Designing and Implementing Fertilizer Subsidy Programs

By: Carly Trachtman

FSP Best Practices 11
March 2026

A best practice is a method or technique that has been generally accepted as superior to any alternatives because it produces results that are superior to those achieved by other means or because it has become a standard way of doing things. This document is one of a series of reports from the Food Security Portal on best practices for emerging topics in agriculture and food security policy.

Introduction

Domestic agricultural production, including production by smallholder farmers, is a key contributor to the domestic food supply in many low-income countries (Fanzo, 2017). To achieve the yield thresholds necessary to keep domestic food supplies and prices stable, these farmers require reliable access to agricultural inputs, including fertilizer. However, fertilizer prices have been both volatile and high over the past 6 years due to global events such as the COVID-19 pandemic, the war in Ukraine, and escalating tensions in Iran (Vos et al., 2025). High and volatile prices limit access to fertilizer, especially for smallholder farmers who can face significant liquidity constraints at the period of the season in which fertilizer needs to be applied (Melkani et al., 2025).

In the face of major price shocks, governments often intervene by subsidizing the price of fertilizers. While subsidy programs may play an important role in protecting livelihoods and ensuring a steady food supply, however, they should be designed and implemented with caution. Price subsidies are distortionary, decreasing the cost of fertilizer beyond the price that the market would otherwise dictate. This can lead to fertilizer overuse (Kurdi et al., 2020), which has negative environmental externalities. Excessive nitrogen application, for example, results in runoff that can contaminate local water supplies with nitrates (Craswell, 2021). Additionally, lowering the input costs of domestic agricultural exports can artificially improve a nation's competitiveness on the global market, requiring caution to ensure that subsidy policies do not violate World Trade Organization (WTO) rules regarding trade-distorting support (Amaglobeli et al., 2024).

At the domestic level, subsidies may "crowd out" private sector investments in the fertilizer market, as private retailers find it impossible to compete with government-backed pricing, thereby stunting the long-term development of a robust, independent fertilizer market infrastructure (Xu et al., 2009). Moreover, the price disparity between subsidized and market-rate fertilizer creates a lucrative environment for fraud and arbitrage; anecdotally, in many settings, individuals buy up large quantities of subsidized stock only to smuggle it across borders or resell it in other markets for a significant profit (Kaushik, 2025).

Given these complexities, in this brief, we will discuss best practices for the design and implementation of fertilizer subsidy programs. Careful policy design choices ensure that subsidies maximize the tangible benefits to farmers, namely yield stability and income protection, while implementing safeguards that minimize negative environmental, market, and fiscal side effects.

Targeting and Registering Beneficiaries

Choosing Beneficiaries: Universal vs. Targeted

A foundational challenge of any subsidy program is the selection of beneficiaries. Policymakers must decide between a universal price subsidy, in which the discounted rate is theoretically available to all, or a targeted approach restricted to specific individuals. Universal programs allow policymakers to forgo the administrative costs associated with selecting and monitoring beneficiaries. However, given budget constraints, the actual quantity of fertilizer available at the subsidized price is finite, and hence "universal" rarely equates to "ubiquitous." Without explicit targeting, the supply is often exhausted by those with the most social capital or logistical proximity to distribution points, effectively creating a potentially inequitable form of targeting (Ricome et al., 2024; Trachtman and Hill, 2025).

A deliberate targeting strategy allows for beneficiaries to be chosen strategically based on the program's primary objective. If the goal is a rapid increase in national food supply, the program can target highly productive farmers who possess the land and labor needed to turn additional inputs into significant yield gains. If the program has a social protection objective, it can instead target the poorest and most vulnerable farmers. However, in practice, identifying appropriate targets can be challenging. Measuring "potential productivity" or "exact income" can be expensive, or even impossible, in low-income country settings; in these cases, relying on more cheaply observable welfare proxies can be prudent. Productive farmers can be identified through larger land holdings or existing membership in agricultural cooperatives, while poor farmers can be targeted based on smaller landholdings or other traditional welfare proxies.

Potential Barriers to Program Participation

Even in programs labeled "universal," practical hurdles may serve as a form of informal screening. Paying attention to these hurdles and who might be unintentionally being excluded allows policymakers to ensure subsidies are actually reaching intended beneficiaries. For example, even requirements, like identity verification, that aim at helping program implementers track purchases and prevent the fraudulent resale of inputs can exclude farmers who do not have a formal government identification number or card.

The choice of distribution channel also shapes who receives the benefit. For instance, governments in countries like Ethiopia, Nepal, and Zambia use existing networks of agricultural cooperatives to distribute subsidized fertilizer. Distribution through cooperatives leverages local enforcement and "on-the-ground" knowledge to ensure that fertilizer goes to genuine farmers. However, this model is highly dependent on the quality of local cooperative governance; it can easily be compromised by local politics (Tefera et al., 2017). Moreover, in some settings, farmers may need to pay in order to join a cooperative, which may exclude poorer farmers (Blekking et al., 2021).

Many nations are now streamlining subsidy targeting and delivery by integrating these programs with comprehensive farmer registry databases that link a farmer's ID to their land holdings and information about the types of crops they cultivate. Asking individuals to join a farmer registry in order to receive benefits provides some screening, ensuring that applicants are active farmers and providing some indication of how much fertilizer they might need for their chosen crop and land area. Yet these sophisticated systems can also inadvertently exclude the most marginalized. For example, digital registries often require phone or internet access in order to register. Potential beneficiaries must either own a phone or be able to sign up with the help of a phone-owning friend or local development agent. Some programs even offer the subsidies themselves as "eVouchers" delivered via SMS message, meaning that a phone is also needed to retrieve the subsidized fertilizers at the distribution point or point of sale. These features could exclude those who are less digitally or socially connected.

Additionally, some fertilizer subsidy programs, such as those in Egypt and Morocco, require farmers to provide official documentation that they can legally cultivate the land they claim (such as a land title or rental agreement). While this can again help programs screen out individuals who are not farmers, it also may exclude farmers who lack formal land documents. Similarly, "voucher-for-deposit" schemes, in which a farmer must pre-pay their share of the fertilizer price into a bank account and receive a voucher to redeem for the input at a distribution point/point of sale, can screen out those with low financial literacy or a fundamental mistrust of institutional banking.

For these reasons, best practices suggest a hybrid approach: While features like digital registries provide the most robust tracking data and fraud protection, they must be supplemented with policy sensitization efforts and accessible, locally appropriate, in-person registration options to ensure that these features do not exclude intended beneficiations.

Types of Fertilizer and Inputs to Subsidize

Chemical Fertilizers

Another critical policy design choice is which types of fertilizer should be subsidized. Historically, large-scale subsidy programs in low-income countries have provided inorganic fertilizers, which are various blends of the primary macronutrients: Nitrogen (N), Phosphorus (P), and Potassium (K). The optimal choice of which blend(s) to subsidize will depend on the crop, agroecology, soil types, and farmers' current growing practices, which all affect the fertilizer's impact on yields (Ichami et al., 2019). Moreover, if a program chooses to subsidize an unfamiliar fertilizer type, additional agricultural extension efforts to teach farmers how to adapt their practices will likely be needed to ensure correct application.

Soil Testing and Soil Health

The fertilizer blend that will increase a farmers' yields most may be highly localized, depending on the nutrients the farmer's soils lack. Traditional subsidy programs tend not to subsidize highly localized fertilizer blends, in part due to a lack of diagnostic data. To transition toward more sophisticated "best practices," subsidies could be integrated with soil-testing services, offering each farmer subsidies for the optimal type and quantity of fertilizer based on their land. Providing farmers with specific recommendations helps ensure they do not over-apply nutrients—a practice that is both economically wasteful and environmentally harmful.

Furthermore, policymakers must confront the reality that chemical fertilizers alone can be detrimental to long-term soil health. For instance, the heavy application of nitrogen-based fertilizers can lead to soil acidification over time (Jolley and Pierre, 1977), which eventually locks out other nutrients and kills beneficial soil microbes (Naz et al., 2022). To mitigate these effects, fertilizer subsidy programs can also subsidize additional soil amendments like lime or dolomite alongside chemical inputs to balance soil pH. Kenya's 2026-2027 fertilizer subsidy program, for instance, plans to avail 40,000 metric tons of agricultural lime to counteract the legacy of soil degradation (Kenya National Treasury, 2026).

Ultimately, the effectiveness of any chemical fertilizer is limited by the physical and biological health of the soil, including its organic matter content and cation exchange capacity (Burke et al., 2019). In highly degraded soils, chemical nutrients may fail to improve yields. While historically, agricultural development interventions focused almost exclusively on promoting chemical fertilizers based on their immediate returns, a balanced approach is required for maintaining soil health in the longer term. Best practices involve promoting organic and bio-organic fertilizers in tandem with inorganic ones. By subsidizing a mix that supports both immediate yield gains and the long-term biological integrity of the soil, subsidy program implementers can ensure their agricultural investments remain productive for generations to come.

Subsidy Distribution Mechanisms

The logistical architecture of a subsidy program, which determines the mechanism by which the input moves from the point of procurement to the farmer's field, is critical to the program's success. In most large-scale subsidy programs, the program implementer procures the fertilizer, either from domestic manufactures (when possible) or via large-scale international tenders. The challenge

then lies in the "last-mile" delivery, ensuring that both the physical product and the price discount reach the intended beneficiaries without being siphoned off by intermediaries.

Government-Led vs. Private Sector Integration

A primary design choice involves the degree of state involvement in the distribution supply chain. A fully government-run channel involves the state managing the entire logistics network: procuring the fertilizer, transporting it to local government depots or state-connected cooperatives, and selling it directly to farmers at the subsidized rate. While this offers the government maximum control over both the stock and the monitoring of recipients, it can lead to "crowding out" of the private sector. By monopolizing the market, the state can inadvertently stunt the growth of local agricultural retailers and distributors, leaving the country without a resilient private market infrastructure should the government end their subsidy program.

To avoid this, many "best practice" models incorporate the private sector in the distribution and retailing of fertilizer. How this is done will depend on where in the value chain the subsidies are introduced. One option is for a program implementer (usually the government) to provide financial incentives directly to domestic fertilizer producers or large-scale importers. The goal is to lower the final cost of the fertilizer, with the expectation that this discount is passed through to the final consumer. This approach may be appropriate when a secondary goal is to stimulate growth in the domestic fertilizer industry. However, its success depends heavily on market competition; if a few suppliers hold significant market power, they may fail to transmit the full discount to farmers, leading to incomplete price "pass-through" (Weyl and Fabinger, 2013). To combat this, governments often complement supplier subsidies with Maximum Retail Price (MRP) regulations, which stipulate the maximum price consumers can legally be charged for subsidized inputs. Ensuring that retailers stick to the MRP when fertilizer is in high demand is often difficult, however, and requires enforcement capacity that program implementers may not have. Hence, in some contexts, farmers report being regularly charged above the MRP, without much recourse (Putra and Harahap, 2025).

Alternatively, a program implementer could directly subsidize the farmer at the time of purchase. This "pull-side" approach requires the supplier to pay the full market price initially. The implementer only reimburses the retailer for the subsidy amount after a verified sale to a registered farmer is completed. This system shifts the power dynamic in favor of the buyer, as the supplier cannot access government funds without a successful, documented transaction with a legitimate beneficiary. At the same time, this model demands extensive record-keeping and a digital or physical infrastructure capable of verifying beneficiary status at the point of sale, often through electronic vouchers or biometric IDs. While government distribution points might have built-in tracking for program beneficiaries, private sector participation requires the state to provide retailers with the tools to verify eligibility in real time.

Ultimately, the distribution mechanism must be a pragmatic choice that weighs the program's goals against the existing capacity of the national government and the maturity of the local private market.

Political Concerns and Fiscal Sustainability

Choosing Subsidy Amounts

The long-term viability of fertilizer subsidy programs is frequently threatened by their immense fiscal burden, with many national governments spending between 2-3 percent of their annual GDP on energy and agricultural subsidies alone (Bachas et al., 2023). This massive expenditure creates a profound opportunity cost, potentially diverting funds from other critical sectors. A primary lever for fiscal control is the determination of the subsidy rate—the specific fraction of the market price the subsidy implementer covers. Because fertilizer is a "normal good," demand increases as the subsidy increases, which in turn increases the total fiscal outlay and the magnitude of market distortions.

To optimize the impact of this spending, policy designers must think about the "marginal farmer": the individual who would otherwise forgo profitable fertilizer use at market rates but will adopt it at the subsidized price. The objective is to provide a discount deep enough to trigger this behavioral change without over-subsidizing farmers who would have purchased the input regardless. Methods to contain these costs include capping benefits per household or tying the total subsidy amount to verifiable landholding data and planned cultivation behaviors. If the primary goal is social protection, then with a fixed subsidy budget, it is often more fiscally sustainable to provide a much larger subsidy to a smaller, more strictly targeted share of the population rather than a shallow discount to everyone.

Subsidy Program Duration

The temporal design of the program is also essential for sustainability. Ideally, fertilizer subsidies should not be permanent fixtures of the national budget. One major economic rationale for their implementation is to overcome risk aversion among farmers who may be hesitant to invest in modern inputs without firsthand experience of their benefits. In this "learning-by-doing" framework, the subsidy should be temporary, lasting only a few seasons until farmers become sufficiently informed about the yield gains to make their own cost-benefit comparisons at full market prices (Carter et al., 2021). Alternatively, subsidies can be designed as contingent stabilizers aimed at shielding farmers from sudden global price shocks. In these instances, the intervention should also be short-lived, only being implemented during price spikes to cover the difference between the standard market price and the new, elevated cost. The difficulty then lies in the exit strategy. It is often challenging for policymakers to distinguish between a temporary price shock and a "new normal" in global markets. A gradual tapering of benefits—when the subsidy percentage decreases over time—can help ease the transition and allow farmers to adapt to higher long-run costs.

Political Concerns

Finally, policy designers should be aware of additional political factors that may shape which policy options are realistically feasible. Fertilizer subsidy benefits are often highly visible and popular among constituents (Hill and Resnick, 2025), making them susceptible to strategic use by politicians to meet political objectives that may not align with stated policy objectives or fiscal prudence (Mason et al., 2017). Transparent, data-driven targeting rules and implementation protocols may help programs maintain their technical integrity in the face of fluctuating political pressures.

Conclusion

In summary, fertilizer subsidies represent a complicated policy instrument. While they serve as potentially powerful tools to bolster national food security, improve smallholder livelihoods, and build resilience against global price shocks, their efficacy is entirely dependent on the rigor of their design. A poorly structured program risks creating significant market distortions, fiscal instability, and environmental degradation that could outweigh any short-term gains in agricultural productivity. By adhering to best practices—such as implementing precise, objective-driven targeting, utilizing diverse distribution channels that may involve the private sector, and ensuring a balanced nutrient profile that respects long-term soil health—governments can maximize the social and economic returns of these massive public investments.

However, it is vital to recognize that fertilizer subsidies should fundamentally be viewed as short-term, transitional policies rather than permanent fixtures of the agricultural landscape. For governments seeking to achieve the same objectives with fewer distortions, alternative pathways should be explored. If the goal is a sustained increase in production, investments in agricultural training, real-time weather information, and improved market infrastructure may yield more robust results over time. If the primary goal is social protection, direct cash grants can often provide more efficient relief to vulnerable populations without interfering with commodity markets.

Despite these alternatives, fertilizer subsidies remain highly popular and are unlikely to disappear from the policy toolkit in the near future. Therefore, the path forward requires a pragmatic approach that prioritizes maintaining technical integrity in the face of political pressures. By treating these subsidies as a temporary bridge to more sustainable agricultural practices and by remaining cognizant of the constantly evolving needs of farmers, policymakers can ensure these programs serve as a foundation for genuine resilience rather than a source of long-term fiscal and environmental strain.

References

Amaglobeli, D., Benson, T., & Mogues, M. T. (2024). Agricultural producer subsidies: Navigating challenges and policy considerations. International Monetary Fund.

Bachas, P., Hill, R., Sosa, M. E., & Wai-Poi, M. (2023). In many countries, taxes and transfers make the poor poorer, it doesn't have to be this way. World Bank Blogs.

Blekking, J., Gatti, N., Waldman, K., Evans, T., & Baylis, K. (2021). The benefits and limitations of agricultural input cooperatives in Zambia. World Development, 146, 105616.

Carter, M., Laajaj, R., & Yang, D. (2021). Subsidies and the African Green Revolution: direct effects and social network spillovers of randomized input subsidies in Mozambique. American Economic Journal: Applied Economics, 13(2), 206-229.

Craswell, E. (2021). Fertilizers and nitrate pollution of surface and ground water: an increasingly pervasive global problem. SN Applied Sciences, 3(4), 518.

Fanzo, J. (2017). From big to small: the significance of smallholder farms in the global food system. The Lancet Planetary Health, 1(1), e15-e16.

Hill, R. V., & Resnick, D. (2025). Realistic options for repurposing fertilizer subsidy spending. International Food Policy Research Institute.

Ichami, S. M., Shepherd, K. D., Sila, A. M., Stoorvogel, J. J., & Hoffland, E. (2019). Fertilizer response and nitrogen use efficiency in African smallholder maize farms. Nutrient cycling in agroecosystems, 113(1), 1-19.

Jolley, V. D., & Pierre, W. H. (1977). Soil Acidity from Long-term Use of Nitrogen Fertilizer and Its Relationship to Recovery of the Nitrogen. Soil Science Society of America Journal, 41(2), 368-373.

Kaushik, K. R. (2025). Fertilizer Scans in India: Cost to the Government and Farmers—Causes, Consequences and Policy Measures to Control Fraudulent Practices. International Journal of Scientific Research and Engineering Development, 8(5), 1998-2009.

Kurdi, S., Mahmoud, M., Abay, K. A., & Breisinger, C. (2020). Too much of a good thing? Evidence that fertilizer subsidies lead to overapplication in Egypt (Vol. 27). Intl Food Policy Res Inst.

Mason, N. M., Jayne, T. S., & Van De Walle, N. (2017). The political economy of fertilizer subsidy programs in Africa: Evidence from Zambia. American Journal of Agricultural Economics, 99(3), 705-731.

Mather, D. L., & Jayne, T. S. (2018). Fertilizer subsidies and the role of targeting in crowding out: evidence from Kenya. Food Security, 10(2), 397-417.

Melkani, A., Mason, N. M., Mather, D. L., Chisanga, B., & Jayne, T. (2025). Liquidity constraints for variable inputs at planting time and the maize production and marketing decisions of smallholder farmers in Zambia. Agricultural Economics, 56(1), 73-91.

The National Treasury of the Republic of Kenya. (2026). 2026 Budget Policy Statement: Accelerating gains under the Bottom-Up Economic Transformation Agenda for inclusive and sustainable growth. Republic of Kenya.

Naz, M., Dai, Z., Hussain, S., Tariq, M., Danish, S., Khan, I. U., ... & Du, D. (2022). The soil pH and heavy metals revealed their impact on soil microbial community. Journal of Environmental Management, 321, 115770.

Putra, R. A., & Harahap, M. Y. (2025). Legal Protection for Farmer Groups in Subsidized Fertilizer Pricing: A Case Study in Kualuh Hilir, North Sumatra. Al-Adalah: Jurnal Hukum dan Politik Islam, 335-349.

Ricome, A., Barreiro-Hurle, J., & Fall, C. S. (2024). Government fertilizer subsidies, input use, and income: The case of Senegal. Food Policy, 124, 102623.

Tefera, D. A., Bijman, J., & Slingerland, M. A. (2017). Agricultural co‐operatives in Ethiopia: evolution, functions and impact. Journal of International Development, 29(4), 431-453.

Trachtman, C., & Hill, R. V. (2025). Targeting of beneficiaries in chemical fertilizer subsidy programs: State of knowledge and evidence gaps.

Vos, R., Glauber, J., Hebebrand, C., & Rice, B. (2025). Global shocks to fertilizer markets: Impacts on prices, demand and farm profitability. Food Policy, 133, 102790.

Weyl, E. G., & Fabinger, M. (2013). Pass-through as an economic tool: Principles of incidence under imperfect competition. Journal of Political Economy, 121(3), 528-583.

Xu, Z., Burke, W. J., Jayne, T. S., & Govereh, J. (2009). Do input subsidy programs "crowd in" or "crowd out" commercial market development? Modeling fertilizer demand in a two‐channel marketing system. Agricultural Economics, 40(1), 79-94.

Carly Trachtman, c.trachtman@cgiar.org
Research Fellow, Markets Trade and Institutions Unit, International Food Policy Research Institute

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
A world free of hunger and malnutrition

1201 Eye Street, NW, Washington, DC 20005 USA
T. +1-202-862-5600 | F. +1-202-862-5606 | ifpri@cgiar.org | www.ifpri.org