



## Research Article

# Factors Affecting Potato Marketed Surplus in Kavre District of Nepal

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### Abstract

Potato is a staple food crop. It has been being a highly consumed food grown in all parts of Nepal. A study was conducted to identify the factors affecting the potato marketed surplus, taking randomly selected 100 potato growing households in Kavre district of Nepal. Face to face survey with semi structured questionnaire for primary data collection and secondary information was collected through review of relevant publications from the government authority. Descriptive statistics and econometric model were used for data analysis. The multiple linear regression model was used to identify the determinants of potato marketed surplus. It was revealed around 81% of the total potato production was usually sold to the market and the remaining 11% and 9% of potato were used for seed and home consumption respectively. The multiple regression model indicates that among the seven variables used namely area of potato production, NARC released potato varieties, experience of farmer, education level, price and selling to traders were significantly influenced to the marketed surplus of potato in Kavre. Farmers' access to quality inputs services and capacity building training for enhanced production and strengthening backward and forward linkage for effective marketing.

## Introduction

Potato (*Solanum tuberosum*) is an important food crop grown in almost in mid hills and mountains of Nepal (FAO, 2013). Potato is a high value crop and it is regarded as a popular vegetable crop in terai region. It has an important role in food security and income generation (Lama *et al.*, 2016). Potato can be grown in wide range of climatic condition starting from Terai (70 masl) to High Mountain (4400 masl). The national production of potato crop is 3,131,830 mt and the area covered by potato cultivation is around 188,098 hector in Nepal. The average productivity is around 16.6 t/ha (MoALD, 2021). Similarly, the average per capita potato consumption in Nepal is around 29.9

kg/year (CBS, 2019). It contributes 2.17% of national GDP and 6.57% of AGDP. It stands in fourth rank following the rice, maize and wheat in terms of total volume of production.

Agriculture practice in Nepal is being gradually commercialized and in particular crop commodity it has attained certain level of competitiveness. Farmers are attracted towards market-oriented production. Urbanization and dense city dwellers are the main causes behind this. In addition to this change in food habit, technological innovations and policy interventions are the influencing factors to drive market-oriented production. Shrestha *et al.* (2020) mentioned that diversified consumption pattern has

increased the demand of potatoes. Fentie *et al.* (2017) and Malik *et al.* (1993) stated that in order to maintain the balance of demand and supply of food crops with the rapid increases in demand due to higher growth population, urbanization, industrialization and overall economic development. The knowledge on marketed and marketable surplus is essential in the process of proper planning for the procurement, distribution, export and import of agricultural product. Marketable surplus of the food crops is the quantity of crops only for sale in the market after the utilization and consumption of required amount by farmers. Similarly, Thakur *et al.*, 1997 stated that the marketed surplus shows the quantity actually been sold to market after and adding the previous stock left out for sale. The rate at which production expands determines the pace of its development, while the growth in the marketable surplus determines the pace of overall economic developments. The economic development of the country is determined by the increase the agricultural production which must be accompanied by an increase in the marketable surplus (Yadav *et al.*, 2020). The marginal surplus or marginal deficit of food crops availability has shown a significant effect on their price level (Sharma, 2016). The marketed surplus is an important factor as total production influencing market price. A reliable estimate of marketed surplus and to identify important determinants of marketed surplus are to design appropriate production, procurement, storage, distribution and pricing policies. The importance of marketed and marketable surplus has greatly increased owing to the recent changes in agricultural technology as well as social patterns.

This study was undertaken to assess the marketed surplus of potato in Kavre district. It was intended to examine important factors which determine the level of marketed surplus on various categories of farm households. Identifying the determinants of markets surplus will help to point out different areas of intervention to improve farmer's income and supply chain. Therefore, this study was conducted to identify the determinants of potato marketed surplus of small holder farmers in Kavre district of Nepal. In order to benefit potato farmers from production and market supply, potato marketing system must operate well. In doing so, the study attempted to contribute in filling the knowledge gap by identifying factors affecting potato marketed surplus in the study area for the purpose of providing vital information for effective research, planning and policy formulation and for better interventions in the future.

## Materials and Methods

Kavre district is one of the leading districts of Nepal in vegetable production and especially in potato farming. This study was conducted in Kavre, it has 6 rural and 7 urban

municipality altogether of 13 municipalities. The total area of the district has 1,396 km<sup>2</sup> and a population of 381,937. It stands in first rank as potato growing district in Bagmati province by area (9912 ha) and production (204,111 mt/ha) and it stands in second position in nationwide after Jhapa district. Kavre has better productivity of potato it stands second in the productivity of potato after Bhaktapur (MoALD, 2021). Agriculture and livestock farming is the main occupation of people of Kavre. Dhulikhel, Banepa and Kathmandu are the major market outlets for the farmers to sell their agriculture produce. This district was purposively selected as it is a leading potato producing district in terms of productivity and production of potato in Nepal (Banjade *et al.*, 2019). In addition, potato super zone program under Prime Minister Agriculture Modernization Project (PMAMP) have been launched by government of Nepal. From the district, three potato growing pockets were identified with a consultation with Agriculture Knowledge Centre (AKC).

### Data Collection

Primary data were collected randomly from 100 households through a pre-tested semi structured questionnaire. The focus group discussions in each pocket and key informant interviews were conducted. From the district, samples were selected through simple random sampling. Secondary data were taken from Ministry of Agricultural Livestock Development (MOALD), Central Bureau of Statistics (CBS), National Potato Research Program (NPRP), National Potato Development Program (NPDP) and through online references as well.

### Data Analysis

Both descriptive statistics and econometric analysis were used in analyzing the data. Descriptive statistics included means, percentages, standard deviation and frequencies. Econometric analysis uses multiple linear regression model as used by Fentie *et al.*, 2017 to analyze factors affecting farm level potato marketed surplus in the study area because all potato producers participate in the market. Econometric model specification of marketed surplus function in matrix notation is the following.

$$Y = X'\beta + U$$

Where: Y is Potato marketed surplus,

X' is a vector of explanatory variables,

$\beta$  is a vector of parameters to be estimated and

U is disturbance term

Potato marketed surplus is a continuous dependent variable used in the multiple linear regression model. It is measured in quintal (log-normalized) and represents the actual supply of potato by farm households to the market in the year 2019/20. Whereas the summary of independent variables used in this model are presented below in Table 1.

**Table 1:** Statistical description of the variables used in the multiple linear regression model.

Variables	Type of variables	Value	Expected sign
Land size allocated for potato production	Continuous	Katha	+
NARC released potato varieties	Dummy	Yes=1, Otherwise=0	+
Potato farming experience	Continuous	Years	+
Ethnicity	Dummy	Bhramin/chettri=1,Otherwise-0	+/-
Education	Continuous	Years	+
Access to irrigation	Dummy	Yes=1, otherwise =0	+
Selling Price	Continuous	Rupees/kilogram(Rs/Kg)	+
Sell to local collector/trader	Dummy	Yes=1, otherwise =0	+/-
Credit availability to farmers	Dummy	Yes=1, otherwise =0	+

## Result and Discussion

In the study area potato farming was the major source of income followed by seed and household consumption. 80.59% of potato produced by farmers were supplied to the market, 10.68% was used as seed and 8.72% was consumed by households. The multiple regression model was used to find the factors of marketed surplus of potato. The F-test calculated value  $F(10, 87) = 7.49$  was significant; and the adjusted  $R^2$  was computed to be 45.56% implying that 45.56% of the variation in the dependent variable was explained by the explanatory variables under consideration. The multi-collinearity test was employed to test the existence of multi-collinearity among explanatory variables and the result showed that the mean VIF was 1.19 which indicates no problem of multi-collinearity among explanatory variables in the model. The model showed that seven variables were statistically significantly affecting marketed surplus of potato. The hypothesized variables were land size allocated for potato production, NARC released potato varieties, farm experience of the household head, age, ethnicity, education level of household head, sell to local collector/trader, credit access, irrigation access, sold price. The estimated regression parameters of the marketed surplus model are shown in Table 2. All the variables except ethnicity have positive sign, and most are statistically significant, indicating that they have a positive impact on marketed surplus. From these, seven variables namely land size allocated for potato production, NARC released potato varieties, potato farming experience, education, sold price and sell to traders influenced are found to be significantly affecting marketed surplus of potato.

Land size allocated for potato production, in katha. It significantly affected potato marketed surplus at 1% significance level. A one katha increase in potato land size increases potato marketed surplus by 2.1 %, keeping all other explanatory variables constant. Similar study conducted in Ethiopia by Fentie *et al.*, 2017 found that land allocated for potato production affected market supply positively. Similarly, Tegegne, 2008; Tesfahun, 2007; Sashimatsung and Giribabu 2015, and Bordoloi *et al.*, 2018

also found land allocated under cotton, sesame, cabbage and tomato respectively also affected market supply positively. Also, Sharma *et.al* (2020) stated that land size allocated for wheat, pigeon pea and bajra were also significant. NARC released potato varieties was dummy variable. NARC has released different varieties of potato. National Potato Research Program (NPRP) is under Nepal Agricultural Research Council which has mandate of producing potato varieties. NPRP has released 11 improved varieties of potato in Nepal namely, Kufri Sindhuri, Kufri Jyoti, Desiree, Khumal Seto 1, Khumal Rato 2 Janakdev, Khumal Laxmi, IPY 8, Khumal Uphar, Khumal Ujwal, Khumal Bikas and registered varieties are TPS 1, TPS 2, Cardinal, Rojita, MS-42.3 (Thapa *et al.*, 2022). The use of NARC released potato varieties was positively significant towards marketed surplus at 5 % significance level. A unit increase in the use of improved varieties than the probability of market supply increase by 23%. The reason behind this might be increased potato productivity by the use of improved varieties.

The education was measured in years of schooling of households head. It was expected to affect positively. The analysis result showed that the education was positively significant at 1 % level on the marketed surplus of potato. With the increase in One-year education, the marketed surplus increases by 37.1 % keeping all other factors constant. The study done by Aslam (2019) also found that the education significantly affects the marketed surplus in both bitter gourd and lady's finger. The quantity of potato supplied to the market positively and significantly at 5% significance level. This relationship indicates that when selling price increased by one rupees per kilogram, the marketed surplus of potato will increase by 7%. It is due to increased production and market supply due to increased price. In the study site mostly the farmers sell their produce to local traders. The quantity of potato was supplied to market was positively significant at 5% level of significant. This indicates when the farmer sells their produce to local traders, the marketed surplus increase by the 8.16%.

**Table 2:** Factors affecting marketed surplus of potato

Variables	Coefficients	Standard error	P-value
Land size allocated for potato production	.0217	.005	0.000***
NARC Released potato varieties	.232	.127	0.054**
Potato farming experience	.013	.009	0.147*
Ethnicity	-.013	.141	0.923
Education	.037	.012	0.002***
Access to irrigation	.100	.119	0.371
Sold Price	.007	.003	0.013**
Sell to local collector/trader	.281	1.321	0.026**
Credit availability to farmers	.072	.1348	0.591

**Summary statistics**

Number of Observation	100
Root MSE	0.52
R <sup>2</sup>	45.56
Adjusted R <sup>2</sup>	40.09
Multicollinearity (Mean VIF)	1.19
Wald chi2(10)	84.37*** (prob >chi2)=0.0000

Source: Field Survey 2019/20

Note: Dependent variable is potato marketed surplus in Qt (transformed to logarithm), \*\*\* Significant at 1% level ; \*\* Significant at 5% level ; \* Significant at 10% level

**Conclusion**

The study revealed that with the increase in land size allocated for potato production, NARC released potato varieties, potato farming experience, education, sold price and sell to traders by 1%, the marketed surplus increases by 2.1 (P<0.01), 23 (P<0.05), 1.3 (P<0.1), 37.1(P<0.01), 7 (p<0.05) and 8.16 (P<0.05) percent respectively. The farmers and concerned stakeholders should focus on better irrigation facilities, credit accessibility and adoption of recent improved varieties to increase production which ultimately increase marketed surplus. In addition to that, by improving the knowledge and skills of the farmers through trainings and seminars encouraging economically active population in agriculture enterprises is important for better production.

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**Conflict of Interest**

The author declares that there is no conflict of interest regarding the publication of this paper.

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