NEPALESE JOURNAL OF AGRICULTURAL SCIENCES,
July, 2026, volume 31
e-ISSN: 2091-0428; p-ISSN 2091-041X
Published by HICAST, Purbanchal University, Kathmandu

Diagnosing Nepal's Fertilizer Crisis: Governance Failures and Systemic Bottlenecks in the Fertilizer Supply Chain

Kamana KAFLE[1], Bidur Prasad CHAULAGAIN[2]*, and Nanu JHA[2]
[1]Arkansas State University, Arkansas, USA
[2]Himalayan College of Agricultural Sciences and Technology (HICAST), Kirtipur, Kathmandu, Nepal
***Corresponding author's email**: bidur@hicast.edu.np

ABSTRACT

Chemical fertilizer is a critical input for enhancing agricultural productivity and ensuring food security in Nepal. However, the sector is plagued by chronic supply insecurity, characterized by persistent demand–supply gaps, untimely delivery, and inequitable distribution. This study employs a mixed-methods institutional analysis, guided by Ostrom's Institutional Analysis and Development (IAD) framework, to diagnose systemic bottlenecks in Nepal's fertilizer supply chain and assess their impact on end-user farmers. Primary data were collected from February to August 2022 from key institutional actors (n=20), 15 agricultural cooperatives, and 60 farmers in the Kathmandu Valley the central hub for fertilizer import and distribution. Secondary data from government reports and policy documents were analyzed to contextualize the findings. Results reveal a profound disconnection between policy intent and field-level reality. An estimated national demand of 600,000 metric tons (MT) is met with less than half through official channels, with procurement delays averaging 8–11 months. The state-controlled duopoly of the Agricultural Inputs Company Limited (AICL) and the Salt Trading Corporation Limited (STCL) have marginalized private sector participation, creating a rigid and inefficient supply system. At the farmer level, 86% reported untimely access, 74% found subsidized fertilizers unaffordable, and 28% were unaware of the subsidy program itself. Distribution is highly inequitable, favoring the Terai region over remote hills ($p < 0.001$). Qualitative findings reveal four core themes: bureaucratic procurement paralysis, political interference, cooperative-level failures, and farmer coping strategies. The study concludes that the fertilizer crisis is fundamentally a governance failure, stemming from institutional monopolies, flawed procurement logistics, weak distribution networks, and poor policy communication. To achieve a resilient

fertilizer supply system, policy reforms must prioritize decentralized distribution, strategic buffer stocks, revitalized public–private partnerships, and enhanced farmer-centric extension services.

Keywords: Access constraints, chemical fertilizer, institutional bottlenecks, subsidy policy, supply chain

INTRODUCTION

Agriculture remains the cornerstone of Nepal's economy, contributing approximately 25.8% to the national GDP and providing livelihoods for about two-thirds of the population (MoALD, 2022). To meet the food demands of a growing population amidst shrinking arable land, enhancing crop productivity through improved inputs is imperative. Fertilizer, along with seed and irrigation, is a major input for agricultural production (McArthur et al., 2017). With the commercialization of agriculture, demand for fertilizer has been continually increasing (FAO, 2019). Fertilizers (organic or inorganic) are among the most important agricultural inputs, and their unavailability in time and required quantity hampers crop production to a great extent (Panta, 2018). Historically, Nepal's fertilizer consumption has been low relative to its South Asian neighbors, averaging about 60–96 kg of nutrients per hectare far below the recommended levels for intensified cropping systems (FAO, 2023; The Rising Nepal, 2023).

The governance of fertilizer supply in Nepal has undergone significant policy oscillations. Prior to 1997, a subsidized public monopoly prevailed. This was replaced by a deregulated market (1997–2008), which improved supply but led to price volatility and quality issues. In 2009, the government reintroduced subsidies, creating a state-controlled duopoly that persists today. Despite fertilizer subsidy allocation from NPR 15 billion to NPR 18.5 billion (FY 2023/24), increased budgetary allocations reaching NPR 15.85 billion in FY 2021/22, systemic inefficiencies remain. Nepal's import of agricultural goods reached Rs. 250 billion in FY 2019/20, with fertilizer subsidy allocations rising from NPR 8.99 billion (FY 2018/19) to NPR 15 billion (FY 2020/21) (MoF, 2020). However, the formal supply meets only a fraction of national requirements, forcing farmers to rely on informal cross-border markets (Gautam et al., 2022). The Agriculture Perspective Plan (APP, 1995–2015) aimed to increase fertilizer consumption to 150 kg/ha by 2015. Yet consumption declined from 1999 to 2008, largely due to subsidy removal, which made fertilizers unaffordable. Private sector participation has been constrained by high costs and risks. The 2009 subsidy reintroduction

temporarily boosted applications, but demand–supply gaps persist. Paudel and Cargo (2017) report that despite rising subsidy expenditure, the supply system remains inefficient, with significant delays and mismatches between demand periods and distribution. International assessments reveal a widening nutrient supply gap, particularly for nitrogen, phosphorus, and potassium (Chakraborty et al., 2024). Shrestha (2010) emphasizes that Nepal's fertilizer system is an institutional governance issue, shaped by political transitions, bureaucratic delays, and weak coordination across federal, provincial, and local levels.

While the Terai region accounts for most cereal production, this study focuses on the institutional node where national procurement, import authorization, and distribution mandates originate. The Kathmandu Valley serves as the administrative epicenter, allowing the study to trace governance failures from policy formulation to implementation. While existing literature documents the demand–supply gap, few studies integrally analyze the institutional architecture and link its failures to quantifiable farmer-level constraints. This study addresses the gap using IAD framework, which examines how rules, actors, and institutional arrangements shape governance outcomes. The IAD framework conceptualizes institutional performance as shaped by the interaction of action situations (the procurement and distribution context), actors (state agencies, cooperatives, private dealers, farmers), rules-in-use (procurement regulations, subsidy mechanisms, allocation criteria), and outcomes (supply gaps, price distortions, informal market reliance). By examining how these elements interact, the IAD framework enables a systematic diagnosis of why policy intentions consistently fail to translate into field-level outcomes (Ostrom, 2011). We ask: (1) What are the key institutional and procedural bottlenecks in Nepal's official fertilizer procurement and distribution system? (2) How do these systemic failures translate into access and affordability constraints for end-user farmers?

MATERIALS AND METHODS

Study area

Kathmandu Valley was purposively selected as the study site for institutional rather than agricultural reasons. As the location of the Ministry of Agriculture and Livestock Development (MoALD), the Customs Department, and the headquarters of both AICL and STCL, the valley is the central node where national procurement policies, import authorizations, and distribution mandates originate. By focusing on this institutional hub, the study traces governance

failures from their source policy formulation and import authorization to their manifestation in distribution networks and farmer access.

While the study is geographically confined to the Kathmandu Valley, the institutional pathologies identified procurement latency, centralized decision-making, and information asymmetry are structural features of the national distribution framework. However, the magnitude of farmer-level impacts may vary across regions, and future research should extend the analysis to Terai and hill districts.

Research design and sampling rationale

A descriptive, single-case study design with a convergent parallel mixed-methods approach was adopted. Purposive sampling identified three stakeholder groups: (a) Institutional Actors (n=20): Senior officials from MoALD (n=8), AICL (n=5), STCL (n=4), and the Customs Department (n=3); (b) Supply Chain Intermediaries (n=15): Representatives from agricultural cooperatives (n=10) and private input dealers (n=5); (c) End-User Farmers (n=60): Active fertilizer-using farmers were selected across Kathmandu, Lalitpur, and Bhaktapur districts..

This study utilized the Kathmandu Valley as an institutional proxy for the national supply chain. While the Terai region is the primary cereal-producing heartland, the institutional pathologies identified here procurement latency, centralized decision-making, and systemic information asymmetry are structural governance failures that originate at the administrative hub. By isolating these bottlenecks at the source, this research identified the root causes of supply failures that manifested across the country.

The sample size of 60 farmers was selected to provide an exploratory depth that captured the governance failures (weaknesses) at the distribution hub; while not statistically exhaustive, it generated critical qualitative and quantitative insights into systemic bottlenecks. Furthermore, the single Focus Group Discussion (n=10) served as a supportive qualitative mechanism to triangulate individual survey data and capture shared experiences among cooperative members, rather than aiming for full theoretical saturation. Within each district, farmers were selected purposively to ensure a diverse mix of landholding sizes, crop types, and varying proximity to cooperative distribution centers.

Data Collection (February–August 2022)

Key Informant Interviews (KIIs): Semi-structured interviews lasting 45–90 minutes were conducted with 20 institutional actors covering procurement procedures, subsidy mechanisms, distribution logistics, and policy challenges.
Focus Group Discussion (FGD): One FGD was conducted with 10 cooperative members and progressive farmers (6 male, 4 female) to explore shared experiences and systemic bottlenecks. The discussion lasted approximately 120 minutes and was audio-recorded with consent.

Household Survey: A structured questionnaire was administered to 60 farmers to collect quantitative data on demographics, fertilizer access (timing, quantity), affordability, subsidy awareness, and satisfaction.

Secondary Data: National import/export statistics, AICL/STCL annual reports, policy documents, audit reports, and peer-reviewed literature were systematically reviewed.

Data Analysis
Quantitative Analysis: Survey data were analyzed using descriptive statistics (frequencies, percentages, means) in Microsoft Excel 2016. One-way ANOVA was used to compare provincial supply variations, with statistical significance set at $p < 0.05$.
Qualitative Analysis: Interview and FGD transcripts were analyzed using inductive thematic content analysis. Transcripts were manually coded by two researchers to identify recurring patterns, themes, and narratives. Inter-coder agreement was 87%, with discrepancies resolved through discussion.
Institutional Analysis: A supply chain map was developed to visualize actors, linkages, and critical nodes. Time-series data on national fertilizer imports and prices were analyzed to identify historical trends and supply gaps.

RESULTS AND DISCUSSION

National annual demand for chemical fertilizer in Nepal is approximately 600,000 MT (MoALD, 2022). However, official supply in FY 2020/21 was only 269,482 MT, meeting less than half of the total requirement, a demand-supply gap exceeding 50%. Officials interviewed for this study estimated that informal cross-border channels may account for up to 70% of total fertilizer consumption. Survey

data from the Kathmandu Valley indicated that 86% (52 out of 60) of farmers did not receive fertilizers during the critical pre-planting period, highlighting the severity of access constraints even in the central distribution hub.

Figure 1 illustrates the magnitude of the demand-supply gap across Nepalese provinces. The widest gaps are observed in Madhesh Province, followed by Bagmati and Lumbini Provinces, where agricultural production intensity is highest. In contrast, Karnali Province, designated as an organic farming zone, exhibits the smallest gap due to lower chemical fertilizer demand**.**

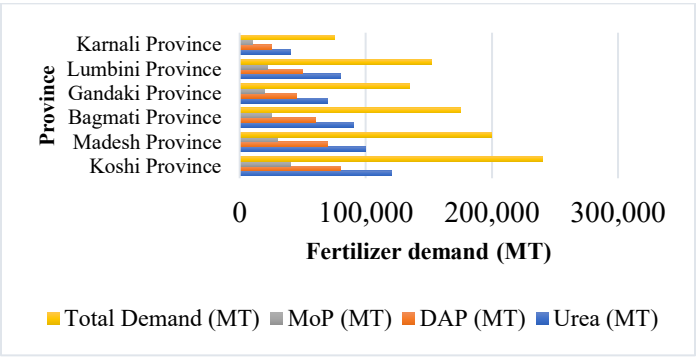


Figure 1. Fertilizer demand-supply gap by province in Nepal (FY 2020/21)

Fertilizer demand for cereal crops varies considerably across the provinces of Nepal. Koshi Province records the highest demand, reflecting its favorable conditions and extensive area devoted to cereal cultivation. Madhesh and Lumbini Provinces also show substantial demand, with cash-crop production estimated at 2.228 million MT and 2.200 million MT, respectively, while Koshi leads at 2.434 million MT. In contrast, Karnali Province has the lowest fertilizer demand, which corresponds with its relatively low cash-crop production (0.582 million MT) and its stronger orientation toward organic farming practices (Figure 2). The persistent gap between demand and official supply forces farmers to seek alternatives. As shown in subsequent sections, this shortfall drives reliance on informal markets, where farmers prioritize availability over price, a critical insight for policy design.

Over the past 17 years, Nepal's fertilizer supply has remained highly inconsistent, marked by repeated fluctuations rather than steady growth. Although supply increased during several periods, these gains were often interrupted by sharp declines, most notably the drop from 298,677 MT in FY 2071/72 to 259,061 MT in FY 2072/73. Such irregularity reflects persistent institutional and logistical

NEPALESE JOURNAL OF AGRICULTURAL SCIENCES,
July, 2026, volume 31
e-ISSN: 2091-0428; p-ISSN 2091-041X
Published by HICAST, Purbanchal University, Kathmandu

weaknesses in maintaining a stable fertilizer supply system, a concern also highlighted by Panta (2018) as illustrated in Figure 3.

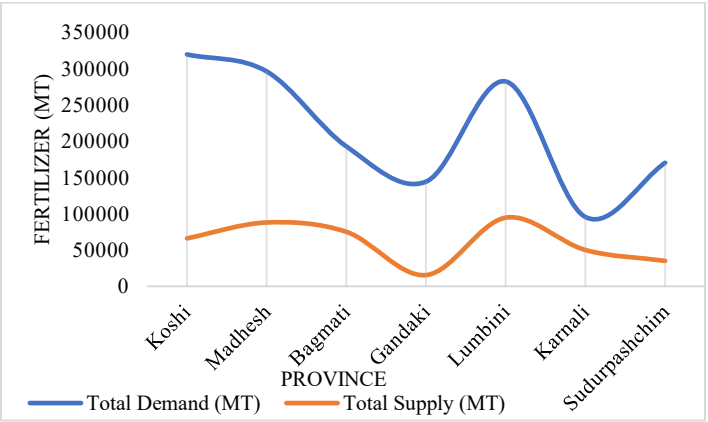


Figure 2. Province-wise estimation of fertilizer demand for cereals in Nepal

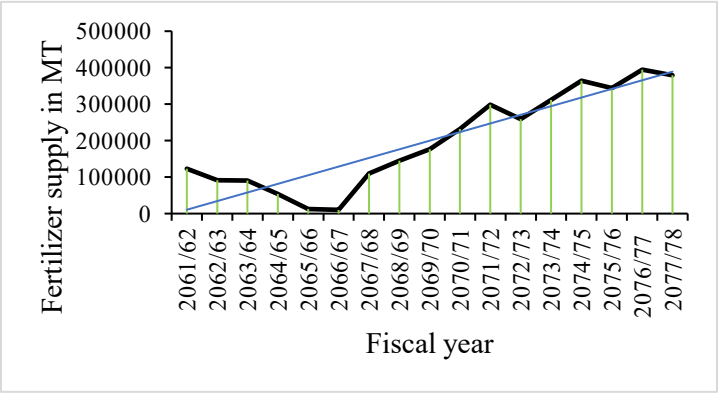


Figure 3. Fertilizer supply trend of Nepal over 17 years (FY 2061/62–2077/78)

This study confirms that Nepal's fertilizer supply insecurity is driven by structural, institutional, and policy-level weaknesses, not temporary logistical disruptions. The persistent demand–supply gap less than half of national needs met officially, aligns with Gautam et al. (2022), who found that chronic shortages force reliance on informal markets. The finding that up to 70% of consumed fertilizer may be

informal (based on expert estimates from officials interviewed) reinforces this structural dependency.

Institutional structure and supply trends

An analysis of fertilizer distribution trends from FY 2061/62 to FY 2077/78, as presented in Figure 4, underscores a persistent reliance on a duopolistic state structure, with AICL serving as the primary provider and STCL playing an auxiliary role. The pronounced year-on-year volatility observed throughout this period highlights an inherent lack of procurement resilience and suboptimal institutional responsiveness to demand surges. By maintaining a highly centralized distribution framework, the system suffers from strategic inflexibility; this concentration exposes the national supply chain to critical failure points, including administrative bottlenecks, import interruptions, and recurring coordination deficits.

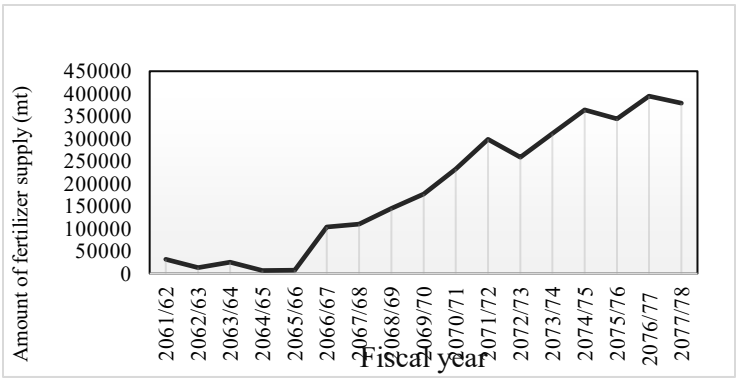


Figure 4. Fertilizer supply trend of AICL and STCL (FY 2061/62–2077/78)

Provincial-Level Distribution Inequities

Table 1 summarizes province-wise fertilizer supply status in Nepal during FY 2020/21. A one-way ANOVA revealed significant inter-provincial differences ($p < 0.001$) for urea, DAP, MOP, and total fertilizer supply. Madhesh Province received the highest total allocation (108,978 MT), followed by Lumbini and Bagmati, reflecting larger cultivated area, intensive cereal production, proximity to the Indian border, and better road connectivity. In contrast, Karnali Province received the lowest total supply (4,011 MT), indicating persistent geographical and logistical constraints. Across all provinces, urea accounted for the largest share of fertilizer supply, followed by DAP and MOP.

NEPALESE JOURNAL OF AGRICULTURAL SCIENCES,
July, 2026, volume 31
e-ISSN: 2091-0428; p-ISSN 2091-041X
Published by HICAST, Purbanchal University, Kathmandu

Farmer-level access and affordability constraints

The survey revealed important farmer-level constraints related to fertilizer access, affordability, awareness, and informal market use (Table 2). A large majority of respondents (86%) reported untimely access to fertilizers, indicating recurring seasonal delays in supply. Limited availability from AICL and STCL outlets was identified as the principal constraint, whereas transportation was considered less problematic due to Kathmandu Valley's relatively favorable market access.

Table 1. Fertilizer supply status (MT) by Province in Nepal, 2020/21

Province	Urea (MT)	DAP (MT)	MOP (MT)	Total (MT)	CV (%)
Koshi	38,332	20,871	1,917	61,120	20.79
Madhesh	62,033	44,321	2,624	108,978	22.33
Bagmati	42,731	19,191	2,118	64,040	13.30
Gandaki	8,693	3,973	387	13,053	24.95
Lumbini	55,098	33,096	1,719	89,913	12.79
Karnali	2,482	1,427	102	4,011	21.54
Sudurpaschim	18,200	10,461	666	29,327	21.96
F-value	***	***	***	***	
p-value	<0.001	<0.001	<0.001	<0.001	

*Note: *** indicates highly significant at $\alpha = 0.001$. CV: Coefficient of variation

It is important to note that the farmer-level data presented here reflects conditions in the Kathmandu Valley, the institutional hub of the distribution system. While these findings highlight systemic access constraints at the administrative center, they may not represent the more severe challenges faced by farmers in remote hill or Terai regions. Despite subsidy support, 74% of respondents considered fertilizers expensive overall. Urea (NPR 25 kg^{-1}) was generally perceived as affordable, whereas DAP (NPR 57 kg^{-1}) and MOP (NPR 44 kg^{-1}) were widely

viewed as costly. This price differential may encourage imbalanced nutrient use, with greater reliance on nitrogen relative to phosphorus and potassium.

More than one-quarter of respondents (28.3%) were unaware of the government subsidy program, suggesting gaps in farmer outreach and extension communication. Among farmers using informal channels (n = 38), better availability during planting season (68%) was the main reason for purchase, followed by reduced paperwork or rationing (45%) and access to dealer credit (32%). Only 18% cited lower price, indicating that timely availability was more important than cost savings**.** The institutional governance of fertilizer distribution explains these deficits. The 2009 subsidy reintroduction, while intended to protect farmers, created a non-competitive market that stifled private investment. This outcome consists of Shrestha (2010) and Raut and Sitaula (2012), who documented how subsidy-driven price controls made private competition impractical. The AICL/STCL duopoly, handling nearly all subsidized distribution, lacks operational flexibility and accountability.

Table 2. Farmer-Level Access, Affordability, Awareness, and Informal Market Use (n = 60)

Category	**Indicator**	**Result**
Access & Availability	Untimely access	86% of farmers
	Procurement sources	AICL (23), Distributors (20), Agro-vets (17)
	Main access constraint	Purchasing power due to limited supply from AICL/STCL
	Other issues	Quality concerns: moderate Transportation: Accessible
Affordability	Farmers finding fertilizers expensive	74%
	Urea price perception	NPR 25/kg – Affordable
	DAP price perception	NPR 57/kg – Expensive
	MOP price perception	NPR 44/kg – Expensive
	Resulting behavior	Imbalanced nutrient application
Awareness	Unaware of subsidy program	28.30%
Informal Market Use (n = 38)	Better availability during planting	68%
	No paperwork/rationing	45%
	Credit availability	32%
	Lower price	18%

Distributor-level challenges

Based on semi-structured interviews with 15 distributors and cooperative input dealers in the Kathmandu Valley, delayed procurement from AICL and STCL emerged as the most frequently cited operational challenge. Respondents reported uncertainty in stock release schedules, limited seasonal allocation, and administrative delays that disrupted retail planning. Transportation and local distribution mobility were the second most common constraints, particularly during peak demand periods. In contrast, most respondents considered the physical quality of government-supplied fertilizers satisfactory. Several distributors recommended streamlining procurement procedures and exploring domestic fertilizer production to reduce dependence on imports.

Qualitative themes explaining fertilizer supply constraints

Thematic analysis of key informant interviews (KII) and focus group discussions (FGD) generated four recurring themes that help explain the quantitative findings presented in Tables 1 and 2. These themes clarify why fertilizer shortages persist despite subsidy support.

Theme 1: Procurement Delays and Administrative Bottlenecks. Respondents from public agencies consistently described lengthy tendering, budget approval, import processing, and customs clearance as major causes of delayed fertilizer arrival. Several officials noted that procurement timelines frequently extended beyond the main planting season, supporting survey findings on untimely farmer access One respondent noted, *"By the time approval is completed, the planting season may already be over."*

Theme 2: Allocation Inequity and Political Influence. Cooperative representatives and farmers reported that local allocation decisions were not always perceived as transparent. Some respondents believed political connections influenced access priority, which may contribute to unequal local distribution. Several respondents perceived local allocation as inconsistent and politically influenced. One cooperative member stated, *"Those with connections often receive fertilizer first."* This suggests trust deficits in local distribution systems.

Theme 3: Storage and Cooperative-Level Management Constraints. Interviewees identified inadequate warehouse facilities, poor stock handling, and weak inventory management at some cooperative outlets. Such constraints were

reported to reduce fertilizer quality and availability during peak demand periods. An AICL official noted that many cooperatives lack basic storage facilities, resulting in improper exposure of fertilizer to environmental conditions: *"Fertilizer bags are left in the open, exposed to rain. By the time farmers receive it, the urea has caked and the DAP has lost potency"* (KII-AICL-07). This reflects operational deficiencies at the last-mile distribution level that may reduce input effectiveness.

Theme 4: Farmer Coping Responses. Farmers described adaptive responses including reduced fertilizer application, crop switching, delayed planting, and purchases through informal markets. These responses indicate that uncertainty in official supply directly affects farm productivity and decision-making. One farmer stated, *"It costs more, but at least we get it when needed."*

Core institutional pathologies

Applying Ostrom's Institutional Analysis and Development (IAD) framework, the fertilizer governance system in Nepal exhibits four interlinked institutional pathologies. First, in the action situation, procurement cycles (8–11 months) are misaligned with agricultural planting seasons, leading to recurrent seasonal shortages. Second, at the level of actors, a duopoly of state-owned enterprises (AICL and STCL) dominates the system, while private sector participation remains constrained, reducing competition and responsiveness. Third, within rules-in-use, subsidy allocation favors state agencies, with weak performance-based accountability or incentive mechanisms. Finally, these conditions result in persistent outcomes, including an estimated 50% demand–supply gap, ~70% reliance on informal markets, and uneven provincial distribution. Fertilizer importation is concentrated through three customs points—Bhairahawa, Biratnagar, and Birgunj—via global tenders or government-to-government procurement. After entry, prices are administratively fixed following subsidy adjustment, and distribution proceeds through AICL/STCL depots, cooperatives, and agro-vet networks. Farmers bear additional costs for transport and handling at the final stage.

Figure 5 illustrates this institutional supply chain structure**.** It depicts a system where procurement and pricing remain centralized, while distribution becomes progressively layered and weakly coordinated downstream. This fragmentation generates cumulative delays, reduced accountability, and leakage into informal fertilizer markets. The institutional pathologies identified in this study

procurement latency, centralized decision-making, and systemic information asymmetry are structural governance failures that originate at Kathmandu.

Provincial supply patterns reveal systemic imbalances. The disproportionate supply of urea over DAP and MOP ($p < 0.001$) reflects a long-standing nutrient imbalance, consistent with Chakraborty et al. (2024) findings on widening phosphorus and potassium gaps. Madhesh Province's higher supply corresponds with cultivated area, infrastructure, and border proximity, but the significant variation across provinces indicates weak federal–provincial–local coordination, supporting Mishra and Paudel (2023). Farmer-level evidence demonstrates the consequences of institutional failure. The 86% reporting untimely access and reliance on informal sources at higher prices reflects chronic systemic failure. The 28% unawareness of the subsidy program indicates critical extension service failures. Farmers' primary reason for using informal markets better seasonal availability rather than price suggests that supply timing is more critical than subsidy levels. This finding has important policy implications: improving logistics may matter more than increasing subsidy budgets. Distributor challenges procurement delays from AICL/STCL as the most severe constraint align with Raut and Sitaula (2012).

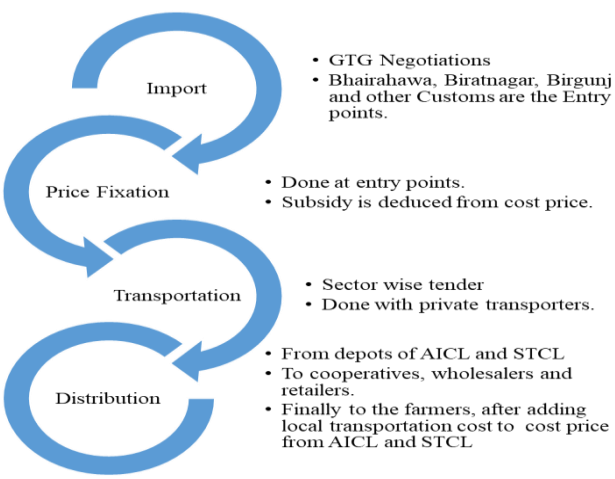


Figure 5. Flow chart of chemical fertilizer supply system in Nepal

Valley's administrative hub. By isolating these bottlenecks at the source, we identify root causes that manifest across the country. Thapa et al. (2019) argued

that Nepal's crisis is fundamentally a policy and governance issue, a conclusion strongly supported here. Applying Ostrom's IAD Framework: Nepal's Fertilizer Governance with explicit mapping of framework components to empirical findings reveals that the current institutional arrangement creates perverse incentives. The duopoly faces no competition, procurement rules favor bureaucratic processes over seasonal responsiveness, and no performance metrics link institutional behavior to farmer outcomes. The result is a system that reliably produces shortages.

CONCLUSION AND SUGGESTIONS

This study demonstrates that Nepal's fertilizer crisis is driven not by mere supply shortages, but by structural failures (weaknesses) in governance, procurement, and distribution. Despite increased subsidy allocations, the system remains constrained by persistent demand–supply gaps, procurement delays averaging 8–11 months, and inequitable access. The centralized duopoly of AICL and STCL has constrained systemic efficiency, limited market competition, and stifled private sector agility. Empirical evidence confirms that the disconnect between policy intent and field-level reality is rooted in a rigid institutional architecture, which this study has diagnosed as a failure of institutional design rather than failure of agricultural inputs. It has been suggested for a reform at Palika-level forecasting, integrating real time digital audit tools for stock and visibility, and introducing regulated competition by enabling vetted cooperatives and private entities to participate in the supply chain. That may ensure transition of Nepal's fertilizer system toward a more responsive, equitable, and resilient structure.

AUTHORS' CONTRIBUTIONS

Kamana Kafle: Conceptualization, Literature review, methodological support, and data collection methodology, data collection, statistical analysis, manuscript writing,
Bidur Prasad Chaulagain: Manuscript reviewing, and editing,
Nanu Jha: Interpretation of findings, manuscript review and academic guidance.

ACKNOWLEDGMENT

We would like to express sincere gratitude to all the respondents, MOALD, SALT and AICL representatives, for their continuous guidance, encouragement, and support throughout this research

REFERENCES

Chakraborty, D., Sherpa, S.R., Koirala, P., Baral, B.R., Karki, S., Sapkota, S., Gathala, M. and Krupnik, T.J. (2024) *Mind the (nutrient supply) gap: an assessment of demand and supply limitations for nitrogen, phosphorus and potassium for major crops in Nepal*. Kathmandu, Nepal: The Cereal Systems Initiative for South Asia (CSISA), Nepal Seed and Fertilizer (NSAF) Project and Transforming Agrifood Systems in South Asia (TAFSSA). Available at: https://hdl.handle.net/10883/35104

FAO. (2019). *World fertilizer trends and outlook to 2022*. Rome: Food and Agriculture Organization of the United Nations. Available at: https://openknowledge.fao.org/server/api/core/bitstreams/42d5a668-f44c-4976-8540-8efdb0f4d17b/content

FAO. (2023). *Fertilizer consumption (kilograms per hectare of arable land) – Nepal*. Food and Agriculture Organization / World Bank data series. Available at: https://www.indexmundi.com/facts/nepal/indicator/AG.CON.FERT.ZS

Forsyth, T. and Johnson, C., (2014). Elinor Ostrom's legacy: governing the commons, and the rational choice controversy. *Development and change*, *45*(5), pp.1093-1110.

Gautam, S., Gaihre, Y.K., Acharya, G.D., Dongol, P. and Choudhary, D., (2022). Fertilizer demand-supply gap and avenues for policy revisits in Nepal: fertilizer deman supply gap in Nepal. *SAARC Journal of Agriculture*, *20*(2), pp.223-234. Available at: https://doi.org/10.3329/sja.v20i2.63583

Government of Nepal, Ministry of Finance (2022) *Economic Survey 2021/22*. Kathmandu: Ministry of Finance. Available at: https://www.mof.gov.np (Accessed: 21 April 2026).

McArthur, J.W. and McCord, G.C., (2017). Fertilizing growth: Agricultural inputs and their effects in economic development. *Journal of development economics*, *127*, pp.133-152. Available at: https://www.sciencedirect.com/science/article/pii/S0304387817300172 (Accessed: 21 April 2026).

Ministry of Agriculture and Livestock Development (MoALD) (2022) *Statistical Information on Nepalese Agriculture 2020/21 (2077/78).* Planning & Development Cooperation Coordination Division, Statistics and Analysis Section, Singha Durbar, Kathmandu: Government of Nepal. Available at: https://centralaglab.gov.np/sites/default/files/publication-file/ STATISTICAL-INFORMATION-ON-NEPALESE-AGRICULTURE-2077-78-82136.pdf

Ministry of Agriculture and Livestock Development MoALD (2024) *Statistical Information on Nepalese Agriculture 2022/23*

Ministry of Finance. 2020. *Budget Speech of Fiscal Year 2020/21*. Kathmandu: Government of Nepal, Ministry of Finance. Available at: https://demo.mof.gov.np/uploads/document/file/1674635120_Economic_Survey_2022.pdf

Mishra, R.P. and Paudel, I.H. (2023) *Agribusiness and supply chain development policies in Nepal: A review from temporal dynamics*. *Nepal Public Policy Review*, 3(1), Special Issue: Agricultural Policies and Practices in Nepal: Pathways for Transformation. Available at: https://doi.org/10.59552/nppr.v3i1.60

National Soil Science Research Centre (NSSRC) / Nepal Agricultural Research Council. (2023). *New fertilizer doses recommended after nearly half century*. Available at: https://risingnepaldaily.com/news/28030

Ostrom, E., (2011). Background on the institutional analysis and development framework. *Policy studies journal*, *39*(1), pp.7-27.

Panta, H.K., (2018). Supply chain of subsidized chemical fertilizers in Nepal. *Journal of the Institute of Agriculture and Animal Science*, *35*(1), pp.9-20. Available at: https://doi.org/10.3126/jiaas.v35i1.22509

Paudel, J. and Crago, C.L., (2017). Fertilizer subsidy and agricultural productivity: Empirical evidence from Nepal.https://ageconsearch.umn.edu/record/258464/files/Abstracts_17_05_22_10_27_57_86__73_4_114_253_0.pdf

Raut, N. and Sitaula, B.K., (2012). Assessment of fertilizer policy, farmers' perceptions and implications for future agricultural development in Nepal. *Sustainable Agriculture Research*, *1*(2). Available at: https://doi.org/10.22004/ag.econ.231372

Shrestha, R. K. (2010) "Fertilizer Policy Development in Nepal", *Journal of Agriculture and Environment*, 11, pp. 126–137. Available at: doi: 10.3126/aej.v11i0.3660.

Thapa, G., Kumar, A. and Joshi, P.K., (2019), *Agricultural Transformation in Nepal: Trends, Prospects, and Policy Options.* Singapore: Springer Nature. doi: 10.1007/978-981-32-9648-0.