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RESEARCH ARTICLE

Policy Review and Strategies for Fertilizer Supply System Management in Nepal

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ABSTRACT

Chemical fertilizer is one of the priority inputs as identified by agriculture perspective plan and agriculture development strategy of Nepal in achieving increased agricultural productivity. High price and unavailability of required quantity of fertilizer in time are major problems associated to this sector. Subsidy in chemical fertilizer was introduced aiming at reduced cost and increased production. However, as found by many past studies, subsidy could not bring seemingly positive changes in Nepal in terms of fertilizer availability and crop productivity. It further increased government financial burden in importation of chemical fertilizers which being politically sensitive issue could not be removed. Further, it discouraged private sector's import due to which total supply could not be increased as expected. Private sector should, thus, be encouraged through soft loan, bank guarantee, and transport as well as transit liberalization. Government-to-government agreement with fertilizer manufacturing countries including India will help in cost reduction and supply assurance. With the ineffectiveness of chemical fertilizer policies and everlasting short supply, Nepalese government introduced subsidy in organic fertilizers also. However, organic products were found poor in quality. Due to their slow response and difficulty in transportation, farmers expressed their reluctance in using organic fertilizers. Organic fertilizers in the present context of Nepal could not completely substitute the chemical fertilizers. Rather combination of organic and chemical fertilizers may ensure higher productivity as well as reduced cost which in long-term induce sustainability. Subsidy in organic fertilizer should be removed and program to improve farmyard manure, compost, and green manuring should be launched.

Key words: Chemical fertilizers, global tender, liberalization, organic fertilizers, subsidy

INTRODUCTION

Fertilizer supply in Nepal remains critically below the total demand every year. Nepal has not been able to supply chemical fertilizers in time and sufficient quantity. Nepalese government had introduced subsidy in chemical fertilizer during the 1970s. Subsidy in chemical fertilizer became the political issue in the country. Unstable fertilizer policy affected adversely the fertilizer import, distribution, and use. In every periodic plan and development strategies including the 14th interim plan,^[1] agriculture perspective plan (APP),^[2] and agriculture development strategy,^[3] due priority is given to agriculture and commitment has been

made by the government for the development of this sector through expanded budget and improved technology adoption.

Effective demand of chemical fertilizer in Nepal at present is estimated to be 700,000 MT which is projected to increase to 1,500,000 MT by 2022.^[4] Proper use of nutrients remains a considerable constraint to agricultural productivity in Nepal. Its use is very high in some vegetable pockets where the use of urea was found to be unnecessarily high. Lack of knowledge on nutrient requirement to plants and quick effect of nitrogenous fertilizer (especially, the urea) resulted into high dose of chemical fertilizer.

The past studies reported that chemical fertilizer plant is not economically feasible in Nepal due to unavailability of raw material, lack of capital, and power supply. Many studies said that price is not a determining factor for fertilizer use

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in Nepal. Rather, availability and quality are important factors. For food and fertilizer security, Nepal should also invest in fertilizer production in India.^[4] According to Takeshima *et al.*,^[5] the nutrients from fertilizing with manure seem to substitute for chemical fertilizer use in Nepal. The informal imports of fertilizers are estimated to be about 3 times more than the formal imports.^[6] Raut and Sitaula^[7] in their study in Nepal found that about 88% of farmers at that time were not aware about the reintroduction of subsidy in chemical fertilizer in 2009. Of those familiar about the policy, only 44% were satisfied, 14% highly satisfied, 28% neutral, and 14% dissatisfied. A study by Kumbhakar and Lein^[8] in Norwegian grain farm during 1991–2006 showed that subsidies negatively affected the farm productivity but positively the technical efficiency. Similarly, Bezlepkin and Lansink^[9] in their study among Russian large-scale farms during 1995–2000 found negative relation between subsidy and production.

Significant systematic efforts of importation and distribution of fertilizers began with the establishment of the Agriculture Inputs Corporation (AIC) under the Ministry of Agriculture (MOA) in 1966. AIC, as a public sector enterprise, was responsible for procurement and distribution of chemical fertilizers in the country. As government mandated Salt Trading Corporation Limited (STCL) to import and distribute subsidized chemical fertilizers in 2015, Agriculture Inputs Company Limited (AICL) and STCL have taken the total responsibility then after. However, inefficiencies have been noticed in working of these government units. AICL^[10] stated that more clear assessment of the fertilizer situation in country should be made to evaluate the costs and benefit of the current subsidy policy on fertilizer in Nepal. The fertilizer subsidy must be reviewed in relation to its impact on smuggling, effect on demand, use, and productivity, as well as its budget implications. Therefore, critical review of government's fertilizer policy for necessary policy amendment aiming at contributing to greater efficiency of fertilizer supply and increased agricultural production is the felt need.

Supply from formal and authentic government source was estimated to be <20%. The past studies clearly indicated that the fertilizer supplied by the informal sources is of poor quality. Illegal trading, especially from India, is resulting into low national

revenue and supply of low-quality fertilizer. Thus, the study on appropriate policy option to check illegal transaction and to provide farmers the high-quality fertilizer in required quantity, in time, and at affordable price will be very important. Findings of the study will be useful to improve the fertilizer supply situation in the country. Overall objective of the study was to study the fertilizer policy of Nepal and its supply-side effects. The specific objectives were as follows:

1. To assess the private as well as public sector contribution in fertilizer supply,
2. To analyze the effect of fertilizer subsidy in its supply and farm-level availability, and,
3. To suggest appropriate policy amendments for efficient management of fertilizer subsector in Nepal.

MATERIALS AND METHODS

This research basically designed to be based on secondary data. However, some primary data were collected from household survey (HHS), key informant interview (KII), and focus group discussion (FGD). Key informants from custom office of Bhairahawa were interviewed to seek information on fertilizer import and related issues including custom regulations. Discussions with authorized officials from AICL and STCL were made to have data on fertilizer import, distribution, and pricing systems as well as the problems they have been facing. Similarly, 10 agri-input dealers and one agricultural cooperative's member were interviewed about their attitude toward the supply system and policy related to fertilizer subsector in Nepal. Three organic fertilizer producers from central Nepal were interviewed to assess their attitudes on government policies and supports on organic fertilizer production and their problems about fertilizer production and distribution.

One focus group discussion with 21 participants in Chitwan and next with 19 participants in Rupandehi by involving cooperative members and progressive farmers were organized to study their attitude toward government working modality and policies related to fertilizer supply in Nepal. FGD had identified the major fertilizer-related problems of the districts and suggested important policy amendments to the concern agencies. A total of 100 respondents (80 randomly selected conventional farmers and 20 purposively selected organic producers) were selected randomly

from two districts for HHS. A semi-structured questionnaire was administered for data collection from the respondents.

Both primary and secondary data were used in the study. Household survey, KII, and FGD generated primary data, whereas data on fertilizer demand and supply situation, price, and trends of their use in the country were collected from secondary sources. Descriptive statistics were extensively employed to analyze data obtained from each technique with the help of Microsoft Excel.

RESULTS AND DISCUSSION

Fertilizer policy in Nepal and its impacts

During 1966–1972, cost-plus basis of fertilizers pricing policy was adopted in Nepal. That policy resulted into higher price in hills than in terai proportional to actual transportation cost incurred. As the international price of fertilizer increased following the oil crisis of 1972, the policy was slightly amended to adopt a more uniform pricing system when Nepalese government fixed the maximum retail price across the country. The subsidy policy aimed to encourage farmers to use fertilizers by providing it at a relatively low price and also to discourage fertilizer flow from Nepal to India by keeping the price 15–20% higher than that of India. Price and transportation subsidies were introduced in some selected high hill and mid-hill districts in 1973/74. For which, the AICL was paid the difference between the actual cost and selling price. With this new pricing system, the hill farmers got fertilizers below the actual cost, whereas terai farmers paid more than the actual cost to cover transportation cost.

With the growing demand for fertilizer and the continuous rise in international fertilizer prices, the government was forced to bear an increasing financial burden as a subsidy allocation. Being a politically sensitive issue, the government was also hesitant to make price adjustments. As a result, this situation aggravated the AICLs losses and that became unable to import fertilizers as per the demand. To partially recover the fertilizer shortages during that period, Nepal obtained additional fertilizer as foreign aid from several countries including Japan, Germany, and Finland. In 1997, the government announced policy reforms in the fertilizer sector eliminating subsidy on non-urea fertilizers and phase-wise withdrawal

on urea. Subsidy was completely phased out in 1999. However, deregulation policy largely failed to bring desirable impact on improving supply situation and quality control. High price in international market and heavy subsidy in India cause fertilizer prices in Nepali markets often more than 100% higher than in Indian markets. The porous border and low price in India together resulted into illegal inflow from India to Nepal. The new policy thus worsened the situation unexpectedly.

After the deregulation of 1997, supply from formal sources (AICL and private importers) improved only up to 1998/99. The reasons were retention of partial subsidy in urea before November 1999 and relatively favorable price situation existing in international market. Fertilizer supply after 1999/2000 decreased because both AICL and private importers could not import large quantity due to price fluctuation in international market. Further, both government and private sectors were in trouble in selling fertilizers as heavily subsidized cheap Indian fertilizers, and other adulterated and substandard fertilizers were easily available in the free markets of accessible areas, especially in terai of Nepal. Farmers, however, did not worry about the quality of fertilizers, but they were happy to receive fertilizers at lower price than that were supplied by AICL and authorized private importers. In addition to that, overall supply situation in remote areas was not improved due to high cost of transportation. Therefore, as supply situation was not improved as per the expectation and quality suffered the farmers, amendment on deregulation policy was invited.

Between 2002 and 2009, legal free trade continued to fall due to highly subsidized fertilizer products entering Nepal illegally from India. Vast gap in price and quality of fertilizer through legal and illegal channels were observed at that time. However, farmers paid same prices for both products imported legally or entered illegally. After deregulation of 2002, private sector was encouraged and their supply had increased remarkably. During 2001/02–2008/09, private sector supplied fertilizers dominated the public sector supply. Average share of private sector supply was estimated to be 74% during that period. Finally, GON decided to provide limited subsidy on chemical fertilizers in March 25, 2009, targeting small farmers. Silent features of fertilizer policy (2009) are as follows:

- AICL will be the sole agency to import fertilizers under subsidy scheme.
- Provision of a high-level “subsidy allocation management committee” under the chairmanship of Secretary of MOAC.
- The committee is mainly responsible for fixing retail price and subsidy reimbursement to AICL.
- Subsidized fertilizers will be available for up to 0.75 ha and 4 ha in the hills and terai, respectively, for three crops a year.
- Fertilizers will be retailed through AICL field offices (depots) and cooperatives.
- Sell price in the five entry points (Biratnagar, Birgunj, Bhairahawa, Nepalganj, and Dhangadi) was set 20–25% above Indian prices at border.
- Retail fertilizer price for farmers through the AICL was set at 20–25% above Indian prices at the border plus transportation cost.

With the partial phaseout of subsidy in 1997, supply from private sector has increased continuously up to 2003/04 contribution highest to the total supply (more than 85%). Total supply from both the private and public sector had decreased thereafter and reached to the minimum ever in 2008/09 due to illegal flow from India combined with policy uncertainty [Figure 1]. With the introduction of subsidy in 2009, total supply had increased abruptly and continues to increase up to 2013/14. Following the devastating earthquake of 2015, government investment on subsidy decreased resulting into fall in total supply. Results revealed that subsidy plays positive role in total supply [Figure 2].

With the reintroduction of subsidy government had allocated, more budget and fertilizer import increased substantially. However, only about 20% of Nepal's total fertilizer demand had been met during subsidy period also. No data were recorded on private sector's supply after deregulation of 2009. It clearly indicated that private sectors as they lost their competitive power to supply chemical fertilizers at subsidized prices, they stop procuring and distribution fertilizers or there were negligible imports by private sector during that time. Further, subsidy crowded out the private traders from fertilizer market which unexpectedly reduced the fertilizer supply in the country instead of increasing it. By this policy change, private sectors stopped imports of primary source of NPK (urea, DAP, and MOP) and restricted in importing only the secondary sources of NPK, micronutrients, and some organic fertilizers which were not subsidized.

It had been estimated that nearly 70–80% of the 600,000–800,000 MT of fertilizer consumed in Nepal were improperly imported. In 2011/12, demand for fertilizer in Nepal was estimated to be 500,000 MT of which formal sector supplied only 75,000 MT and the rest was supplied by informal sources.^[4] From 2001/02 to 2008/09, both AICL and private trader's supply of chemical fertilizer in Nepal was found to be highly fluctuating year after year which later on showed continuous increment up to 2013/14.^[11] Farmers are not satisfied with the private sector supplied fertilizers due to low quality. Even the subsidized fertilizers were weighted less (40–48 kg only) than their claim.

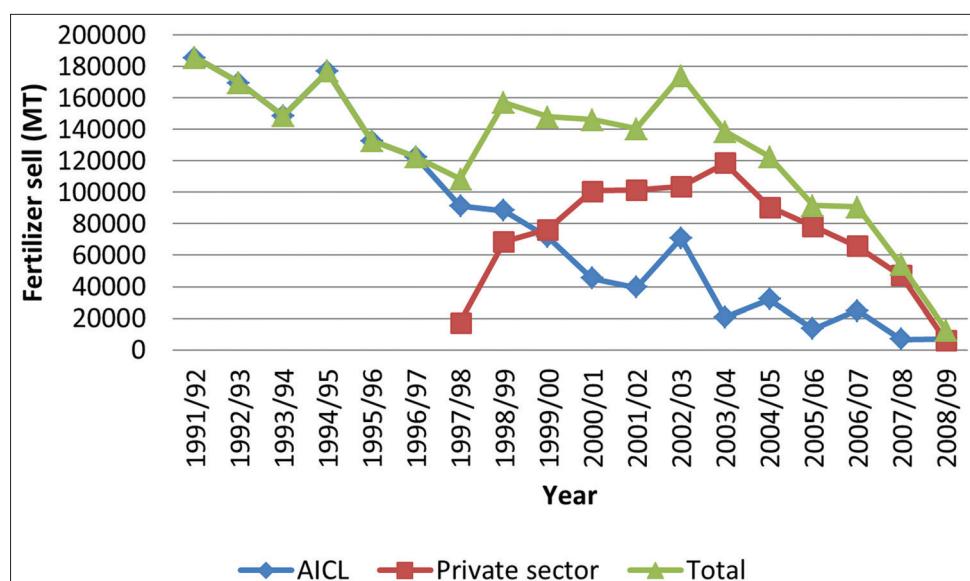


Figure 1: Supply of fertilizer by Agriculture Inputs Company Limited and private sector in Nepal during deregulation period (1997/98–2008/09)

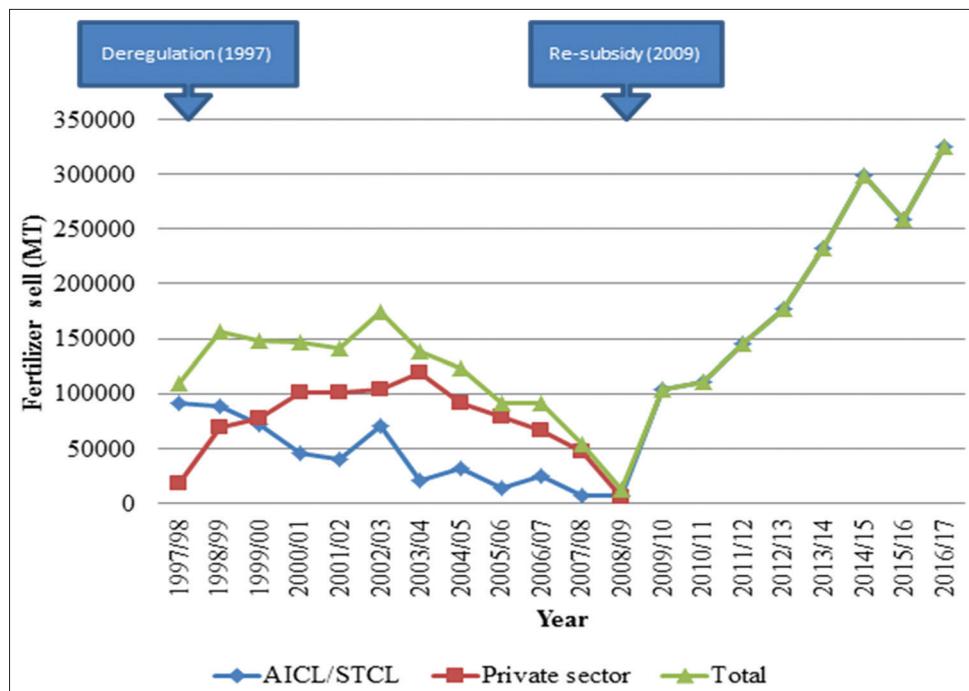


Figure 2: Supply of fertilizer by public (Agriculture Inputs Company Limited and Salt Trading Corporation Limited) and private sectors in Nepal during deregulation and subsidy period (1997/98–2016/17)

Finding of this research is consistent with the results of Raut and Sitaula^[7] who also have stated that following the deregulation of the fertilizer sector in 1999, there have been concerns that the supply of chemical fertilizers has not improved. Recently, in 2009, the government reintroduced the subsidy on chemical fertilizers. Given this, a central question to be addressed here is: In what ways can the fertilizer policy contribute to the present and future demand for food production in the country? In this context, it is important to examine the changing policies with regard to fertilizer and the institutional structures related to the supply of fertilizer.

Subsidy supply relationship of chemical fertilizer in Nepal

With the restoration of subsidy policy in the year 2009, fertilizer import and sell in Nepal has been continuously increased. Data show that government investment had been increased highly from 2008/09 to 2012/13 after which that was almost stagnant [Figure 3]. Direct relationship between subsidy amount and fertilizer import as well as sell was found in the country. However, the total supply of major source of NPK both by private and public sector could not be assessed due to unavailability of data on private sector supply. Total import in this graph includes quantity imported by AICL and STCL only. Nevertheless,

it can be stated that in spite of increased supply from public sector induced by greater subsidy provided by government, the total supply of chemical fertilizers in Nepal had not increased with the subsidy. Regarding the impact of subsidy in farm-level fertilizer use, a study from hill of Nepal reported that subsidy on an average increases fertilizer use by 38.7% among those who are eligible to get subsidy. However, among all smallholders subsidy reduced fertilizer use and productivity by 12.1 and 21.2%, respectively.^[12]

Present situation of organic fertilizer and its policy in Nepal

Organic fertilizer production in Nepal

Due to Nepal's constraints to supply quality chemical fertilizers on time, the production and use of organic manures including compost, farmyard manure (FYM), and other biofertilizers seemed compulsory. There were about 30 organic fertilizer producers with total capacity of 100,000 MT/year. Of total registered organic fertilizer producing companies in Nepal, 25 got 50% subsidy in purchasing machine from the department of agriculture. The total capacity of those 25 plants was estimated to be 90,000 MT/year. Some international companies are also working in production and distribution of organic fertilizers in Nepal.

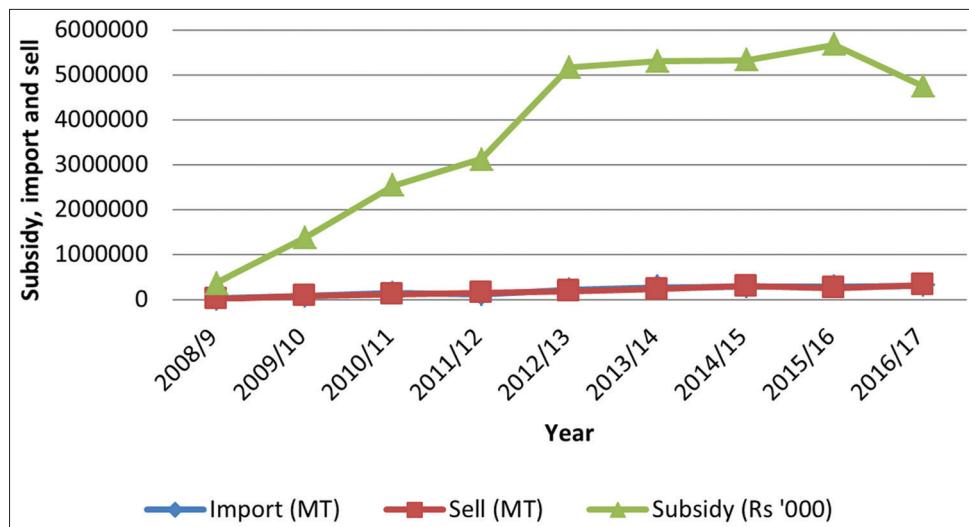


Figure 3: Fertilizer import, sell, and subsidy relationships in Nepal (2008/09–2016/17)

Organic fertilizer subsidy and distribution in Nepal

GON has started providing subsidies for biofertilizer production and use from 2011 when \$100,000 was allocated for subsidizing organic fertilizer, particularly vermin compost. Initially, 50% subsidy was provided in purchase of machine used in organic fertilizer production. In addition, MOAD provided price subsidy at the rate of NRs 10/kg of product or 50% of the sell price whichever is less to the farmers for maximum of 1500 kg to a farmer at 50 kg/kattah or 75 kg/ropani.

Data have showed that targets have not met in the distribution of organic fertilizer by MOAD in Nepal [Table 1]. Organic fertilizer subsidy program has not been found to be effective in the country. Poor nutrient content and lot-to-lot and product-to-product variation have been observed in organic products produced in Nepal (Balram Rijal, Personal communication, February 02, 2018). Bulkiness of product and difficulty in transportation and lack of quality assurance are the major issues for low consumption of organic fertilizers at farmers' level.^[13] Slow effect and use of locally produced FYM rather than purchased organic fertilizer are other reasons behind the ineffectiveness of the subsidy policy of organic fertilizer in the country. Due to ineffectiveness of subsidy in organic fertilizer reported from different sectors operating all over the country as well as some unfair trading reported, Supreme Court had announced stay order in the year 2017 after which there is no distribution of subsidized fertilizers from government sector in Nepal.

Source of Fertilizer

The study found that largest percentage of the farmer (61%) considers agrovets as the source of

chemical fertilizer [Table 2]. Similarly, 23% have reported that they get chemical fertilizers from cooperatives. Farmers getting fertilizers from AICL and STCL were found to be 4%. It revealed that majority of farmers in the study area depends on informal sector (agrovets, neighbors, and others) for chemical fertilizer. The result further indicated that even the subsidized fertilizers have been distributed by the informal sector that is not mandated. Major issue here is to investigate how the subsidized fertilizer reached to the hands of agrovets and retail shops.

The study had found that majority of farmers in the study area rely on informal sector including agrovets, neighbor, other farmers, and retail shops in getting organic fertilizers. It has indicated that formal sector (STCL and AICL, as well as cooperatives) has not been serving farmers adequately. Non-government organizations (NGOs) were found to be the major supplies of organic fertilizers. Some NGOs had been distributing organic fertilizers in the study area, but farmers were found not interested even in getting organic fertilizers provided free of cost. Based on responses of respondents, agrovets, retail shops, and neighbors were found to be the major informal sector suppliers of organic fertilizers. Only 7% of respondents had reported cooperative as the source of organic fertilizer.

Major fertilizer policies, orders, and directives in Nepal

Major policies, orders, and directives related to fertilizer procurement, distribution, and use in Nepal are as follows:

- Fertilizer Control Order 1999.^[14]
- Chemical Fertilizer Directives 2000.
- The National Fertilizer Policy 2002.^[15]
- National Fertilizer Policy Revisited 2009.
- Fertilizer Supply and Distribution Management (District Level) Procedure 2012 (2069).

Other plans and strategies related to fertilizer sector are as follows:

- APP 1995–2015.
- Tenth 5-year plan 2002–2007.
- National Agricultural Policy 2004.^[16]
- 3-year Interim Plan (2007–2010), (2010–2013), (2013–2016), and (2016–2019).
- Agricultural development strategy 2015–2035.

Nutrient assessment of organic fertilizers

Analysis of market available organic fertilizer products for their nutrient contents had shown that none of the sample have met its nutrient content as

Table 1: Distribution of subsidized organic fertilizer by MOAD in Nepal (2011/12–2017/18)

Year	Target (MT)	Distribution (MT)
2011/12	788	788
2012/13	3977	3177
2013/14	10,000	2615
2014/15	10,000	1128
2015/16	10,000	4053
2016/17	6925	4000
2017/18	Stay order from supreme court	

Table 2: Responses of the respondents regarding the source of chemical and organic fertilizer in the study area

Source	Chemical	Organic
	Frequency (%)	Frequency (%)
AICL/STCL	3 (3.8)	1 (5)
Agrovet	49 (61.3)	6 (30)
Coop/group	18 (22.5)	3 (15)
Retail shop	3 (3.8)	2 (10)
Other farmers	0 (0)	2 (10)
Neighbor	2 (2.5)	4 (20)
NGOs	0 (0)	5 (25)

AICL: Agriculture Inputs Company Limited, STCL: Salt Trading Corporation Limited, NGOs: Non-government organizations

that is claimed. Nutrient contents of the fertilizers were found 0–60% low than the claimed ones (average is taken if nutrient content is provided in range). Considering all organic fertilizer products and all nutrients, nutrient content in organic fertilizers included in the study was found 29% low than what the producers claim. Result revealed that all the market available products are of poor quality [Table 3].

Suggestions for policy implication

Based on the finding of this research, the researcher would like to suggest the following policy implications as some of the means of improving fertilizer supply situation in Nepal:

1. As supply of chemical fertilizer in Nepal is affected by many national as well as international context, uncertainty always exists regarding its supply and price. Relying on chemical fertilizer only has been badly affecting agricultural production in Nepal repeatedly. Therefore, government should take policy of bulk purchase (increasing lot size) at time of low international market price and maintain stock. It, on the one hand, reduces cost and, on the other, guarantees timely availability.
2. Policy to encourage organic production is to be implemented. Price premium, compensation, and insurance on organic product will be effective measures to encourage producers in adopting organic production techniques.
3. Mobilization of technical specialists should be greater making farmers know the rational use of chemical fertilizers.
4. Present subsidy policy did not bring positive vibes in smoothening fertilizer supply situation of the country. Thus, reduction in subsidy and focus on quality and timely supply may reduce government cost immediately and improve production also in long term. Similarly, attention is to be given for increasing return from fertilizer rather than just reducing price by subsidy.

Table 3: Laboratory analysis results of market available organic fertilizers

Sample	Nutrient claim (%)			Nutrient content (%)		
	Nitrogen	Phosphorus	Potash	Nitrogen	Phosphorus	Potash
Sample 1	2.2–2.35	2.2–4.8	1.5–1.75	1.8	2.0	1.3
Sample 2	2–4	2–4	1.5–2	1.2	1.5	1.3
Sample 3	1.5	0.5	1.5	1.0	0.5	1.4

5. Encouraging private sector's involvement in fertilizer procurement and distribution is very important. Their participation in fertilizer supply system can be increased through consortium finance, bank guarantee, subsidized interest rates, liberalized import and transportation facilities, and support in infrastructures (warehouses), particularly for big importers.
6. In advance, government-to-government (GTG) negotiation with fertilizer manufacturing countries in long term may assure the timely supply and safeguard against high and frequent international price fluctuations.
7. Subsidy in organic fertilizer is to be revisited. Instead, FYM improvement, composting, green manuring, and other organic practices should be encouraged through incentives, trainings, and supports.
8. Complete abolition of transport curtailing, road, and local taxes in fertilizer delivery may reduce cost.
9. Transport as well as transit agreements with neighboring fertilizer manufacturing countries along with others from where fertilizer enters to Nepal should be made. Provision of direct delivery from port of neighboring countries such as Bangladesh, India, and China to the destination (not only up to entry point) should be made. It may help to reduce cost and time of delivery.
10. As manufacture has been increasing in China, import from it is to be prioritized. GTG negotiation with China may improve supply system. However, extension of entry point facility and road to Kerung as well as Tatopani is prerequisite for this.
11. Previous studies (IBN) showed that establishment of chemical fertilizer plant in Nepal is almost infeasible in technical, economic, and commercial grounds. Therefore, it is better to share equity with China, India, and Bangladesh for fertilizer manufacturing. It would be followed by treating fertilizer as a free trade commodity between Nepal and India, Nepal and China, and Nepal and Bangladesh. It would be better to extend this agreement with other South Asian countries.
12. Nepal should make serious discussion with India in checking illegal trade between these countries. Harmonized subsidy policy between these two countries may be important in this issue. Further, informal trade from India should make a legal activity with some taxation system establishing fertilizer desks in major custom offices as well as in major entry routes. Nepalese government/local authority should negotiate with Indian/state government in this matter.
13. Present area limitation for subsidized fertilizer (eligibility criteria, i.e., 0.75 and 4 ha at most, respectively, in hill and terai) is not found scientific. Thus, maintaining equity is important. It is better to fix the amount of subsidized fertilizer per household based on crop area of farmers rather than simply by specifying area for terai and hill.
14. Since all cooperatives are not capable of procuring and distributing chemical fertilizers attributing to remoteness, fund limitation, and human resource limitation, selection of cooperatives for distribution of subsidized fertilizer should be based on their capacity rather than their years of establishment. Policy with the provision of institutional loans at lower cost for cooperatives should be made. Most of the cooperatives were found to be supplying fertilizers only in rice and wheat seasons. Permission to agrovets to distribute subsidized fertilizers may maintain regularity in supply.

CONCLUSION

Subsidy both in organic and chemical fertilizer is not the best solution for existing fertilizer-related problems in Nepal. Priority should be given to timely supply of required fertilizer than to providing subsidy only. Private sector role in supplying fertilizer should be acknowledged and that should be encouraged through legal as well as financial supports. Improvement of FYM and compost should be given higher priority and use of chemical and organic manure in combination should be promoted.

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