subsidies) allowing for better targeting of subsidies; generating granular data on actual fertilizer usage at farm level / an additional benefit of reduced manufacturer capture of subsidies. The JAM (Jan Dhana – Aadhaar – Mobile) infrastructure and bolstered JAM program makes 4x easier to administer today than any other time in our history.

7.3 Accelerate PM-PRANAM and Promote Alternative Fertilizer

As of August 2024, the Prime Minister's (PM) Program for Restoration, Awareness, Nourishment, and Amelioration of Mother Earth (PM-PRANAM) provides incentives for state governments to decrease their consumption of chemical fertilizers by converting 50% of their subsidy savings into a grant from the state government. In order for this mechanism to work well and be effective, the following actions will also be required: (i) Large-scale production of nanoparticles-based fertilizers (Nano-Urea and Nano-DAP) — liquid formulations that can provide sufficient nutrients with significantly less fertilizer usage as compared to conventional fertilizers; (ii) establishment of 10,000 planned Bio-Input Resource Centres; and (iii) Integration of the recommendations from the development of Soil Health Cards into the Direct Benefit Transfer (DBT) Approval Process, thereby ensuring that payments or subsidies for fertilizers will be based on the requirements of soil health.

7.4 Shift from Input to Income Support: PM-Kisan Integration

The government of India must shift gradually from the broad-based fertilizer price subsidies to direct cash transfers to farmers via an expanded PM-KISAN initiative. The current system of farm input subsidy keeps the prices of fertilizers at an artificially low level, resulting in overconsumption of urea and benefiting primarily the bigger farmers. Direct cash transfers will allow the prices of fertilizers to reflect market costs, thereby giving farmers more flexibility in terms of how to spend their money on fertilizers, seeds, irrigation, and soil improvement.

With the integration of Soil Health Cards, DBT and PM-PRANAM, there is a potential for better utilization of fertilizers and reduction of urea consumption, besides limiting fertilizer leakages. This would further bolster the targeting of government expenditure as small farmers would benefit greatly from direct cash transfers. The transition to this solution will take time and will ensure proper protective measures against rapid increase of fertilizer prices, providing proper support to farmers. Overall, such transition will boost farmers' wellbeing as well as resource efficiency and food security in the long run.

7.5 Address the Food Security–Nutrition Disconnect

Simply improving fertilizer policy will not fix India's problems with hunger and malnutrition. The Global Hunger Index (GHI) indicates that there is a disconnect between how much food is produced in aggregate and how much food provides nutrition security to households. It will be necessary to pay additional attention to our public health system; increase the level of fortification of PDS (Public Distribution System) food (especially with nutritious food such as pulses, millets, and oil that are less subsidized than wheat and rice); empower women and elevate their awareness of nutrition; improve wage growth in the villages; and expand access to the Mid-Day Meal Scheme and anganwadi services for children and mothers.

7.6 Reduce Import Dependency and Geopolitical Vulnerability

Because of India's 100% reliance on imported potash, about 60% reliance on imported DAP (Diammonium Phosphate), and the consumption of liquefied natural gas (LNG) to manufacture fertilizers, the Indian agricultural sector is vulnerable to fluctuations in the prices of these commodities in the international marketplace. In response, India can take a number of actions including: secure long-term bilateral agreements for fertilizer imports from a larger pool of international suppliers; accelerate the development of domestic production capabilities for DAP fertilizer; invest in precision fertilizer application technologies to reduce total fertilizer usage per unit of agricultural output; and, establish a strategic reserve of fertilizers, modeled after the petroleum industry's strategic oil reserve.

8. CONCLUSION

India's fertilizer subsidy program is an important policy tool for supporting agriculture; it helped shift India from being a food deficient country to having some of the best food surpluses that we will ever see in only a period of 60 years. The transition to being able to produce large amounts of rice and wheat (332.22 million metric tonnes of food grains in FY2023-24) was possible

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

because of the supply of subsidised fertiliser, especially urea, which played a critical role in supporting the Green Revolution and subsequent periods of increased productivity.

Despite this very compelling evidence of the important outcomes that have occurred due mainly to this policy, the evidence leads one to conclude that the policy has only partially achieved its stated goal of providing adequate food security; only in the sense of being able to provide sufficient production/availability of food and failing significantly on accessibility, utilisation and stability of food. 13.70% of the population of India are undernourished; the rate of child wasting is at 18.70% (the highest in the world); the ratio of NPK (nitrogen, phosphorus & potassium) being applied to the crop is distorted using a ratio of 10.9:4.4:1 instead of the recommended 4:2:1; there is up to 30% of the subsidised urea that is being diverted away from agricultural production; and the fiscal burden of the fertiliser subsidy has crowded out other complementary agricultural investments. Therefore, the policy, as it currently exists, is neither efficient nor comprehensively effective.

The course of change to improve Indian farmers' economic viability, through expanded Direct Benefit Transfers (DBT), PM-PRANAM, Nano Urea, Soil Health Cards, and the introduction of NBS for P&K; is trending positively. However, fully integrating urea within the framework of a Balanced Nutrient System while shifting the base support payments supporting urea from a price to a direct transfer to individual farmers remains politically contentious and administratively burdensome. The 2020-21 farmer's protests and subsequent repeal of the 2021 farm laws illustrate the sensitivity to political ramifications of reforming the product pricing structure.

Achieving true food security for all 1.4 billion people in India requires much more than reforming the fertilizer subsidies, it requires a complete reorientation from a focus on maximising production at a national level, to producing healthy food intake at the household level; agricultural input subsidisation to income security for farmers; and relatively short-term political economic motivations for producing food to produce food sustainably (soil health & agro-ecologically). The fertilizer subsidy as currently constructed can be viewed as one tool to achieve food security, but is a necessary and insufficient tool to achieve the final goal. To answer the central question of the paper; India's fertilizer subsidy will main to achieve its stated goal of food security to a diminishing extent on each of the 3-dimensions important to an individual: availability, access, nutrition and stability, robustly on "availability" but diminishingly on the other dimensions (access, nutrition and stability).

REFERENCES

- 1) Alagh Committee. (2001). *Report of the Expenditure Reforms Commission on Fertilizer Subsidies*. Government of India.
- 2) Business Standard. (2024, July 23). Union Budget 2024: Govt slashes food, fertiliser, and fuel subsidy bill. Business Standard. Retrieved from https://www.business-standard.com/budget/news/union-budget-2024-govt-slashes-subsidy-bill-for-food-fertiliser-and-fuel-124072301364_1.html
- 3) Central Ground Water Board (CGWB). (2022). *Dynamic Ground Water Resources of India 2022*. <https://cgwb.gov.in>
- 4) Concern Worldwide & Welthungerhilfe. (2024). *Global Hunger Index 2024*. <https://www.globalhungerindex.org>
- 5) Department of Fertilizers. (2024). *Annual Report 2023–24*. Ministry of Chemicals and Fertilizers, Government of India. <https://fert.nic.in>
- 6) Department of Fertilizers. (2025). *Union Budget and Fertilizer Subsidy Statistics*. <https://fert.nic.in>
- 7) FAO. (1996). *Rome Declaration on World Food Security and World Food Summit Plan of Action*. <https://www.fao.org/3/w3613e/w3613e00.htm>
- 8) FAO. (2009). *Declaration of the World Summit on Food Security*. https://www.fao.org/fileadmin/templates/wsfs/Summit/Docs/Final_Declaration/WSFS09_Declaration.pdf
- 9) FAO. (2023). *The State of Food Security and Nutrition in the World 2023*. <https://www.fao.org/publications/sofi>
- 10) Fertiliser Association of India (FAI). (2022). *Fertilizer Statistics 2021–22*. <https://www.faidelhi.org>
- 11) Food Corporation of India (FCI). (2023). *Buffer Stock Position Reports*. <https://fci.gov.in>
- 12) Gulati, A., & Banerjee, P. (2015). *Rationalizing Fertilizer Subsidy in India: Key Issues and Reform Options*. Indian Council for Research on International Economic Relations (ICRIER). <https://icrier.org>
- 13) ICAR. (2021). *State of Indian Agriculture and Soil Health Assessments*. Indian Council of Agricultural Research. <https://icar.org.in>

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

- 14) IFPRI. (2018). *Bangladesh Fertilizer Subsidy and Cash Transfer Reform Studies*.
<https://www.ifpri.org>
- 15) IPCC. (2022). *Climate Change 2022: Mitigation of Climate Change*.
<https://www.ipcc.ch/report/ar6/wg3>
- 16) Kumar, P., Kumar, A., & Joshi, P.K. (2019). *Agricultural Growth and Productivity in India*. Academic Foundation.
- 17) Ministry of Agriculture & Farmers Welfare (MoAFW). (2023). *Agricultural Statistics at a Glance 2023*.
<https://agriwelfare.gov.in>
- 18) Ministry of Chemicals & Fertilizers. (2012). *Nutrient Based Subsidy Policy for Fertilizers*.
<https://fert.nic.in>
- 19) Ministry of Chemicals & Fertilizers. (2024). *Direct Benefit Transfer in Fertilizers*.
<https://fert.nic.in/page/direct-benefit-transfer>
- 20) Ministry of Finance, Government of India. (2024). *Economic Survey 2023–24*.
<https://www.indiabudget.gov.in/economicsurvey>
- 21) Mukherjee, A., & Kathuria, V. (2017). Fertilizer use, groundwater contamination and environmental externalities in India.
<https://link.springer.com>
- 22) NITI Aayog. (2016). *Evaluation Study on Fertilizer Subsidy Reforms and DBT*.
<https://www.niti.gov.in>
- 23) NITI Aayog. (2020). *Strategy for New India @75: Agriculture Sector*.
<https://www.niti.gov.in>
- 24) OECD. (2021). *Agricultural Policy Monitoring and Evaluation 2021*.
<https://www.oecd.org/agriculture/topics/agricultural-policy-monitoring-and-evaluation>
- 25) Pingali, P.L. (2012). Green Revolution: Impacts, limits, and the path ahead.
<https://www.pnas.org/doi/10.1073/pnas.0912953109>
- 26) Pingali, P., Aiyar, A., Abraham, M., & Rahman, A. (2019). *Transforming Food Systems for a Rising India*. Palgrave Macmillan.
<https://link.springer.com/book/10.1007/978-3-030-14409-8>
- 27) PMFIAS. (2025). *Fertilizer Subsidy and NPK Imbalance Notes*.
<https://www.pmfias.com>
- 28) Press Information Bureau (PIB), Government of India. (2025, August). Fertilizer Sector: Production, Subsidy and Reforms. Ministry of Chemicals and Fertilizers. <https://www.pib.gov.in/PressNoteDetails.aspx?NotelId=154966&ModuleId;=3>
- 29) Rawal, V., & Saha, P. (2015). *Tenancy and Agricultural Land Relations in India*.
<https://www.cprindia.org>
- 30) Shah, T. (2009). *Taming the Anarchy: Groundwater Governance in South Asia*. Routledge.
- 31) Sharma, V.P. (2011). *India's Fertilizer Policies: Retrospect and Prospect*. Indian Institute of Management Ahmedabad.
<https://www.iima.ac.in>
- 32) Singh, Y., & Benbi, D.K. (2018). Nitrogen use efficiency in rice–wheat systems of the Indo-Gangetic Plains.
<https://link.springer.com>
- 33) Swaminathan, M.S. (2010). *From Green Revolution to Evergreen Revolution*.
<https://www.mssrf.org>
- 34) World Bank. (2022). *India Agriculture and Food System Review*.
<https://www.worldbank.org/en/country/india>
- 35) World Bank. (2023). *World Development Indicators*.
<https://data.worldbank.org>
- 36) World Bank Commodity Markets Outlook. (2022). *Commodity Markets Outlook, October 2022*.
<https://www.worldbank.org/en/research/commodity-markets>
- 37) World Health Organization (WHO). (2022). *Guidelines for Drinking-water Quality*.
<https://www.who.int/publications/i/item/9789240045064>
- 38) Deccan Herald. (2023). Subsidy bill shoots up in 2023-24 to Rs 5.62 lakh crore. Deccan Herald.
<https://www.deccanherald.com/business/union-budget/subsidy-bill-shoots-up-in-2023-24-to-rs-562-lakh-crore-1186847.html>
- 39) Deccan Herald. (2024). India's foodgrain production hits record 332.22 million tonne in 2023–24. Deccan Herald

To what extent does India's fertilizer subsidy policy achieve its stated goal of ensuring food security?

- 40) <https://www.deccanherald.com/business/economy/indias-foodgrain-production-hits-record-33222-million-tonne-in-2023-24-government-3205965>
- 41) Statista / DES India. (2024). Production volume of food grains in India from financial year 2010 to 2023, with estimates for 2024. <https://www.statista.com/statistics/1140261/india-production-volume-of-food-grains/>
- 42) Explained:India's Fertilizer Utilization and Foodgrain Growth. (2025, July 20). Abclive.in.<https://abclive.in/2025/07/20/india-fertilizer-utilization/>
- 43) Gulati, A., & Banerjee, P. (2015). *Rationalising Fertiliser Subsidy in India: Key Issues and Policy Options*. ICRIER Working Paper No. 307. <https://icrier.org/publications/rationalising-fertiliser-subsidy-in-india-key-issues-and-policy-options/>
- 44) Federation of Indian Chambers of Commerce & Industry (FICCI). (2022). *Balanced Nutrition for Soil Health: Challenges and Way Forward*. New Delhi: FICCI.
- 45) International Panel on Climate Change (IPCC). (2022). *Climate Change 2022: Mitigation of Climate Change Contribution of Working Group III to the Sixth Assessment Report*. Cambridge: Cambridge University Press



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.