FERTILIZER SUBSIDY POLICY AND ITS ECONOMIC IMPLICATIONS IN NEPAL

N. Upadhyay[1], N. Bhandari[2], S. Gairhe[1], N. Kafle[2] and M. Sapkota[2]

ABSTRACT

This research article examines the impact of fertilizer subsidy program on paddy cultivation in Nepal. The Government of Nepal has been subsidizing fertilizer for more than four decades. In Nepal, since 1950, fertilizer has become the most politically sensitive input. The present fertilizer subsidy is critically analyzed on the basis of its economic, social implication by employing three separate consumption functions for major three fertilizers (Urea, DAP and Potash) by using simple regression model. The impact has been further elaborated using descriptive statistical method supporting to secondary data. The regression results showed that change in price of fertilizer, subsidy scheme and arable land have significant effect on fertilizer consumption whereas irrigated area, paddy farming area and price of paddy does not effect on the volume of fertilizer use. The positive impact of fertilizer subsidy policy on productivity, profitability, food self-sufficiency and cost of production of paddy over time suggest that subsidy program still need to be promoted in order to achieve higher productivity.

Key words: Consumption function, economic impact, fertilizer subsidy, paddy farming.

INTRODUCTION

Paddy is intimately related to the overall growth of agricultural sector as it contributes the largest share i.e. 20.75% in terms of Agriculture gross domestic product (Khanal, 2013). It generates rural employment and provides raw material to the existing agro- based industries such as rice mills; paper mills (Bhandari *et al.*, 2017). Among cereals, paddy occupies the first position in terms of area (42.2%) and production (51.7%) (MoAD, 2015). Various plans, policies and programs have been formulated and implemented to promote paddy production. Successive governments have also provided support to stimulate paddy production by way of introducing guaranteed price schemes, major irrigation schemes and fertilizer subsidy schemes. NPK are the three major components of plant nutrition however Nitrogen is the most critical elements for paddy production. Fertilizer is an important input for agriculture production and has been a commodity of political importance in Nepal for long

1 Nepal Agricultural Research Council, Singhadarbar Plaza Kathamandu
Corresponding author: Email: namdevupadhyay@gmail.com
2 Department of Agriculture, HariharBhawan Kathmandu

time now (Shrestha, 2010). Fertilizer use is strongly associated with productivity and overall economic growth Takeshima *et al.,* 2016). It has played significant role to achieve substantial gain in agricultural productivity during green revolution (Carter *et al.,* 2014). There is, therefore, strong advocacy for fertilizer subsidy as tools to increase its consumption in developing countries (Sachs, 2004). Its consumption depends on price and ease of access (IDL group, 2006). There are several arguments in literature in both 'for' and 'against' the subsidy schemes of fertilizers. Positive activists advocate that subsidy reduces input costs and encourages farmers to adopt new technologies there by contributes to higher production and lower food prices. However, those who are against the subsidy policies argue that subsidy distorts the fertilizer use pattern thereby distorting overall supply chain. Notably, (Schultz, 1964) model farmers as rational profit maximizing agents and claim that subsidies distort fertilizer use away from optimal levels. Similarly, Duflo *et al.,* (2011) argue that fertilizer subsidies may lead to failure to supply the right amount of fertilizer at the right time, specifically in rural areas of developing countries. It is also likely that fertilizer subsidies might turn out to be regressive, with wealthier families well-connected to government officials benefiting more than subsistence farmers (Chibwana *et al.,* 2010; Pan and Christiaensen, 2012; Raut and sitaula, 2012; Lunduka *et al.,* 2013). Finally, fertilizer subsidies may lead to overuse of fertilizers and result in negative environmental externalities (Burch *et al.,* 2007). It also leads to heavy fiscal burden to government. Against this background, the main objective of the study is to analyze socio-economic implication of subsidy policy in Nepal. The study divided the time series data into four phases i.e. Phase I: Initiation of fertilizer use-(1950-1973), Phase II Earlier subsidies scheme (1973/74-1996/97), Phase III: Liberalization and subsidy removal (1997/98-2008/2009) and Phase IV: Contemporary subsidy scheme (2008/09-2016/17).

FERTILIZER SUBSIDY POLICY DEVELOPMENT IN NEPAL

In Nepal chemical fertilizer was introduced first time in early 1950's, but systematic effortsto promote chemical fertilizer in agriculture was started with establishment of Agricultural Input Corporation (AIC) in 1966. Government adopted cost plus approach until 1972.Under this approach, government add together the direct material cost, direct labor cost, and overhead costs for a product, and add to it a markup percentage in order to derive the price of the fertilizer. In 1973-1974 government introduced subsidy in fertilizer pricesin domestic marketsdue to skyrocketing price of fertilizers in international markets. AIC used to receive difference between actual cost and selling price as subsidy.

Nepal received fertilizers under grant aid from the countries like Germany, Canada, Japan and Finland until the late sixties. Some countries stopped the supply after 1991/92, while others reduced the volume. In the meantime, the government adopted liberal economic and deregulation policies. As part of the new economic policy subsidy schemes were either reduced or removed. In November, 1997, price subsidy in DAP and MoPwas completely removed while in Urea it remained until 1999.To institutionalize the deregulation policy, and to regulate the business under the policy, the government promulgated Fertilizer Control Order, 1999. To institutionalize the fertilizer deregulation policy Government promulgated Fertilizer (control) Order, 1997 and National Fertilizer Policy, 2002 that paved the way for private traders to stand at equal footing with AIC. In the same period AIC was terminated to form two companies namely, Agriculture Inputs Company Limited (AICL) responsible for fertilizer business and National Seed Company Limited (NSCL) responsible for seed business under Company Act, 1996. The deregulation package involved: **i)** removal of monopoly of the AIC in fertilizer trade by allowing the private sector to import and distribute the fertilizers with equal treatment for both the parties, **ii)** time-bound phase out of fertilizer subsidies and **iii)** decontrolling fertilizer price. In the same year 2002 government promulgated Fertilizer Policy thataimed to encourage domestic production, provisioned transport subsidy for selected districts of high hills and mid-hills, and aimed to create buffer stock to address potential shortage of fertilizer during the main cropping season. In 2009 government endorsed subsidy scheme to assure the supply of quality fertilizer and increase the purchasing power of poor Nepalese farmers.

DATA AND METHODOLGOY

The study was based on analysis of secondary data published on several government publications, statistical reports and journal article. Statistical information of Nepalese agriculture published by MoAD was the major source of data. The main objective of the study was to analyze socio-economic implication of fertilizer subsidy policy in Nepal. Following conceptual framework was used in analysis Table 1.

Table 1: Variable used and its expected outcomes

		Variable	Expected outcome
1.	**Direct impact**	Fertilizer use (consumption)	Increase
2.	**Indirect impact**	Production (yield, land under paddy extend, self-sufficiency in rice)	Increase
		Market impact (Paddy farm gate price, fertilizer price, rice consumer price)	Increase/Decrease
		Social impact (Expenditure on Subsidy, cost of production)	Increase/Decrease

ECONOMETRIC MODEL USED

Breusch-Godfrey LM test

It is a Lagrange Multiplier Test that resolves the drawbacks of the DW test. In particular, it tests for the presence of serial correlation that has not been included in a proposed model structure and which, if present, would mean that incorrect conclusions would be drawn from other tests, or that sub-optimal estimates of model parameters are obtained if it is not taken into account. Based on P value null hypothesis and alternative hypothesis are tested. The null hypothesis is for this test is H0: no autocorrelation and alternative hypothesis is Ha: autocorrelation.

Regression model

The analysis was based on data available from year 1991-2016 covering three major phases of fertilizer subsidy program. First phase was not considered in analysis due to unavailability of data. In order to determine the factor affecting fertilizer consumption multiple regression analysis was done taking sale of fertilizer as dependent variable and price of fertilizer, farm gate price of paddy, paddy area, arable land, policy change and irrigated area as independent variable. Major assumptions for the model and analysis were that all other factors that influence fertilizer use were remained unchanged. Dummy variables used to interpret policy changes. Further, it also assumed that total amount of different fertilizers issued for paddy cultivation during the given year utilized fully for paddy cultivation.

The model is as follows.

Q_t= f {(P *(f) (t)*), (P *(p) (t*-1)), (E *(p) (t)*), (D)}

Where

Qt - Quantity of fertilizer (Mt) used in year t

P (f) (t) - Price of Fertilizer (Rs. /Mt) in year t

P (p) (t-1) - Farm Gate price paddy (Rs. /Mt) in year t-1

E (p) (t) - Paddy Extent under Irrigation in year t

DU- Policy changes

RESULTS AND DISCUSSION

ECONOMIC IMPLICATION OF FERTILIZER SUBSIDY PROGRAM

Impact on fertilizer consumption

The direct and immediate objective of the fertilizer subsidy program is to increase the fertilizer consumption. This impact has been evaluated using both descriptive and econometric analysis. Changes in fertilizer consumption during 1991 to 2015 have shown in Figure 1. For study purpose we considered DAPS, Urea and Potash only. The results show consumption of fertilizer is highly sensitive to the subsidy policy. When government withdrew subsidy scheme the consumption reduceddrastically. The annual average growth of fertilizer consumption was negative in Phase II due to insufficient subsidy allocation by the government thereby hampering the import by AIC (Shrestha, 2010) and in Phase III due to subsidy removal. This resulted on the rise in the price of fertilizers, which made farmers unable to have access to quality fertilizers. Government largely failed to improve the supply and quality control of fertilizer (NARMA, 2006). After re-endorsement of subsidy scheme in 2008 the consumption of fertilizer increased dramatically to 148% in Phase IV (Table 2). Among three fertilizers DAP and Urea shows highly responsive to fertilizer subsidy policy however potash consumption growth is moreover stagnant. In Phase II however there was subsidy in Urea until 1999 the consumption growth is negative this is due to cut off of international grant support on fertilizer from countries like Germany, Canada etc which causes supply shortage reduces urea import thereby causing supply shortage.

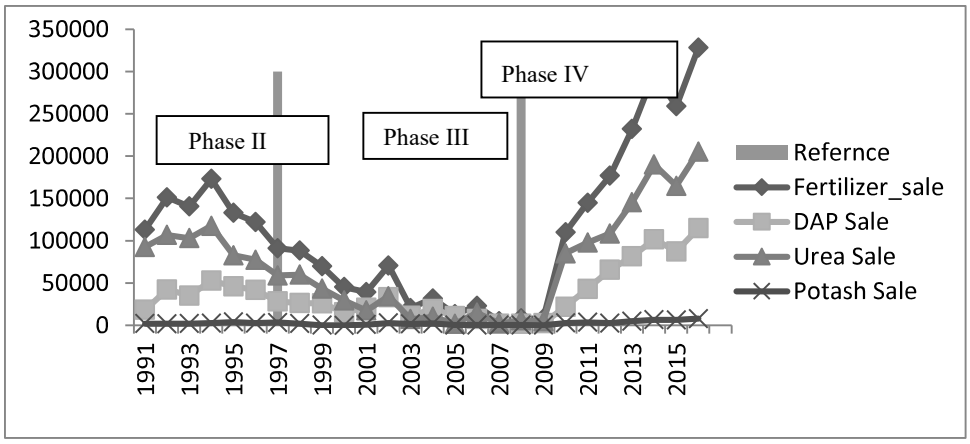


Figure 1. Fertilizer consumption Trend

***Fertilizer Sale includes sale of DAP, Urea and MOP only

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

Table 2: Annual growth of fertilizer consumption in different period of subsidy program

Period	Average annual growth of consumption (Percentage)			
	Over all	DAP	UREA	Potash
Phase II (1991/92-1996/97)	-1.16	18.13	-5.64	12.76
Phase III (1997/98-2008/2009)	-0.13	-8.99	53.76	141.08
Phase IV (2008/09-2016/17)	147.68	101.47	174.90	121.53

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

FERTILIZER CONSUMPTION FUNCTION

According to ASPR unofficial import from long open border with India constitute major portion of fertilizers being used in Nepal. But due to the lack of scientific system of projecting fertilizer demand it is difficult to estimate real demand in the country. Total fertilizer sale by AICC and STC was used to estimate for fertilizer consumption function.

Consumption function for DAP

Dependent variable: DAP Consumption

Independent variables: DAP Price, Paddy farm gate price, Land Extend, Policy change

Table 3: Multiple regression analysis on DAP use

DAP Consumption	Estimate	Std. Err.	T	P>t
DAP Price	6.095832***	1.140547	5.34	0.000
Lagged price of paddy	66.77267	174.8796	0.38	0.707
Irrigated land	-0.03645	0.023664	-1.54	0.14
Paddy Area	-0.0591	0.057038	-1.04	0.313
Fertilizer subsidyPolicy change dummy	30382.03**	10832.43	2.8	0.011
Arableland	0.553153***	0.159909	3.46	0.003
Constant	-1270952	399815.6	-3.18	0.005

R-squared = 0.7883, R-squared (adjusted for d.f.) = 0.7214, Root MSE = 16290Breusch-Godfrey LM test Chi-Square value = 1.442 (p value = 0.2297)

DAP sale = -1270952 + 6.09*DAP price + 66.77* PP - 0.036* IR -0.06 RA – 30382.03*DU + 0.55*AL

According to Table 3, there is a statistically significant relationship between the variables at the 95.0% confidence level. Breush-Godfrey LM test signifies that there is nopossible auto-correlation at 1% level. DAP consumption is highly dependent on DAP price, extent of arable land and policy change. Result shows that when the price of DAP is higher, the consumption is also higher. The increase in fertilizer consumption even at higher price is due to higher global demand (Triostle, 2008), untimely availability of fertilizers and uneven distribution (Thapa, 2011). It has also been observed the positive relationship between arable land and fertilizer subsidy policywith DAP consumption.

Consumption Function for Urea

Dependent variable: Urea Consumption

Independent variables: Urea Price, Paddy farm gate price, Land Extend, Policy change

Table 4: Multiple regression analysis on Urea use

Urea Consumption	**Coef.**	**Std. Err.**	**T**	**P>t**
Urea Price	-6.36139*	2.846339	-2.23	0.038
Lagged price of paddy	467.8579	416.6213	1.12	0.275
Irrigated land	-0.00566	0.053239	-0.11	0.916
Paddy Area	-0.05537	0.14911	-0.37	0.714
Fertilizer subsidy Policy change dummy	13422.61	25716.22	0.52	0.608
Arableland	-0.30142	0.373029	-0.81	0.429
Constant	841650.7	881622.2	0.95	0.352

R-squared =0.6916, R-squared (adjusted for d.f.) = 0.5943, Root MSE = 38219Breusch-Godfrey LM test Chi-Square value = 4.877 (p value =0.0272)

Urea Consumption = 841650.7-6.36139*UP+467.8579*PP-0.00566*IL-0.05537*RA+ 13422.61*DU -0.30142*AL

According to table 4, statistically significant relationship between the variables was observed at 95.0% confidence level. Breush-Godfrey LM test signifies that there is not possible auto-correlation at 1% level. Result showed that urea consumption is responsive to its own price as price of urea increases, its consumption decreases. It is inelastic to other factors. Demand for nitrogen fertilizer is more sensitive to its own price than is the case for phosphate and potash fertilizer (Burrell, 1982). Similar finding was get by Takeshima *et al.*, (2016) i.e. one-unit increase (decrease) in urea price reduced (increased) the

farm household's purchase of urea by 0.256 kilogram on average, ceteris paribus.

Consumption function for MOP

Dependent variable: MOP consumption

Independent variables: MOP Price, Paddy farm gate price, Land Extend, Policy change

Table 5: Multiple regression analysis on MOP use

MOP Consumption	Coef.	Std. Err.	T	P>t
Potash Price	0.254073*	0.101761	2.5	0.022
Lagged price of paddy	4.110421	17.36303	0.24	0.815
Irrigated land	-0.0000485	0.00229	-0.02	0.983
Paddy Area	-0.00065	0.005696	-0.11	0.91
Policy change dummy	1924.306*	1061.094	1.81	0.086
Arableland	0.015401	0.013452	1.14	0.266
Constant	-37037.9	34011.25	-1.09	0.29

R-squared = 0.7883, R-squared (adjusted for d.f.) = 0.7214, Root MSE = 16290Breusch-Godfrey LM test Chi-Square value = 2.957 (p value =0.0855)

PotashSale=-37037.9+0.254073*KP+4.110421*PP-0.0000485*IL-0.00065*RA+1924.306*DU+0.015401*AL

According to Table 5, there is a statistically significant relationship between the variables at the 95.0% confidence level. Breush-Godfrey LM test signifies that there is no possible auto-correlation at 1% level. Based on the statistical analysis, potash consumption depended upon potash price and policy factors. Other independent variable did not show any significant effect.

PRODUCTION IMPACT

Production and Yield response of Subsidy program

Paddy production shows increasing upward trend in Phase II and Phase IV. The growth was stagnant during Phase III. The annual average growth rate of paddy production before during period of withdrawal of subsidy was only 0.09% per annum (Table 6). During second phase of subsidy program, i.e. from 1991 to 1997 growth rate of production was 3.91%. Similarly yield was also increased in subsidy phase II and Phase IV with rate of 2.16% and 1.8% respectively which was higher as compared to subsidy withdrawal period. However in year 2009/10 paddy Production was decreased across the country due to due to late monsoon

rain in different part of countries during the plantation and excessive and damaging rainfall during the pre-harvesting period. In FY 2012/13 late and erratic rainfall resulted in significant losses for paddy In addition, lack of timely fertilizer supply also affected crop production. In FY 2014/15, paddy area dropped to a near record level due to late paddy transplantation as a result of the late arrival ofthe monsoon and the loss of crop area from floods and drought in some mid-western and eastern districts. In year 2015/16 paddy production declined due to unavailability of chemical fertilizers during the prime growing period of paddy resulted from transportation crippled by a prolonged unrest in the Tarai.

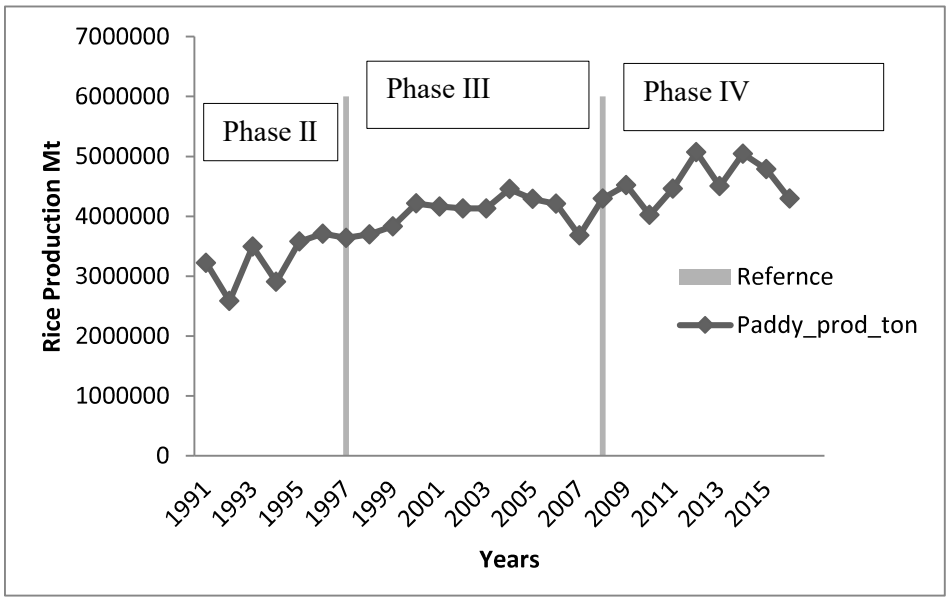


Figure 2. Paddy production trend in Nepal

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

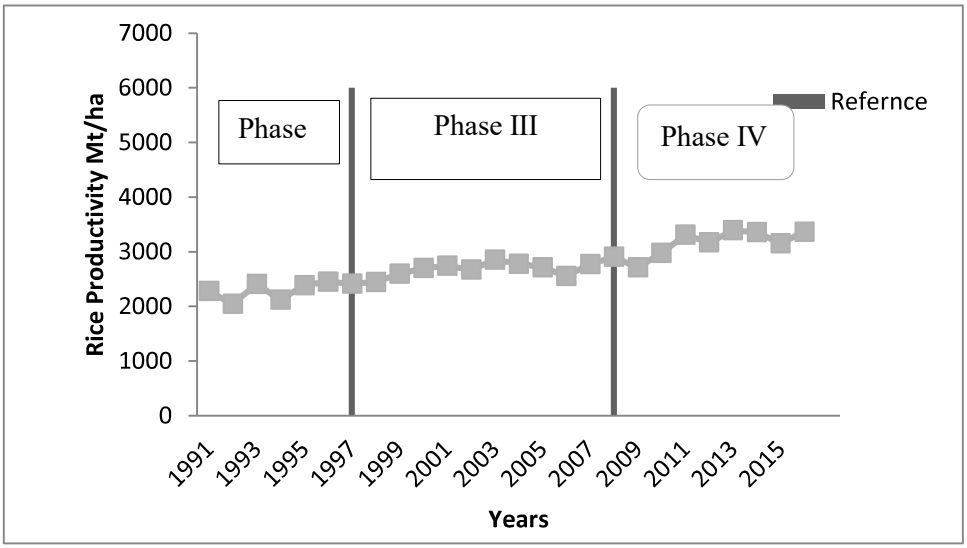


Figure 3. Paddy productivity Trend

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

Table 6: Average Annual growth of of production and Yield at different period of subsidy program

Period	Average annual growth (%)	
	Production	Productivity
Phase II (1991/92-1996/97)	5.08	2.16
Phase III (1997/98-2008/2009)	0.09	1.12
Phase IV (2008/09-2016/17)	3.91	1.84

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

Arable land and Paddy Cultivated land

The result showed that the subsidy policy does not put any effect on the arable land and paddy cultivated area. However the arable land and paddy area was reduced as compared to phase II in phase III and Phase IV. This is may be due to migration of the hill people in Terai which leads to decline in the cultivable land and paddy area.

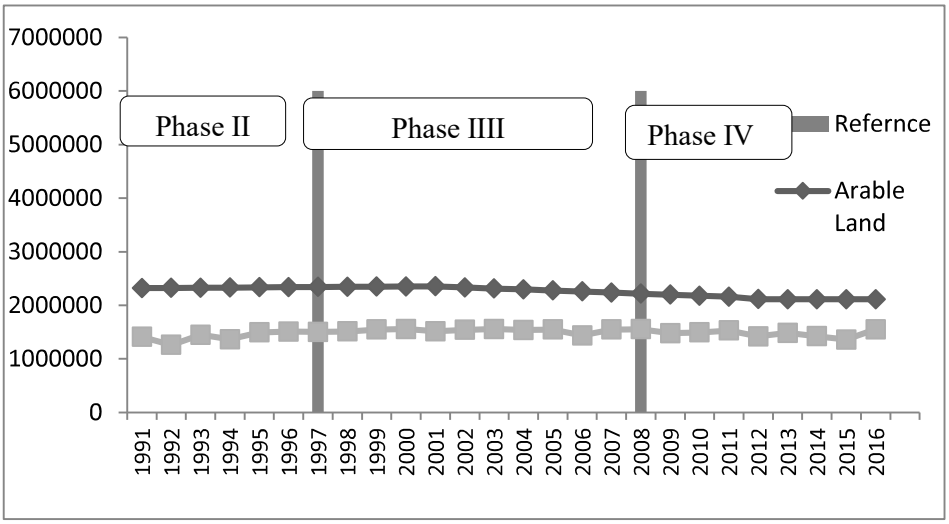


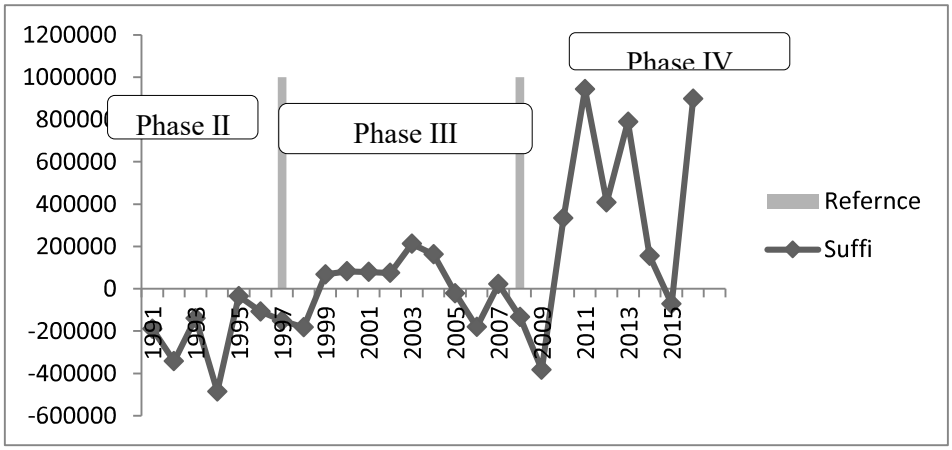
Figure 4. Arable land and Paddy Area in Nepal

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

Food Self Sufficiency

One of the major objectives of the fertilizer subsidy program Nepal is to sustain the country by achieving self-sufficiency in food. Therefore, it has considered as one of the major contributor to production impact. Following Figure 5 shows that the food sufficiency was achieved after fertilizer subsidy program.

Figure 5. Food Self-sufficiency status of Nepal



Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

MARKET IMPACT

Market impact due to fertilizer subsidy has analyzed through changes of retail price of rice, paddy farm gate (Producer price) and Fertilizer retail market price since those are most important variable to analysis market impact of fertilizer subsidy program.

Retail price of rice

According to the figure 6 as below, there is a general increment of retail price of rice in Nepal. The pattern of change is unique for different types of rice. Although the time series data showed the increment in paddy production, the price has not fallen down as expected. This may be due to the price regulation by governing body on market system.

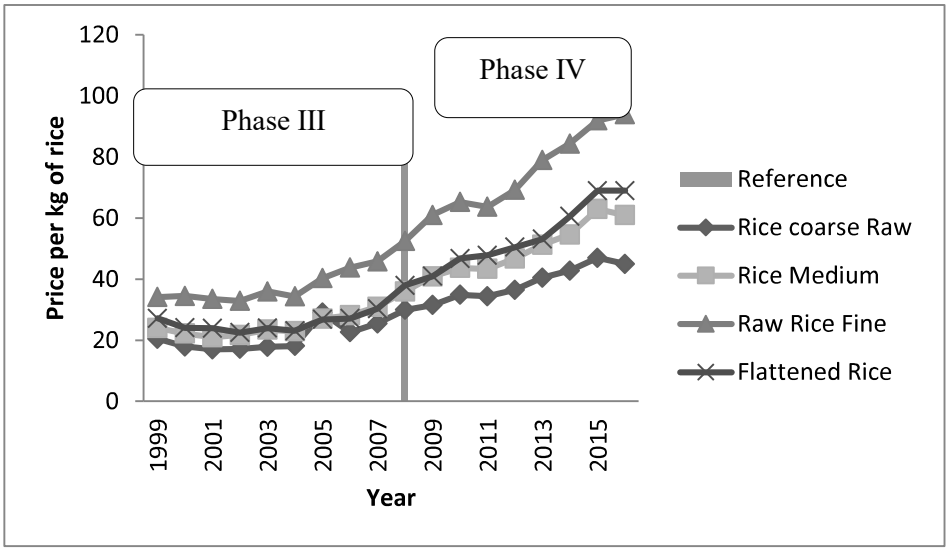


Figure 6. Retail price of Different types of Rice

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

Paddy Farm Gate Price

Paddy price has heavily fluctuated during the study period. Price stability of farm gate is seen during phase II. But after exclusion of subsidy program pricehas been fluctuated and has risen slowly. Again after inclusion of subsidy program its price remarkably increased and was highest in 2010. Late onset of monsoon is said to be the factor for the escalation of paddy farm gate pricein2010. Then after, it has been observed decrease in pricesalong with stability. Therefore subsidy has found to be stabilizing effect on farm gate price as shown in Figure 7.

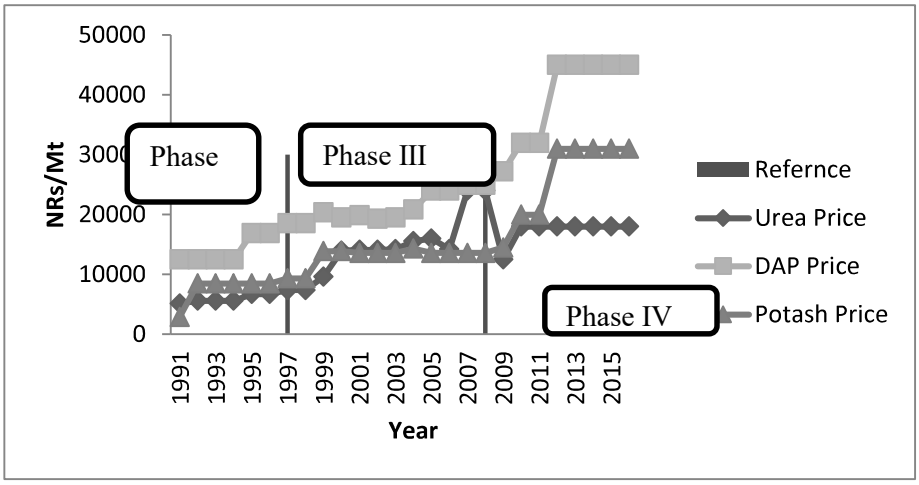


Figure 7. Farm gate price of paddy

Source: Based on calculation made using data from FAO STAT

Fertilizer Retail market Price

The fertilizer prices were stable from 1991 to 1997 due to price subsidy in this period. Similarly price hiked from 1997 to 2007. At the end of 2008 the price of the urea was at peak. Then after inclusion of subsidy scheme the price again stabilizes but its price was hiked due to appreciation of US dollar, price fluctuation of in international market and freight rate shown in Figure 8.

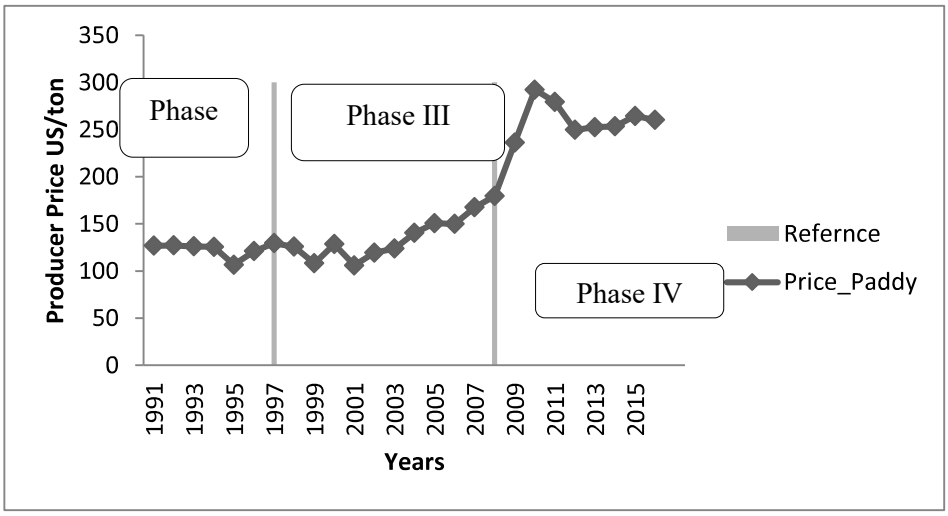


Figure 8. Fertilizer retail price at Market in Nepal

Source: Based on calculation made using data from Statistical information on Nepalese agriculture 2016/17

SOCIAL IMPACT OF FERTILIZER SUBSIDY

Subsidy on fertilizer is supposed to be the government contribution for the social welfare, which has an opportunity cost for use on other social welfare activities including infrastructure development, educational and health improvement program. Table 7 shows the Public expenditure on fertilizer subsidy andits share to total government expenditure. Government expenditure of fertilizer subsidy has decreased over time as compared with national budget expenditure as shown in Table 7.

Table 7: Fertilizer Subsidy as a Percentage of total Government expenditure

Year	Expenditure on Fertilizer subsidy (Rs. Millions)	Expenditures on fertilizer subsidy as a % of total government expenditure
2013/14	5709.8	1.54
2014/15	5615.357379	1.31
2015/16	5440.306546	1.10
2016/17	4809.668172	0.66
2017/18	4807.914	0.97

Source: Economic survey 2017/18 Ministry of finance and fertilizer unit MoAD

E *Cost of production and revenue of Paddy production*

Concerning cost of production and profitability of paddy farming in Nepal is 17.49 Rs/kg as per the data of 2013/14. In whichthe cost of labor, farm power and tradable inputs constitutes 57%, 22.05%, 11.69% respectively. Based on the literature analysis, cost incurred by fertilizer application is nearly 6% of total cost. In Nepal current cost of production of paddy is 17.04 Rsper kg. Based on calculation subsidized fertilizer saves 0.66% in total cost, 16.88% in fertilizer cost and increases 4.73% of total profit at farm level.

Table 8: Cost of production of paddy in one hectors

		Cost of production in NRs.		% change
		Without subsidy	With subsidy	
A	Total cost	70863.2	70394.5134	-0.6614
B	Fertilizer cost	2777.4	2308.71342	-16.875
1	DAP	1518.7	1522.62783	
2	Urea	629.7	386.322139	
3	Potash	629	399.763448	

C	Total Revenue	80772.7	80772.7	0
E	Total profit	9909.5	10378.1866	4.729669

Source: Authors calculation based on data of market research and statistics management program 2014/15

CONCLUSION

The fertilizer use has wider impacts on socio-economic perspective of farmers. Every government policies have prioritized it as leading driver for increased agricultural production. This paper has analyzed genesis and development of fertilizer policy and it's attributed outcomes in Nepalese Economy. The research identified fertilizer subsidy significantly contributing to consumption of major three types of fertilizer like DAP, UREA and MOP. Beyond this sale of fertilizer are elastics to its own price. The consumption of DAP fertilizer also dependent on extent of arable land. It also contributes to production and productivity growth in paddy farming therefore contributing to the food self-sufficiency. It is also found helpful for stabilizing market price of fertilizers, reducing cost of production and hence profitability of farmers. Therefore there is strong justification for fertilizer subsidy program for accelerating agriculture growth and promoting self-sufficiency.

RECOMMENDATION

Based on above conclusion drawn the fallowing recommendation are drawn.

- DAP and potash consumption shows significant response on policy change so government should give more emphasis on providing subsidy to DAP and potash.
- Fertilizer subsidy scheme should be continued as it has larger impact on paddy production and productivity, food self-sufficiency, profitability of farmers, and reducing per unit cost of production.
- In order to increase fertilizer consumption per hector government should lower the price of fertilizer, give more subsidy and increase cultivated land by making people work on agriculture.
- Though the allocated amount for the fertilizer subsidy seems to be increasing year after year, actually government has reduced expenditure on fertilizer subsidy as compared to total government expenditure. To the extent in which supply meets the demand for the fertilizer the government should increase subsidy amount on fertilizer associated with other inputs so as to harvest full potentiality of crop and land.

REFERENCE

ADS, 2014. Agricultural Development Strategy - Asian Development Bank, June 2013 retrieved from www.adb.org/sites/default/files/project-document/78233/43447-022-nep-tacr-01.pdf.

Bhandari, D. Sanjel, P.K. and Adhikari, S., 2017.Policy Review of Paddy Production in Nepal. Kathmandu, for the Ministry of Agriculture and Cooperatives, Kathmandu, Nepal

Burch, D. Lawrence, G. Green, G. Ichijo, K. Nonaka, I. Pimentel, M. Bower, J. Gilbert, C. CoutoFilho, V. and Flavio, L., 2007. World Development Report 2008: Agriculture for development. Number E14 231. The World Bank.

Burrell, A., 1982. The demand for fertilizer in the United Kingdom. Journal of Agricultural Economics, Vol. 40:1-20.

Carter, M. Laajaj, R.R. and Yang, D., 2014. Subsidies and the persistence of technology adoption: Field experimental evidence from mozambique. Technical report, National Bureau of Economic Research.

Chibwana, C. Fisher, M. Jumbe, C. Master, W.A. and Shively, G., 2010. Measuring the impacts of malawi's farm input subsidy program. Available at SSRN 1860867.

Duflo, E. Kremer, M. and Robinson, J., 2011. Nudging farmers to use fertilizer: Theory and experimental evidence from kenya. The American Economic Review 101(6), 2350–2390.

IDL Group. 2006. APP Implementation status report (vol. I): Main Report prepared by NARMA Consultancy Pvt. Ltd. and SEEPORT Consultancy Pvt. Ltd. Nepal for the Government of Nepal.

Khanal, B.,2013. S*hare of Agriculture GDP in Nepal, 2013/14 RetrivedFrom* khanalbadri.blogspot.com/2014/07/share-of-agriculture-gdp-in-nepal-201314.html.

Lunduka, R. Ricker-Gilbert, J.and Fisher, M., 2013.Whatarethefarm-levelimpactsof Malawi's farm input subsidy program? a critical review. Agricultural Economics 44(6), 563–579.

MoAD, 2015. Selected indicators of Nepalese agriculture and population. Government of Nepal, Ministry0 of Agricultural Development, Agri-Business Promotion and Statistics Division, Singhdurbar, Kathmandu, Nepal.

NARMA, 2006.*Impact of fertilizer deregulation policy.* Prepared by NARMA Consultancy Pvt. Ltd.

Pan, L. and Christiaensen, L., 2012. Who is vouching for the input voucher? decentralized targeting and elite capture in tanzania. World Development 40(8), 1619–1633

Raut, N. and Sitaula, B. K., 2012. Assessment of Fertilizer Policy, Farmers' Perceptions and Implications for Future Agricultural Development in Nepal. Sustainable Agriculture Research, 1(2), 188. doi:10.5539/sar. v1n2p188

Sachs, J., 2004. The case for fertilizer subsidies for subsistence farmers. Technical report, Working Paper, the Earth Institute at Columbia University.

Schultz, T. W., 1964. Transforming traditional agriculture. Transforming traditional agriculture.

Shrestha, R., 2010. Fertilizer Policy Development in Nepal. Journal of *Agriculture and Environment*, 11, pp.126-137.

Takeshima, H. Adhikari, R.P. Kaphle, B. Shivakoti, S and Kumar, A.,2016. Determinants of Chemical Fertilizer Use in Nepal: Insights Based on Price Responsiveness and Income Effects (February 12, 2016). IFPRI Discussion Paper 1507. Available at SSRN: https://ssrn.com/abstract=2740540 or http://dx.doi.org/10.2139/ssrn.2740540

Thapa, S., 2011.Impact of Rising Global Fertilizer Prices on the Nepalese Agriculture Sector. 1. 87-97.

Trostle, R., 2008. Global agricultural supply and demand: Factors contributing to the recent increase in food commodity prices. US Department of Agriculture, WRS-0801.