

# Behavior of Private Retailers in a Regulated Input Market: An Empirical Analysis of the Fertilizer Subsidy Policy in Nepal

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The private sector in Nepal participates in the regulated import and distribution of three types of subsidized fertilizer. However, almost 55% of the *agrovets* (family-owned microenterprises) that retail agricultural inputs do not comply. Many farmers rely on the fertilizer purchased through these *agrovets*, including subsidized ones. There is no private sector importer of the three types of fertilizer covered by the subsidy program, which indicates that the *agrovets* either acquire these through leakage in the government distribution system or through illegal cross-border trade from India, both of which are considered legal noncompliance. We discern the determinants for this noncompliant behavior of *agrovets* using logistic regression. The results from logistic regression suggest that the *agrovets* that are more likely to comply are registered, have membership in business associations, and have a higher number of competitors. Those with diversified business portfolios and covering a greater number of districts are less likely to comply. Key informants, consisting of both public and private sector stakeholders, were solicited for their views on solving this noncompliant behavior. The private sector

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unanimously asserts the need for deregulation of fertilizer imports and the participation of *agrovets* in the distribution of the subsidized fertilizer. In contrast, the public sector is skeptical of the ability and trustworthiness of the private sector in the import and distribution of quality fertilizer. We propose a middle ground to mitigate private sector noncompliance and suggest a policy revisit to increase the fertilizer supply and distribution efficiency.

*Keywords:* fertilizer subsidy policy, input retailers, Nepal, noncompliance, regulation

*JEL codes:* K42, Q18

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## I. Introduction

Distortions in agricultural input markets, especially in fertilizer markets due to subsidy, are common in developing countries both in South Asia and Sub-Saharan Africa, with some variation in the magnitude of subsidy for different types of nutrients (Druilhe and Barreiro-Hurlé 2012; Huang, Gulati, and Gregory 2017; Kishore, Alvi, and Krupnik 2019). The purpose of fertilizer policies in these countries, although they are market-distorting, is to increase the supply and use of fertilizer to stimulate agricultural output and farm income. The subsidy is a way to lessen the barriers to the use of fertilizer, but in most cases, fertilizer subsidies have become a political tool restricting their effectiveness and efficiency (Druilhe and Barreiro-Hurlé 2012). The provision of fertilizer, its marketing and distribution, and the use of subsidies to promote the uptake of fertilizer are common across developing countries (Huang, Gulati, and Gregory 2017). A wave of fertilizer subsidy reform started in many Asian and African countries after the global financial crisis. Cross-country assessments indicate that countries have different arrangements for private sector participation in the subsidy market (Huang, Gulati, and Gregory 2017; Kishore, Alvi, and Krupnik 2019). In contrast to most countries in Asia and Africa, Nepal reverted to its pre-1998 subsidy program in 2009, barring the private sector from importing and distributing fertilizer under the subsidy program.

Nepal imports all of the chemical fertilizers used in the country, but the amount imported is far less than the actual demand, leading to frequent shortages. To improve farmers' access to fertilizer, the Government of Nepal experimented with both a regulated fertilizer distribution system (before 1998) and a deregulated system (from 1998 to 2008). Primarily driven by concerns over the quality of fertilizer that was unregulated in their importation and distribution, as well as with increasing international fertilizer prices, the Government of Nepal revised the National Fertilizer

Policy in 2009 (Takeshima et al. 2017). This policy revision essentially ended the role of the private sector in the importation and distribution of chemical fertilizer by putting the private sector at a price disadvantage compared to the two parastatal agencies, the Agriculture Input Corporation Limited (AICL) and the Salt Trading Corporation Limited (STCL), that have a duopoly over the import and distribution of fertilizer at a subsidized price.

The import of subsidized fertilizer by the Government of Nepal is estimated to comprise around 60% of the country's total fertilizer demand (Hoyum 2012), and fertilizer subsidies have not been effective instruments for stimulating chemical fertilizer use in the country (Government of Nepal, Ministry of Agriculture and Development [MOAD] 2016, Takeshima et al. 2017). Paudel and Crago (2017) found a decrease in the annual agricultural yield of 22.6% and a decline in chemical fertilizer usage by 11.1% with the reintroduction of the fertilizer subsidy in 2009. They also showed that the fertilizer subsidy program increased the use of fertilizer by 38.7% among eligible households in the Hill region.<sup>1</sup> However, the impact of the fertilizer subsidy policy among farmers varies for those with landownership title versus those without and for those closer to a market versus those farther away (Takeshima et al. 2017). Many Nepalese kitchens have increasingly become dependent on imported food in recent years (Kumar 2020), and the reliance on foreign markets for agricultural goods has also increased fivefold in the last decade (Prasain 2020). The agricultural productivity of major crops in Nepal is far below that of its neighbors. In this regard, the impact of the fertilizer subsidy in Nepal, which accounts for the majority of the government's agriculture development budget, is more nuanced, even though poor agricultural productivity cannot solely be attributed to the nationwide fertilizer subsidy program or the use of fertilizer alone. The Agriculture Development Strategy, 2015–2035 (ADS) thus provides more pragmatic short-, medium-, and long-term solutions for fertilizer supply to improve productivity, including the introduction of vouchers rather than a direct subsidy on fertilizer (MOAD 2016).

Common sense dictates that the demand–supply gap would make it attractive for private sector entities to invest in fertilizer importation and distribution. However, private sector imports of three types of subsidized fertilizer have not been reported in recent years in Nepal, primarily for two reasons.<sup>2</sup> First, the illegal importation of

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<sup>1</sup>Nepal has three agro-ecological domains: (i) Terai (lowland adjoining India), (ii) Hill, and (iii) High-Hill (Mountain). The Terai region is dominated by rice- and wheat-based cropping systems, while the Hill region is dominated by maize-cropping systems.

<sup>2</sup>Fertilizer subsidies that started in 1973 were limited to diammonium phosphate and muriate of potash; they later were extended to urea. These are the three major types of fertilizer used in Nepal that have been covered by subsidy since the 2009 policy revision.

fertilizer by many petty traders along the Indian border discourages the private sector from legally importing and distributing subsidized fertilizer (MOAD 2016, Panta 2018, Singh 2018). Second, the distribution of subsidized fertilizer through only AICL and STCL puts the private sector at a disadvantage to sell at market price. In this regard, the reintroduction of the fertilizer subsidy in 2009 essentially crowded out the private sector from legally importing and marketing the three main types of fertilizers used in the country, even though there was significant unmet demand.

Reports, however, indicate that farmers significantly rely on fertilizer purchased through informal, private channels to meet demand (Kyle, Resnick, and Karkee 2017; International Maize and Wheat Improvement Center 2017). It is common to find many family-owned microenterprises, which are called *agrovets*, selling subsidized fertilizer primarily because it is complementary to other agricultural inputs they retail.<sup>3</sup> There is no private sector import and distribution of fertilizer under the subsidy program. This points to the fact that the *agrovets* either acquire them through leakage in the government distribution system or through illegal cross-border trade from India (Singh 2018), both of which are considered to be legal noncompliance. An unofficial estimate puts the illegally smuggled import of fertilizer from India at three times the official imported amount (Thapa 2006), while another estimate suggests it to be up to 80% of demand in some years (United States Agency for International Development 2012). The main fertilizer that comes from such illegal cross-border trade is urea and is mostly consumed in the Terai region, which comprises lowland districts adjoining India. This illegal import, to some extent, helps Terai farmers when there is a fertilizer shortage. However, farmers in the Hill region do not have similar access to illegally imported urea, which may be the reason why Hill farmers are willing to pay more for urea than their counterparts in the Terai region, especially when availability is assured (Ward et al. 2020).

The leakage of the subsidized fertilizer following import by the Government of Nepal and illegal imports have implications on the price that farmers pay for these fertilizers. Farmers complain about the ineffective monitoring of the subsidized fertilizer distribution and the level of supply that is far less than demand. The

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<sup>3</sup>*Agrovets* are supply stores for farmers that deal in seeds, chemical fertilizer and micronutrients, animal feed, tools, small farm machinery, veterinary supplies, pesticides, and other farmer needs in Nepal. They are locally based, predominantly individual or family-owned with limited investment and transactions, and specialize in the retailing of agricultural input, often providing agriculture-related advisory services to farmers. Microenterprises in Nepal are defined based on five criteria: (i) fixed investment of less than \$2000, (ii) self-managed (by entrepreneur or family), (iii) employ nine or fewer persons including the entrepreneur, (iv) annual transactions of less than \$20,000, and (v) use less than 10 kW of energy (Government of Nepal, Ministry of Industry, Commerce, and Supplies 2008; Karki 2013). The *agrovets* included in this study are family-owned microenterprises.

cooperatives that are supposed to sell subsidized fertilizer are out of stock when local *agrovets* have sufficient stock but sell at higher prices what are, in many instances, adulterated fertilizer (Rahut and Sitaula 2012). The farmers do not have much concern about who sells the fertilizer but rather want the assured availability of fertilizer and prefer the subsidy to continue. Another issue with the current distribution inefficiency is the leakage of subsidized fertilizer for nonagricultural use (e.g., in the plywood industry).

The objective of this paper is to discern the factors that explain the behavior of *agrovets* to indulge in a business activity (i.e., acquiring and retailing subsidized fertilizer) regulated by the Government of Nepal. In addition, the study seeks the perceptions of public and private sector stakeholders, who are referred to as key informants (KIs), on the potential policy options to mitigate such business practices and ways to improve fertilizer import and distribution.

The remainder of the paper is organized as follows. The following section presents a review of the literature around legal compliance by businesses in general, and micro and small enterprises in particular, followed by a short literature review on family-owned input dealers and retailers in developing countries. In Section III, we describe the methodology used in discerning the factors that explain unethical business practices. Then, we present the major characteristics of *agrovets* in Nepal, followed by a discussion of the results from the logit regression, together with the perceptions of KIs based on interviews. Finally, we provide our conclusions and offer some policy considerations.

## II. Literature Review

Private firms are expected to adhere to business ethics, which means meeting social and legal expectations (Okafor 2011, Abiodun and Oyeniya 2011). This social expectation, also referred to as corporate social responsibility, is more relevant to big businesses where they are expected to go beyond mere compliance for the greater good of society. On the other hand, legal compliance essentially is conformity to policies and procedures by all businesses as required by laws and regulations (Weinstein 2019). This legal compliance can vary based on the characteristics of a business (e.g., sector, size, and location). It may not always be in the interest of all businesses to act ethically, and many businesses tend to weigh benefits and costs in their compliance decisions (Bertilsson 2014). In recent years, many global brands, including some in the agriculture sector, have faced ethical scandals (Conconi 2019, Reuters 2019). The expectation for businesses to adhere to social and legal

expectations emerges from society's values and often correlates with a country's state of affairs in political, social, and economic environments (Ruud and Ruud 2011).

Most prior business ethics research has focused on large businesses (Thompson and Smith 1991). More recently, researchers are showing increasing interest in micro and small enterprises as well, albeit disproportionately more in developed countries. The rise of micro and small enterprises like family-owned or -managed microenterprises make an enormous contribution to the economy of a developing country (Azmat and Samaratunge 2009), and it is important to better understand their business practices. However, it is also important to acknowledge the diversity of firms within the micro and small enterprise sector and not lump them together for the purpose of business research, including the issues of regulatory compliance. For instance, petty traders, street hawkers, or small family retail stores operating in the informal sector (unregistered businesses) are hard for authorities to monitor for compliance. It has been reported that the enforceability of regulations is size-sensitive (Giugale, El-Diwany, and Everhart 2000), and many family-owned microenterprises choose to stay in the informal sector due to the perceived low risk of detection by the authorities, especially when regulations are burdensome (Sookram and Watson 2008). Also, they are more sensitive to uncertainty and less transparent with business behavior compared to nonfamily firms (Bianco et al. 2013). On the other hand, some family-owned microenterprises may be formal (registered) and can be monitored more easily for compliance.

The National Economic Census conducted in Nepal in 2018 (Government of Nepal, Central Bureau of Statistics 2021) suggests most business establishments are microenterprises (i.e., employing less than 10 persons). Of the total number of business establishments in Nepal, 50% are unregistered and account for 74% of total employment. About 91% of registered firms are micro establishments (1–9 persons employed), and the other 8% are small establishments (10–49 persons employed), suggesting that only around 1% of registered firms are medium-sized (50–99 persons employed) or large establishments (100 or more persons employed). Only 48% of micro establishments are registered, and 67% of these employ only one person. In Nepal, 75% of microenterprises, on average, employ three people and are primarily family-owned or managed, while around 60% of the microenterprises operate in the informal economy (not registered as a business) with a high rural concentration (International Labour Organization 2005). In addition, there is considerable disparity in persons employed per enterprise across sectors. While manufacturing-sector enterprises employ a higher number of persons per enterprise, agro-based enterprises are one of the businesses that employ the lowest. Researchers have shown that gender,

managerial foresight, age and size of the enterprise, financial contracts, and social networks are important determinants of the performance of microenterprises in Nepal (Thapa 2015). However, there is no existing literature around regulatory compliance of family-owned microenterprises in general and those operating in the agriculture sector in particular.

Business ethical issues can sometimes be universal to all businesses, while some can be more pertinent to certain business sizes, locations, or sectors in which they operate. In agriculture, unethical business practices are more common around food safety (Olsen and Bánáti 2013), use of chemicals and their impact on health and the environment (Carson 1962), treatment of agricultural labor (Thompson 2015), animal rights issues (Regan 2004), and agricultural biotechnology and genetically modified seeds (Paarlberg 2001, Bernauer 2003). However, these findings disproportionately cover the context of developed countries. Little has been explored around the behavior and practices of agribusinesses in developing countries, particularly for family-owned microenterprises.

In Nepal, the *agrovets*, or agro-dealers, which are known as input shops in some countries, are primarily microenterprises often owned and managed by households or individuals. Some researchers have suggested that these input shops tend to overprescribe or prescribe the wrong agricultural inputs like pesticides, thereby taking advantage of the ignorance and dependence of farmers on them for crop advisory services (Wesseling et al. 1997, Schreinemachers et al. 2017). In addition, bad business practices—such as fund misappropriation, failure to repay loans, and not paying managers and employees for their work—have also been reported among agro-dealers (Herman 2012). The retail sale of inputs—like bad seeds, counterfeit soil amendments, out-of-date chemicals, or recommending the use of inputs at unprofitable levels—are unethical practices that have been seen across countries (Alex 2019). The quality of inputs and the technical recommendations provided by the *agrovets*, in many instances, is questioned because there is a weak monitoring mechanism for such services (Food and Agriculture Organization of the United Nations 2010). However, it is not just the situational context under which the business operates (e.g., inadequate monitoring or stage of development of the country, tax rates, and competition) that have an effect on business malpractices; the personal (e.g., age, sex, and education), demographic (e.g., minority status and religion) and psychological factors of the owners or managers are equally important (Rest 1986, Serwinek 1992, Quinn 1997, Sharma and Dudeja 2013).

In many developing countries, fertilizer is a political commodity. The policies that encourage public-sector involvement in agricultural research, distribution of

inputs (through subsidies), and the marketing of agricultural produce can negatively impact agribusiness ethics (Burkhardt 1986, Thompson 2015). For instance, in Malawi, the private sector has been reported to act unethically and benefit from the input subsidy program in the short run rather than using the subsidies to promote the role of private sector business growth (Chinsinga 2011). Allegations of misuse of fertilizer vouchers by private sector distributors have also been reported in Malawi (Minot and Benson 2009; Kaiyatsa, Ricker-Gilbert, and Jumbe 2018). In this regard, business malpractices in the fertilizer value chain are also common in other countries and not limited to the *agrovets* and private sector in Nepal. However, there is only anecdotal evidence, and either no or limited literature, that relates to the determinants of regulatory noncompliance (unethical behavior) of agricultural input suppliers, especially family-managed microenterprises like *agrovets*. In this regard, our study will contribute to the existing literature gap.

### III. Methodology

An *agrovets* business survey, covering 95 respondents, was conducted by the Nepal Seed and Fertilizer Project in 2017 in the project's targeted area of operations.<sup>4</sup> Of the project's 26 target districts, only 13 districts were selected for this study. The purpose of the district selection was to ensure representation from all four provinces in the study area (out of seven provinces in the country) and all three agroecological regions in the country (Terai, Hill, and Mountain regions). Of the total 95 *agrovets* surveyed, 45 were from Hill and Mountain districts (at least four from each district), and the other 50 were from Terai districts (7–10 from each district). For the survey, six Terai districts, seven Hill districts, and one Mountain district were selected. In the fiscal year 2018/19, less than 2% of the total subsidized fertilizer was allocated to the Mountain region (small demand), and thus we surveyed only one Mountain district. Most Mountain districts have limited cultivable areas at lower elevations that resemble Hill districts (i.e., elevation, type of crops grown) where few *agrovets* operate. Thus, we combine the *agrovets* from this one Mountain district with those from seven Hill districts for the analysis in this paper. The survey was designed to best represent the study area, rather than the whole country. The location and type of districts are presented in the Table 1. The *agrovets* selected for the survey were from at least two

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<sup>4</sup>The Nepal Seed and Fertilizer Project is a United States Agency for International Development-funded project in Nepal that covers a total of 26 districts, including five districts in Bagmati Province that were affected by the 2015 earthquake.

Table 1. List of Surveyed Districts by Region and Province

Region Surveyed	Province and Number of Districts	Name of Districts
Terai (50 agrovets)	Sudurpachim (2)	Kanchanpur and Kailali
	Lumbini (4)	Bardia, Banke, Dang, and Kapilvastu
Hill (45 agrovets)	Sudurpaschim (1)	Baitadi
	Bagmati (2)	Singhuli and Sindhupalchowk
	Karnali (1)	Surkhet
	Lumbini (3)	Rukum, Arghakhanchi and Pyuthan
Total agrovets surveyed: 95 4 Provinces, 13 districts		13 districts

Source: International Maize and Wheat Improvement Center. 2017. Baseline Report: Nepal Seed and Fertilizer Baseline Survey. Kathmandu.

locations in each of the Hill and Mountain districts and at least three locations in Terai districts.

In 2019, we reached out to 14 KIs, 4 from the public sector and 10 from the private sector. The purpose of this follow-up with the KIs was to better understand the results from the survey conducted in 2017 and help articulate our discussion and conclusion. The four KIs from the public sector were those with knowledge of fertilizer policy, importation, and the distribution of fertilizer in the country. The 10 private sector KIs were those involved in the import or distribution of chemical fertilizer in the country. Two of the private sector KIs were members of the Nepal Fertilizer Entrepreneurs Association (NeFEA) that used to import and market different types of registered fertilizer, including subsidized ones, but currently deal only in unsubsidized fertilizer. NeFEA is a business association that lobbies the government and policy makers for private-sector-friendly fertilizer policies. The other eight private sector KIs were owners or managers of established *agrovets* in different districts. These *agrovets* are also eligible for NeFEA membership.

This paper estimated a logistic regression to determine factors that explain the unethical business practices (noncompliance) of family-managed microenterprises. This is a popular and well-accepted statistical method and has been applied to many different fields (Cramer 2002), including topics related to the legal compliance of both small and big businesses (Sifuni 2017). A binary logistic regression is a statistical method for analyzing a dataset in which a dichotomous outcome variable is regressed with one or more independent variables that determine the outcome. For our case study, the family-owned microenterprises (*agrovets*) may have two choices with respect to fertilizer regulation in the country: to comply or not to comply. Thus, we opt for a binary logistic regression model for this study. Following Wooldridge (2010),

we employ the following model to identify the predictor variables affecting noncompliance by *agrovets*:

$$P_r(Y = 1|X) = \text{logit}^{-1}(X\beta) = \frac{e^{\beta X}}{1 + e^{\beta X}} \quad (1)$$

where  $Y$  is the variable to predict, which takes two possible modalities (do not comply = 1, comply = 0),  $X = (X_1, X_2, \dots, X_n)$  as predictive variables (explanatory variables) that are either continuous or binary, and the linear function  $X\beta = (\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n)$ , where  $\beta_i$  are the coefficient estimates.

#### IV. Results and Discussion

Seed, pesticides, micronutrients, farm machinery, veterinary medicines, and fertilizer were the six major inputs sold by the surveyed *agrovets* (Table 2). The seed and pesticides were sold by all *agrovets*, while fertilizer was sold only by 55% of *agrovets* (the lowest among all six inputs). However, seed (74% of *agrovets*) and fertilizer (70% of *agrovets*) were considered the two most important inputs. Fertilizer is the only input where a higher percentage of *agrovets* (70%) considered it to be important for their business than the percentage (55%) of them that sold it. The 15% of *agrovets* who were not trading fertilizer in the survey year believed including fertilizer in their business mix would be helpful. Thus, there could be two reasons for their not trading fertilizer. First, they may have considered it unethical to go against the

Table 2. **Types of Agricultural Inputs Sold by *Agrovets* and Perceived Importance to Their Business ( $n = 95$ )**

Type of Inputs Sold	Share Selling This Input (%)	Share that Considered This Input of High Importance to Their Business (%)
Seed, including hybrid seed	100	74
Pesticides and chemicals	100	54
Micronutrients	87	39
Farm machinery and equipment	72	35
Veterinary medicines	67	52
Fertilizers	55	70

Note: *Agrovets* were asked to rank the importance of the listed inputs even if they did not sell them at the time of the survey.

Source: Authors' calculations based on International Maize and Wheat Improvement Center. 2017. Baseline Report: Nepal Seed and Fertilizer Baseline Survey. Kathmandu.

Table 3. Share of *Agrovets* that Sell Chemical Fertilizers

Details	Noncompliance		
	with Government Regulation	Percentage of Total <i>Agrovets</i> Surveyed ( $n = 95$ )	Percentage among <i>Agrovets</i> that Sold Fertilizer ( $n = 54$ )
<i>Agrovets</i> that sold subsidized fertilizer (urea, DAP, or MOP) only or together with other fertilizer (not subsidized)	Yes	57%	100%
<i>Agrovets</i> that sold both unsubsidized and subsidized fertilizer	Yes	9%	17%
<i>Agrovets</i> that participated in the seed subsidy program	No	32%	21%

DAP = diammonium phosphate, MOP = muriate of potash.

Source: Authors' calculations based on International Maize and Wheat Improvement Center. 2017. Baseline Report: Nepal Seed and Fertilizer Baseline Survey. Kathmandu.

regulation. Second, they probably do not have a viable way to acquire subsidized fertilizer either through government distribution channels or illegally from India.

All the *agrovets* that reported selling fertilizer were selling subsidized fertilizer (noncompliant), but only 17% of them were selling unsubsidized fertilizer in the survey year (compliant if received from STCL or private importers) (Table 3).<sup>5</sup> This level of noncompliance by the *agrovets* also reflects the strong preference of farmers for subsidized fertilizer vis-à-vis the unsubsidized ones. The percentage of *agrovets* that participated in the government's (legal) seed subsidy program is less than the number of *agrovets* that were involved in the (illegal) retailing of subsidized fertilizer (32% versus 57%), while 21% of the *agrovets* that sold subsidized fertilizer also participated in the government's seed subsidy program.

#### A. Summary Statistics of Variables Used in the Logit Model

This paper considers 13 right-hand side variables to explain the unethical business practices (noncompliance) of the *agrovets*. These are grouped into four categories, as indicated by G1, G2, G3, and G4 in Table 4. The first group (G1) has three variables related to the characteristics of *agrovets* owners. The second group

<sup>5</sup>The sale of subsidized fertilizer represents noncompliance as there was no private sector import of the three types of fertilizers subsidized by the government in the survey year. On the other hand, the sale of unsubsidized fertilizer is legal as long as the *agrovets* receive it through STCL or the private sector firms that import and market a small amount of fertilizer.

Table 4. Summary Statistics with the Difference in Mean of *Agrovets* that Comply or Do Not Comply

Variable Group	Continuous Variable	Comply	Do Not Comply	Mean ( $n = 95$ )	$p$ -value
G1	Owner's age (years)	41	37	38.62 (2.54)	0.01
G2	Households served in a month	1,307	1,458	1,393 (-0.44)	0.67
G2	Number of districts served	1.43	2.13	1.83 (-2.12)	0.04
G3	Age of <i>agrovets</i> business (years)	11.32	9.65	10.37 (1.12)	0.26
G3	Number of competitor <i>agrovets</i>	6.12	5.41	5.72 (0.83)	0.41
G3	Business diversity	3.51	4.22	3.91 (-4.79)	<0.001
<b>Binary Variables (Yes = 1, No = 0)</b>					
		<b>Percentage</b>		<b>(Prob &gt;  z )</b>	
G1	Owner sex (1 = Male, 0 = Female)	96%		0.46	
G1	Owner's social class (1 = Dalit or Janajati, 0 = otherwise)	24%		0.35	
G2	<i>Agrovet</i> in Hill district (1 = Yes, 0 = No)	47%		0.007	
G3	<i>Agrovets</i> with a business plan (1 = Yes, 0 = No)	28%		0.009	
G3	<i>Agrovet</i> provides some advisory services to farmers (1 = Yes, 0 = No)	33%		0.60	
G4	<i>Agrovet</i> resisted (1 = Yes, 0 = No)	97%		0.73	
G4	<i>Agrovet</i> with association membership (1 = Yes, 0 = No)	40%		<0.001	

Note:  $p$ -value is for the test for mean difference for continuous variables (with  $t$ -test value in parentheses) and Wilcoxon rank-sum test (Mann–Whitney) for binary variables.

Source: Authors' calculations based on International Maize and Wheat Improvement Center. 2017. Baseline Report: Nepal Seed and Fertilizer Baseline Survey. Kathmandu.

(G2) includes three variables related to the geographic location and reach of the *agrovets*. The third group (G3) consists of five variables related to the characteristics of the *agrovet* business. The fourth group (G4) consists of two variables related to *agrovets*' business registration and networking. Table 4 presents details of the variable name, overall mean (for continuous variables) or percentage (for binary variables), and  $t$ -test for difference of mean (for continuous variables) and Wilcoxon rank-sum test (Mann–Whitney for binary variables) between *agrovets* that comply and those that do not comply with government regulations.

The *agrovets* surveyed were managed by owners and run primarily by household members, and thus were family-owned microenterprises. The *agrovets* were overwhelmingly owned and managed by males, and a quarter of them were owned

by people from the Dalit or Janajati groups, which are socially disadvantaged groups. A typical *agrovet* is managed by a 39-year-old individual with an average business age of around 10 years. Only 28% of these *agrovet*s operated with some sort of business plan. A typical *agrovet* competes with six other *agrovet*s and serves around 1,393 households in an average of 1.83 districts (many serve more than one district). Around 47% of the surveyed *agrovet*s were from Hill districts, with a significantly higher proportion of compliant *agrovet*s in the Hill region compared to the Terai region.

Around 33% of *agrovet*s provided advisory services to farmers apart from the sale of agricultural inputs. The majority of these *agrovet*s were registered with the government, but only 40% had acquired membership in agricultural-input-related business entrepreneurs' associations (e.g., seeds, fertilizer, or pesticide-related associations). The surveyed *agrovet*s sold at least two and at most five types of inputs (not shown in the tables). We construct a business diversity index based on the number of agricultural inputs they traded (of the six input types listed in Table 2) and include this index as one of the explanatory variables in our model. If they trade two types of inputs, the index will be 2; if they trade three types of inputs, the index will be 3. Of the 13 variables listed in Table 4, only six variables show significantly different means (or different percentages for binary variables) between the compliant and noncompliant *agrovet*s. The variables that show significant differences are the age of the owner, number of districts served, business diversity, region of the *agrovet*s (Hill or Terai), if the *agrovet* has a business plan or not, and if the *agrovet* has a business association membership or not.

## **B. Results and Discussion from Logit Regression**

We use logistic regression to explain an *agrovet* owner's decision to comply or not to comply. The model converges in five iterations with a significant Chi-square ( $p$ -value < 0.001), indicating the model is a good fit. The results from logit regression (Table 5) show that none of the three personal characteristics of the *agrovet* owners (age, sex, and social class) are significant to explain the decision to comply or not to comply. Among the three variables related to the location and service reach, the variables for type of district (Hill = 1, Terai = 0) and the number of districts reached are significant, while the number of households reached is not. If the *agrovet* is located in the Terai region, the likelihood of noncompliance is significantly higher, which may be due to two reasons. First, the density of farmers and per-hectare fertilizer use in the Terai region is higher than in the Hill region (International Maize and Wheat Improvement Center 2017; Kyle, Resnick, and Karkee 2017). With this high demand,

Table 5. Results of Logistic Regression of the *Agrovets*  
(Y = 1 for Noncompliance, 0 = for Compliance)

Variable Group	Variables ( <i>n</i> = 95)	Coefficient	Standard Error	<i>p</i> -value
Characteristics of owners	Owner sex (1 = Male, 0 = Female)	0.31	3.08	0.92
	Owner age (years)	-0.03	0.06	0.58
	Owner caste (1 = Dalit or Janajati, 0 = Otherwise)	0.33	0.96	0.73
Geographic location and service reach	<i>Agrovet</i> location (1 = Hill, 0 = Terai)	-2.79	1.01	0.006
	Number of districts served	1.68	0.62	0.006
	Number of HHs served in a month	-0.001	0.0003	0.98
Business portfolio and competition	<i>Agrovet</i> business age (years)	0.0005	0.07	0.99
	Have a business plan (1 = Yes, 0 = No)	3.31	1.22	0.007
	Advisory services to farmers (1 = Yes, 0 = No)	-1.86	1.07	0.08
	Business diversity	3.63	0.89	< 0.001
	Number of competitors	-0.21	0.09	0.02
Business registration and networking	Registered <i>agrovet</i> (1 = Yes, 0 = No)	-6.02	2.52	0.017
	<i>Agrovet</i> is a member of association (1 = Yes, 0 = No)	-2.99	0.98	0.002
	Constant	-7.38	5.07	0.15
	LR chi2 (13)	79.40		
	Prob > Chi2	0		
	Pseudo R2	0.61		
	Log-likelihood	-25.25		

HHs = households.

Source: Authors' calculations based on International Maize and Wheat Improvement Center. 2017. Baseline Report: Nepal Seed and Fertilizer Baseline Survey. Kathmandu.

*agrovets* can fetch a better price if they sell fertilizer. In addition, due to their proximity to the Indian border, the *agrovets* in the Terai region are more likely to have access to fertilizer imported from India illegally.

We found that the greater the number of districts served by the *agrovets*, the higher is the likelihood of noncompliance; however, the number of households reached was not significant for explaining the likelihood of noncompliance. One may be tempted to believe that the number of households directly served would increase with the number of districts the business reached, but that is generally not the case. The *agrovets* that cover more districts tend to reach fewer households because they focus more on supplying satellite *agrovets* in rural areas rather than supplying

households directly. *Agrovets* that work as input dealers or distributors have a larger network and are located in relatively more urban areas. The results suggest that *agrovets* that face more competition in their business are more likely to comply. However, our results also suggest that the *agrovets* in the Terai region are less likely to comply even though the number of competitors is higher in Terai (six *agrovets*) than in the Hill (five *agrovets*). The positive relationship between competition and noncompliance may initially seem contradictory, but micro and small enterprise ethics literature suggests that micro and small enterprises with competitors try to avoid the mistakes and adopt the successful strategies of their rivals (Savaram 2019), which may be what is happening here.

The likelihood of noncompliance is significantly higher for *agrovets* with a business plan, but the age of the business is not significant. The positive relationship between having a business plan and noncompliance is rather surprising, and this could be due to the lack of a clear understanding of what is meant by a business plan. Since we did not ask the *agrovets* what they understood about having a business plan during our survey in 2017, we reached out to eight *agrovets* in different districts in 2019 through telephone. We found a business plan which was understood as different things by different *agrovets*. For the larger ones (primarily located in cities), a business plan meant a document with basic market and financial analysis that was prepared to seek credit from financial institutions rather than market and financial projections to guide their business. On the other hand, the smaller *agrovets* understood a business plan as a simple inventory of inputs in stock, outstanding orders, and debit and credit records.

The results suggest that the likelihood of noncompliance is negatively related to whether the *agrovets* provided advisory services to the farmers and whether the *agrovets* is located in the Hill region. The *agrovets* in the Hill region are more often the only means of agricultural advisory or extension services for farmers, mainly because of the travel distance (and travel time) to extension offices, compared to Terai farmers (International Maize and Wheat Improvement Center 2017). In contrast, Terai farmers have better access to government extension services but have more competition among the *agrovets*. Thus, the frequency of interaction and the trust between a farmer and *agrovets* is likely to be shallower in the Terai region than in the Hill region. Again, where there is trust between *agrovets* and farmers due to repeated interactions (i.e., small number of farmers visiting the same *agrovets*), it is harder to be noncompliant and involved in business practices regulated by the government.

The results suggest that noncompliance increases with business diversity, as shown by the positive and significant relationship between them. If an *agrovets* has identified its competitive advantage (in any one or a combination of the agricultural

inputs), then it is not necessary to be noncompliant and take the risk of being monitored and potentially punished by the authorities. It can be implied that those who cannot specialize are forced to diversify their *agrovets*' business and may use unethical practices, possibly only as a short-run strategy, to remain in business.

We also looked at the legal standing of *agrovets* (i.e., registration with the government) and their association membership to explain their compliance or noncompliance. We find that *agrovets* registered with the government and with commodity association membership are more likely to comply. While these commodity associations in Nepal are not actively monitoring their members for regulatory compliance, there are certain business incentives to remain compliant apart from not wanting to be caught and punished. For instance, many government and nongovernment agencies require agricultural inputs and support services for their agriculture development programs, where the government guideline require registration and regulatory compliance to participate.

### **C. Stakeholder Perceptions and Policy Implications of Fertilizer Value Chain Deregulation**

To put our results into perspective, we reached out to both public and private sector KIs, as described in the methodology section, with a focus on two specific points: (i) their knowledge about the leakage of subsidized fertilizer and the informal fertilizer trade along the Indian border, and (ii) their view on potential options to end unethical or illegal practices.

#### **1. Knowledge About the Unethical Business Practices of *Agrovets***

The public sector KIs are aware of the considerable leakage of subsidized fertilizer in the country, which is more common in Terai districts. They are also aware of the informal cross-border trade from India and do not refute that such informal imports can be helpful to farmers, especially when the government-subsidized fertilizer is not accessible. However, these KIs have doubts about the quality of fertilizer that enters the country informally, which is the same concern the government had during the period of fertilizer deregulation from 1998 to 2009. The public sector KIs accept the fact that the monitoring and coordination of fertilizer distribution and trade are poor, and they lack a reliable official estimate of either the domestic leakage or the illegal imports from India. In addition, the KIs also think the monitoring of fertilizer distribution and informal trade has become even more complicated in recent years, with the devolution of agricultural responsibilities to provincial and local

authorities. Currently, the federal government procures the fertilizer, but provincial and local authorities make distribution arrangements.

The private sector KIs, on the other hand, suggest that the leakage of subsidized fertilizer is more rampant than what the government acknowledges. These KIs report that the leakage and informal fertilizer trade is not only limited to the *agrovets* (which mostly goes to farmers) but also includes nonagricultural sectors, especially the use of urea in the plywood industry. With no private sector imports of urea fertilizer, it is evident that the source of urea for nonagricultural use has to be either the Government of Nepal imports (under a subsidy program) or informally traded urea from India. In addition, the private sector KIs report that some leakage probably happens before the fertilizer reaches the cooperatives (distribution points), possibly through registered but fictitious cooperatives.<sup>6</sup> These KIs also report higher leakage in Terai districts compared to Hill districts.

## **2. Potential Options to End Unethical Business Practices in the Fertilizer Value Chain**

The public and private sector KIs differ fundamentally in their preferred solutions to this noncompliance issue. The private sector asserts that they are helping farmers access fertilizer more easily, often saving the farmers time and transportation costs. In this regard, private sector KIs think they should be treated as useful actors in the fertilizer supply chain, rather than as transgressors. They assert that fertilizer retailing complements the sale of other inputs like seed, pesticides, and micronutrients for the *agrovets*. Thus, the current public sector monopoly in fertilizer distribution makes it difficult for the *agrovets* to serve as the last-mile service and input providers to the farmers. They also do not understand why the private sector can participate in other subsidy programs (e.g., organic fertilizer subsidy and seed subsidy programs) but not in the chemical fertilizer subsidy programs. They feel strongly about the need to completely deregulate the fertilizer sector or at least provide them with a level playing field by including them in the distribution of fertilizer imported under the subsidy program. They claim that the current fertilizer policy undermines their role in providing agricultural extension services and agricultural inputs to farmers. With this realization, NeFEA is trying to integrate *agrovets* located across Nepal to lobby for fertilizer policy reform.

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<sup>6</sup>The authors were not able to verify this claim. This is reported as heard from some of the private sector KIs.

The public sector KIs agree that the current arrangement is imperfect but are skeptical of the ability and trustworthiness of the private sector in the import and distribution of fertilizer. Their concern is primarily on the price and quality, rather than quantity, of fertilizer. This skepticism has been reported by other researchers as well, especially during the 1998–2009 period, when the government liberalized fertilizer trade and distribution (Shrestha 2010, Takeshima et al. 2017), and such skepticism persists. The public sector KIs indicated that efforts are underway to develop a fertilizer information system that will monitor the flow of imported and subsidized fertilizer in real-time once it enters the country, and the authorities will be able to track fertilizer from the point of import to the point of distribution (cooperatives). Still, it would not be easy to monitor fertilizer distribution and check the leakage at more than 7,000 distribution points in the country, nor would it solve the problem of insufficient fertilizer supply. The public sector KIs are not very positive about the idea of complete deregulation of fertilizer imports and distribution under the subsidy scheme. However, they foresee some sort of private sector participation in the distribution of government-imported subsidized fertilizer with effective monitoring, an arrangement similar to the voucher-based distribution of fertilizer as envisioned in the ADS (MOAD 2016).

## V. Conclusion and Policy Implications

In this paper, we try to understand the issue of legal noncompliance by *agrovets* (family-owned microenterprises), where they acquire and retail subsidized fertilizer in violation of government regulation. The private and public sectors have their views on this issue. The private sector asserts this restriction is a regulatory burden on microenterprises' survival and growth, as fertilizer has a high level of complementarity with the other inputs they retail. They expect the public sector to understand their difficulty and deregulate the fertilizer sector fully or partially so that they can continue to serve farmers in rural communities. This assertion by the private sector about their role in solving the last-mile problem is quite valid, as the reach of public extension services in Nepal is poor, but that cannot be the ground for noncompliance. On the other hand, the public sector is not yet ready for complete deregulation, as the private sector (including these family-owned microenterprises) are likely to repeat the same behavior that they showed during the fertilizer deregulation period from 1998 to 2009.

When the government and private sector agribusinesses compete in the same business space (i.e., distribution of agricultural inputs and outputs) rather than complementing each other, it negatively impacts private sector business ethics

(Burkhardt 1986, Thompson 2015). Based on experiences from other developing countries like Bangladesh, Kenya, and Malawi, experts suggest that government policies and investments must support—not control—a dynamic, private-sector-led fertilizer supply to sustainably increase fertilizer use (Samad 1999; Fondriest et al. 2012; Kaiyatsa, Ricker-Gilbert, and Jumbe 2018). The Government of Nepal must ensure that the regulations are enforced, but public policies should also recognize the important role the private sector (including *agrovets*) plays in the agriculture sector's growth. The private sector, on the other hand, should realize that their malpractices (by some enterprises) involving the quality and price of fertilizer during the 1998–2009 period still linger in the memory of the public sector (Takeshima et al. 2017). Thus, there is work to be done to build trust.

This makes it necessary to find a middle ground. In the short run, one such middle ground can be where the government manages the import of quality fertilizer to ensure there is enough to meet the demand and that the *agrovets* (in addition to cooperatives) are also allowed to participate in the distribution of fertilizer. However, we suggest the Government of Nepal also make necessary preparations to implement fertilizer voucher schemes to replace the direct subsidy, as suggested by the ADS. Once the voucher scheme is ready to be implemented, the density of distribution points can be increased by enrolling enough *agrovets* (together with cooperatives) in different parts of the country to efficiently distribute fertilizer. For this, a review and customization of voucher-based fertilizer distribution schemes in India and countries in Sub-Saharan Africa to suit the Nepalese context will be useful (Kato and Greeley 2016). Such an arrangement should provide some space and role for the private sector (including *agrovets*) in fertilizer distribution in the short to medium term. In the longer run, the private sector should aim to restore the public sector's trust to explore opportunities to import and distribute fertilizer within the bounds of government policies and regulations to improve farmers' access to fertilizer. The public sector can then focus more on periodic assessments of the fertilizer-related policies and implement effective monitoring mechanisms to minimize malpractices in the fertilizer value chain.

The short supply of fertilizer is a problem in the country. Rising fertilizer prices make it impossible to increase imports even amid growing demand, given the current fertilizer subsidy budget allocated by the Government of Nepal and the unlikelihood of a substantial increase in the annual fertilizer subsidy budget. There are a few options for the Government of Nepal to consider to increase the supply in the short to medium term. Urea (nitrogen nutrient) is the most demanded fertilizer in the country, and the shortage of this fertilizer is perennial. Urea currently has the highest subsidy per

kilogram (65% price subsidy) compared to diammonium phosphate (DAP) and muriate of potash (MOP) (35% price subsidy for each). In this regard, we suggest revisiting the current urea subsidy, taking advantage of the fact that some farmers (especially in the Hill region) are willing to pay more for urea when the supply is assured (Ward et al. 2020). A reduction in the urea price subsidy to 35% (at par with DAP and MOP) could potentially generate savings to manage aggregate urea demand in Nepal. This reduction in the urea subsidy would also disincentivize higher nitrogen application and incentivize the application of DAP and MOP, thereby promoting the balanced application of fertilizer.

Fertilizer import- and distribution-related problems in Nepal are not due to a lack of resources but result from the inherent inefficiencies in managing imports. Fertilizers are imported through lengthy global tenders (requiring at least 4 months). The contracting parties, in several instances, have an incentive to breach their contracts as the penalty for breach is often less consequential than supplying fertilizer at an increased global price. Dependence on one mode of supply (import through global tenders) alone is risky, thus we suggest diversifying the options. One potential solution can be a government-to-government agreement, preferably with neighboring countries like India and the People's Republic of China. Such government-to-government arrangements should at least ensure the availability of fertilizer (especially urea) during peak seasons (e.g., rice and maize cultivation). For DAP, a potential supplier could be Office Chérifien des Phosphates, Morocco, if the government can explore the possibility of a long-term arrangement. Another consideration for a land-locked country like Nepal is to plan for a buffer stock to safeguard against unforeseen circumstances, which in recent years have included disruptions related to COVID-19 and politically motivated transit barricades set up by India in 2015 (Ghimire 2015).

Despite the inherent inefficiencies in the current fertilizer import and distribution policies, including the administration of the subsidy program, the fertilizer subsidy in Nepal is here to stay in one or another form as fertilizer has become a political commodity (as in several other countries). To be realistic, fertilizer subsidies may have to be continued in some manner to keep Nepalese farmers competitive with neighboring countries that also have fertilizer subsidies in place. The Government of Nepal should partner with the private sector for a more efficient distribution of the available fertilizer rather than letting the current malpractices continue. The Government of Nepal issued a revised fertilizer distribution guideline in 2020 that opens a small space for the private sector to participate in fertilizer distribution. This new guideline is still very restrictive for *agrovets* (e.g., a cumbersome approval process to be eligible for distribution of subsidized fertilizer).

Researchers have shown that improper fertilizer use is related to environmental degradation, including a high concentration of nutrients in watersheds (Zhang et al. 2015, Paudel and Crago 2021). In this regard, the Government of Nepal should not only focus on increasing the supply and use of fertilizer in the country but also on maximizing nutrient-use efficiency, while being mindful of the associated environmental externalities and addressing the critical issue of food security and agricultural growth.

Even though the focus of this study is 26 districts covering four provinces, we believe the findings can be generalized to a fair extent to other provinces for three reasons. First, we cover all three regions (Terai, Hill, and Mountain) of the country. Second, three sides of the country (east, west, and south) share a border with India, and thus there exists the possibility for the *agrovets* in other districts adjoining India to have access to fertilizer illegally imported from India. Third, all *agrovets* in the country face the same regulations related to fertilizer import and distribution.

The indulgence of private sector agricultural input wholesalers and retailers in improper practices like overprescribing and overpricing has been reported in other countries as well (Wesseling et al. 1997, Minot and Benson 2009, Chinsinga 2011, Schreinemachers et al. 2017). Issues surrounding fertilizer supply and subsidy, and the role of the private sector, are common in most developing countries in Asia and Africa (Druilhe and Barreiro-Hurlé 2012; Kishore, Alvi, and Krupnik 2019). In this regard, the information we provide in this paper on the behavior of private sector input retailers in Nepal can be useful for cross-country learning, even as the details of fertilizer supply, policy, and regulations may differ in other developing countries.

## References

- Abiodun, Abolaji Joachim, and Joseph Omotayo Oyeniyi. 2011. "Ethical Dilemmas in Management: An African Perspective." *Journal of Business Systems, Governance & Ethics* 6 (2).
- Alex, Gary. 2019. "Understanding the Complicated Role of Input Suppliers in Agricultural Extension and Advisory Services." <https://www.agrilinks.org/post/input-supplier-roles-agricultural-extension-and-advisory-services>.
- Azmat, Fara, and Ramanie Samaratunge. 2009. "Responsible Entrepreneurship in Developing Countries: Understanding the Realities and Complexities." *Journal of Business Ethics* 90 (3): 437–52.
- Bernauer, Thomas. 2003. *Genes, Trade, and Regulation: The Seeds of Conflict in Food Biotechnology*. Princeton: Princeton University Press.

- Bertilsson, Jon. 2014. "The Slippery Relationship between Brand Ethic and Profit." *Ephemera Journal* 14 (2014).
- Bianco, Magda, Maria Elena Bontempi, Roberto Golinelli, and Giuseppe Parigi. 2013. "Family Firms' Investments, Uncertainty and Opacity." *Small Business Economics* 40 (4): 1035–58.
- Burkhardt, Jeffrey. 1986. "Agribusiness Ethics: Specifying the Terms of the Contract." *Journal of Business Ethics* 5 (4): 333–45.
- Carson, Rachel. 1962. *Silent Spring*. New York: Houghton Mifflin Company.
- Chinsinga, Blessings. 2011. "Agro-Dealers, Subsidies and Rural Market Development in Malawi: A Political Economy Enquiry." Future Agricultures Consortium Working Paper 031.
- Conconi, Robert. 2019. "With Corporate Scandals on the Rise, People Must Demand Accountability." *Observer*, October 9. <https://observer.com/2019/10/corporate-scandals-demand-accountability-c-suite/>.
- Cramer, Jan S. 2002. *The Origins of Logistic Regression*. Amsterdam: Tinbergen Institute.
- Druilhe, Zoé, and Jesús Barreiro-Hurlé. 2012. "Fertilizer Subsidies in Sub-Saharan Africa." ESA Working Paper 12–04.
- Fondriest, S. Nate Kline, Maria Wanzala-Mlobela, and Paul Makepeace. 2012. "Building an Enabling Environment for Fertilizer Sector Growth." EAT Fertilizer Policy Brief.
- Food and Agriculture Organization of the United Nations. 2010. "Agricultural Extension Services Delivery System in Nepal." <https://reliefweb.int/sites/reliefweb.int/files/resources/AgExtServDelSysNepal.pdf>.
- Ghimire, Binod. 2015. "Blockade Cruel, Inhumane." *The Kathmandu Post*, November 16. <https://kathmandupost.com/valley/2015/11/16/blockade-cruel-inhumane>.
- Giugale, Marcelo M., Sherif El-Diwany, and Stephen S. Everhart. 2000. "Informality, Size and Regulation: Theory and an Application to Egypt." *Small Business Economics* 14 (2): 95–106.
- Government of Nepal, Central Bureau of Statistics. 2021. "National Economic Census 2018 Analytical Report Informal Sector." Kathmandu.
- Government of Nepal, Ministry of Agriculture and Development. 2016. "Agricultural Development Strategy." Kathmandu.
- Government of Nepal, Ministry of Industry, Commerce, and Supplies. 2008. "Micro Enterprise Policy." Kathmandu.
- Herman, Grégory. 2012. "Food and Agriculture Organization of the United Nations Fact Sheet: Good Practice Fact Sheet—Niger." <http://www.fao.org/3/a-aq214e.pdf>.
- Hoyum, Raymond. 2012. *Nepal Fertilizer Demand and Plant Nutrient Assessment*. Washington, DC: Chemonics International.
- Huang, Jikun, Ashok Gulati, and Ian Gregory, eds. 2017. *Fertilizer Subsidy—Which Way Forward?* Muscle Shoals: IFDC International Center for Soil Fertility and Agricultural Development.
- International Labour Organization. 2005. "A Report on Micro and Small Enterprise Policy Review in Nepal." Kathmandu.
- International Maize and Wheat Improvement Center (CIMMYT). 2017. "Baseline Report: Nepal Seed and Fertilizer Baseline Survey." Kathmandu.

- Kaiyatsa, Stevier, Jacob Ricker-Gilbert, and Charles Jumbe. 2018. "What Does Malawi's Fertiliser Programme Do to Private Sector Fertiliser Sales? A Quasi-Experimental Field Study." *Journal of Agricultural Economics* 70 (2): 332–52.
- Karki, Bir Bahadur. 2013. "Micro Enterprises in Nepal: Prospect and Practices." *Janapriya Journal of Interdisciplinary Studies* 2 (August): 29–36.
- Kato, Tamahi, and Martin Greeley. 2016. "Agricultural Input Subsidies in Sub-Saharan Africa." *IDS Bulletin* 47 (2): 33–48.
- Kishore, Avinash, Muzna Alvi, and Timothy J. Krupnik. 2019. "Development of Balanced Nutrient Management Innovations in South Asia: Lessons from Bangladesh India, Nepal, and Sri Lanka." <https://csisa.org/wp-content/uploads/sites/2/2019/11/CSISA-Policy-and-Research-Note-14.pdf>.
- Kumar, Ramesh. 2020. "Nepal Agro Imports at All-Time High." *Nepali Times*, August 2. <https://www.nepalitimes.com/latest/nepal-agro-imports-at-all-time-high>.
- Kyle, Jordan, Danielle Resnick, and Madhab Karkee. 2017. "Improving the Equity and Effectiveness of Nepal's Fertilizer Subsidy Program." International Food Policy Research Institute (IFPRI) Discussion Paper 01685.
- Minot, Nicholas, and Todd Benson. 2009. "Fertilizer Subsidies in Africa: Are Vouchers the Answer?" IFPRI Issue Brief 60. Washington, DC.
- Okafor, Gloria Ogochukwu. 2011. "The Ethical Behaviour of Nigerian Business Students (A Study of Undergraduate Students' in Business Schools)." *Arabian Journal of Business and Management Review* 1 (3): 33–44.
- Olsen, Nina Veflen, and Diána Bánáti. 2013. "Ethics in Food Safety Management." In *Food Safety Management: A Practical Guide for the Food Industry*, edited by Yasmine Motarjemi and Huub Lelieveld, 1115–25. Amsterdam: Academic Press.
- Paarlberg, Robert L. 2001. *The Politics of Precaution: Genetically Modified Crops in Developing Countries*. Baltimore: Johns Hopkins University Press and IFPRI.
- Panta, Hari. K. 2018. "Supply Chain of Subsidized Chemical Fertilizers in Nepal." *Journal of the Institute of Agriculture and Animal Science* 35 (1): 9–20.
- Paudel, Jayash, and Christine L. Crago. 2017. "Fertilizer Subsidy and Agricultural Productivity: Empirical Evidence from Nepal." Paper presented at the Agricultural and Applied Economics Association Annual Meeting, Chicago.
- \_\_\_\_\_. 2021. "Environmental Externalities from Agriculture: Evidence from Water Quality in the United States." *American Journal of Agricultural Economics* 103 (1): 185–210.
- Prasain, Sangam. 2020. "Nepal's Overall Imports Have Gone Down but Agriculture Imports Continue to Expand, Hitting Record Rs250 billion." *The Kathmandu Post*, July 27. <https://kathmandupost.com/national/2020/07/27/nepal-s-overall-imports-have-gone-down-but-agriculture-import-continue-to-expand-hitting-record-rs-250-billion>.
- Quinn, John J. 1997. "Personal Ethics and Business Ethics: The Ethical Attitudes of Owner/Managers of Small Business." *Journal of Business Ethics* 16 (2): 119–27.
- Rahut, Nani, and Bishal Sitaula. 2012. "Assessment of Fertilizer Policy, Farmers' Perceptions and Implications for Future Agricultural Development in Nepal." *Sustainable Agriculture Research* 1 (2): 188–200.
- Regan, Tom. 2004. *The Case for Animal Rights*. Berkely: University of California Press.
- Rest, James R. 1986. *Moral Development: Advances in Research and Theory*. New York: Praeger.

- Reuters. 2019. "Bayer Says Won't Tolerate Unethical Behavior as France Probes Monsanto File." May 11. <https://www.reuters.com/article/us-bayer-france-monsanto/bayer-says-wont-tolerate-unethical-behavior-as-france-probes-monsanto-file-idUSKCN1SH0BR>.
- Ruud, Judith Kish, and William N. Ruud. 2011. "Law and Ethics: Society and Corporate Social Responsibility: Is the Focus Shifting?" *Journal of Academic and Business Ethics* 4 (2011): 1–31.
- Samad, Abdus. 1999. "Private-Sector Imports of Fertilizers and Pesticides in Bangladesh." In *Privatization and Deregulation: Needed Policy Reforms for Agribusiness Development*, edited by Surjit S. Sidhu and Mohinder S. Mudahar, 191–203. Dordrecht: Springer.
- Savaram, Ravindra. 2019. "Why 'Competition' Is Great for Small Businesses." <https://www.business2community.com/small-business/why-competition-is-great-for-small-businesses-02233045>.
- Schreinemachers, Pepijn, Hsiao Pu Chen, Thi Tan Loc Nguyen, Borarin Buntong, Lilao Bouapao, Shrinivas Gautam, Nhu Thinh Le, Thira Pinn, Phimchai Vilaysone, and Ramasamy Srinivasan. 2017. "Too Much to Handle? Pesticide Dependence of Smallholder Vegetable Farmers in Southeast Asia." *Science of the Total Environment* 593–594: 470–77.
- Serwinek, Paul J. 1992. "Demographic and Related Differences in Ethical Views among Small Businesses." *Journal of Business Ethics* 11 (7): 555–66.
- Sharma, Tejinder, and Manisha Dudeja. 2013. "Business Ethics in SMEs: An Empirical Study of Selected Units of Haryana." *International Journal of Indian Culture and Business Management* 7 (3): 307–23.
- Shrestha, Ram Krishna. 2010. "Fertilizer Policy Development in Nepal." *Journal of Agriculture and Environment* 11 (September): 126–37.
- Sifuni, Twamzehirwa Daudi. 2017. *SME Taxpayers Perceptions on Tax Compliance in Tanga City and Muheza District, Tanzania*. Morogoro: Mzumbe University.
- Singh, Dikshya. 2018. "Nepal-India Informal Trade in Agricultural Inputs: Evidence from a Small-Scale Survey." South Asia Watch on Trade, Economics and Environment Research Brief No. 2.
- Sookram, Sandra, and Patrick Kent Watson. 2008. "Small-Business Participation in the Informal Sector of an Emerging Economy." *Journal of Development Studies* 44 (10): 1531–53.
- Takeshima, Hiroyuki, Rajendra Prasad Adhikari, Sabnam Shivakoti, Basu Dev Kaphle, and Anjani Kumar. 2017. "Heterogeneous Returns to Chemical Fertilizer at the Intensive Margins: Insights from Nepal." *Food Policy* 69 (May): 97–109.
- Thapa, Ajay. 2015. "Determinants of Microenterprise Performance in Nepal." *Small Business Economics* 45 (3): 581–94.
- Thapa, Yam Bahadur. 2006. "Constraints and Approaches for Improving Fertilizer Supply for Meeting Domestic Demand." Economic Policy Network Paper.
- Thompson, Judith Kenner, and Howard L. Smith. 1991. "Social Responsibility and Small Business: Suggestions for Research." *Journal of Small Business Management* 29 (1991): 30–44.
- Thompson, Paul B. 2015. *From Field to Fork: Food Ethics for Everyone*. New York: Oxford University Press.

- United States Agency for International Development. 2012. "Nepal Fertilizer Demand and Plant Nutrient Assessment." Nepal, Economic, Agriculture and Trade Activity.
- Ward, Patrick S., Shweta Gupta, Vartika Singh, David L. Ortega, and Shrinivas Gautam. 2020. "What Is the Intrinsic Value of Fertilizer? Experimental Value Elicitation and Decomposition in the Hill and Terai Regions of Nepal." *Food Policy* 90 (January): 101809.
- Weinstein, Bruce. 2019. "What's the Difference Between Compliance and Ethics?" *Forbes*, May 9. <https://www.forbes.com/sites/bruceweinstein/2019/05/09/whats-the-difference-between-compliance-and-ethics/#808b2f675249>.
- Wesseling, Catharina, Rob McConnell, Timo Partanen, and Christer Hogstedt. 1997. "Agricultural Pesticide Use in Developing Countries: Health Effects and Research Needs." *International Journal of Health Services: Planning, Administration, Evaluation* 27 (2): 273–308.
- Wooldridge, Jeffrey M. 2010. *Econometric Analysis of Cross Section and Panel Data*, 2nd edition. Vol. 1. Cambridge: MIT Press.
- Zhang, Xin, Eric A. Davidson, Denise L. Mauzerall, Timothy D. Searchinger, Patrice Dumas, and Ye Shen. 2015. "Managing Nitrogen for Sustainable Development." *Nature* 528 (2015): 51–59.