International Journal of Research and Review
Vol. 10; Issue: 9; September 2023
Website: www.ijrrjournal.com
Research Paper *E-ISSN: 2349-9788; P-ISSN: 2454-2237*

Effect of Agricultural Subsidy on Farm Income of Commercial Vegetable Farmers of Makwanpur and Dhading Districts, Nepal

Hari Krishna Panta[1], Sulochana Thapa[1], Srijana Poudel[1], Arun GC[2], Kamal Regmi[1]

[1] Institute of Agriculture and Animal Science, Tribhuvan University, Kathmandu, Nepal
[2] Central Department of Economics, Tribhuvan University, Kathmandu, Nepal

Corresponding Author: Sulochana Thapa

DOI: https://doi.org/10.52403/ijrr.20230940

ABSTRACT

Recent agricultural policies of Nepal prioritize subsidy programs. However, there has always been concern about the realistic assessment of the economic implications of subsidy programs. This study was carried out to assess the effect of agricultural subsidy on farm income in the Makwanpur and Dhading districts of Nepal. Altogether 120 households from Thaha-2 of Makwanpur and Benighat Rorang-7 of Dhading were selected using a multi-stage sampling technique. Descriptive statistical tools, correlation analysis, independent sample t-test, and multiple linear regression were used to analyse the data. Among the total sampled households, 54.17% had access to at least one agricultural subsidy program. The result revealed that farm income was the primary source of household income, contributing 64.17% to total household income. Pearson product correlation shows positive and statistically significant relation between subsidy and technology adoption, technology adoption and annual farm income, subsidy and annual farm income. The estimates of multiple regression coefficients show that subsidy had a significant ($p< 0.01$) and positive effect on the annual farm income of commercial vegetable farmers. Also, the area under cultivation was a highly significant ($p<0.01$) factor influencing the farm income. From the independent t-test, the annual farm income of subsidy recipients and non-recipients was found significantly different ($p<0.01$). So, this study suggests the concerned stakeholders to identify the most needed and best-suited technologies and implement the subsidy program accordingly to boost the annual farm income of commercial vegetable farmers.

Keywords: Effect, Farm income, Regression, Subsidy

INTRODUCTION

The agriculture sector of Nepal has a significant impact on the national economy contributing 23.9 percent to the national Gross Domestic Product (GDP). [1] One of the national strategies of ongoing plans and policies is to enhance agricultural production and productivity.[2] However, the growth rate of Agricultural Gross Domestic Product (AGDP) was only 2.9% in the last ten years and only 2.3% in the year 2021/22.[1]The majority of Nepalese farmers have low purchasing power for inputs. [3] Higher prices of the inputs are a major constraint for farmers to intensify inputs in their farms. [4]

In spite of several controversies, subsidies have become an integral part of development policies in different forms. [5] Agricultural policies of Nepal also prioritize subsidies to improve agricultural production and productivity, and reduce income poverty among smallholder farmers. [6] In the fiscal year 2021/22 NRs. 24.67 billion was allocated for subsidy in agriculture and livestock sectors of which 88.5% of the total allocated budget was utilized. Farmers are receiving support in the form of subsidized

inputs (chemical fertilizers, improved seeds, machinery, equipment, etc.), technical backstopping, subsidized credit, and subsidy in insurance premiums. [7]

Input subsidies are considered a means of accelerating food production and generating farm incomes. [8] As articulated by governments of many developing countries, the goal of the subsidy programs is to increase food production to ultimately improve farmers' incomes and national food security. [9] Agricultural subsidies can significantly increase the sown area, and total income of farmers in poverty-stricken areas, which is conducive to improving the farmers' comprehensive capacity for production as well as income. [10]

Although there is an increase in the budget for subsidy programs year after year, there has always been concern about the realistic assessment of the economic implications of subsidy programs in Nepal. The success or failure of agricultural subsidy policies depends on their modality, targeting, and delivery mechanism. [8, 11] Whether or not subsidy programs contribute to enhance income of farmers was the major research question of this study. The findings of the study will generate valuable information for policy formulation. The specific objectives of this study were to analyse the relationship between subsidy programs and technology adoption, and to examine the effect of subsidy on the farm income of commercial vegetable farmers.

MATERIALS & METHODS

The study was conducted in the Makwanpur (Thaha-2) and Dhading (Benighat Rorang-7)) districts of Nepal. The respondents were selected by using a multi-stage sampling technique. The two districts, Makwanpur and Dhading were purposefully selected due to their significance in commercial vegetable farming and access to subsidy programs within the Bagamati Province of Nepal. In the second stage, one municipality was purposefully selected from each district with the highest number of commercial vegetable farmers. Subsequently in the third stage, using the same criteria, one ward was purposively chosen from each municipality. In the last stage, farming households were selected from each ward using a simple random sampling technique.

For this study, individuals who cultivated vegetables for at least two seasons in a year, covering an area of at least 0.1 hectare were considered as commercial vegetable farmers, constituting the study population. The total number of commercial vegetable farming households in Thaha-2, Makwanpur, and Benighat Rorang-7, Dhading were 208 and 195, respectively. A total of 120 commercial vegetable farmers (60 from each ward of rural/municipality), which constitutes both subsidy recipients and non-recipients, were selected. The data collection took place between June and August of 2022. Respondents were enumerated face-to-face using a semi-structured interview schedule to collect the data of the year 2021. The information was also supplemented by key informant interviews, focus group discussions, and secondary data.

STATISTICAL ANALYSIS

Descriptive statistics were used for analyzing the general characteristics of sampled households. Correlation analysis was done to analyze the relation between subsidy amount, technology adoption, and farm income. Two independent sample mean t-test was used to compare the mean annual farm income of subsidy recipients and non-recipients. A multiple linear regression model was used to assess the effect of subsidy and selected household characteristics on farm income. A multiple linear regression model is a highly effective and valuable tool that allows researchers to gain deeper insights into the connections among the data they are investigating, particularly concerning the interrelationships between multiple independent variables and a dependent variable. [12] The regression model used to assess the effect of subsidy on farm income is:

$$Y_i = \beta_o + \beta_i X_i + U_i$$

Where, Yi= Gross annual farm income in Nepalese rupees (NRs.)

β_o = Constant, β_i= coefficient, U_i= error term

X_i = explanatory variables

The explanatory variables used in multiple linear regression model is presented in Table 1.

Table 1: Description of the explanatory variables for the multiple regression model

Explanatory variables	Variable type	Description of variables
Age	Continuous	Age of household head (years)
Economically active family members	Continuous	Number of economically active (15-59 years) members in the farmer's HHs
Cultivated land	Continuous	Owned and rented in land (hectare)
Farming experience	Continuous	Years of commercial vegetable production
Subsidy amount	Continuous	Amount of subsidy received by HHs (NRs.)

RESULTS AND DISCUSSION

General characteristics of sampled households

The average age of sampled households' heads (HHH) was 50.97 years. The result indicates that middle-aged members of households served as household heads (Table 2). The average number of economically active members per household (HH) was 3.51. The farming household had average farming experience of about 20 years. The average land under cultivation per household was 0.42 hectare.

Table 2: General characteristics of sampled households

Variables	Dhading (n=60)	Makwanpur (n = 60)	Total (n = 120)
Age of HHH	51.45 ± 11.60	50.50 ± 9.66	50.97 ± 10.64
Economically active members in HHs	3.63 ± 1.40	3.34 ± 1.40	3.51 ± 1.45
Cultivated land (ha)	0.47 ± 0.35	0.36 ± 0.28	0.42 ± 0.31
Farming experience (years)	18.37 ± 9 .05	20.73 ± 9.02	19.55 ± 9.03

Households' access to agricultural subsidy

The findings revealed that 54.17% of the total sampled households had access to at least one agricultural subsidy program while 45.83% had not received any form of agricultural subsidy to date. Beneficiary households in the study area have received different kinds of subsidies. Overall, major subsidy programs in the study area included subsidy on seed, tunnel construction, agricultural machinery (hand/mini-tiller, digging machine), agricultural tools (sprayer, plastic mulch), and irrigation management (drip irrigation sets, irrigation motor pump). Subsidy programs of the study area have been categorized into these five categories for this study. Among the total sampled households, the highest number of subsidy programs accessed by an individual household was five which was assessed by only 2.5%, and the lowest was one assessed by 18.3% of households. The result shows the decreasing numbers of households as the number of subsidy programs increases (Figure 1).

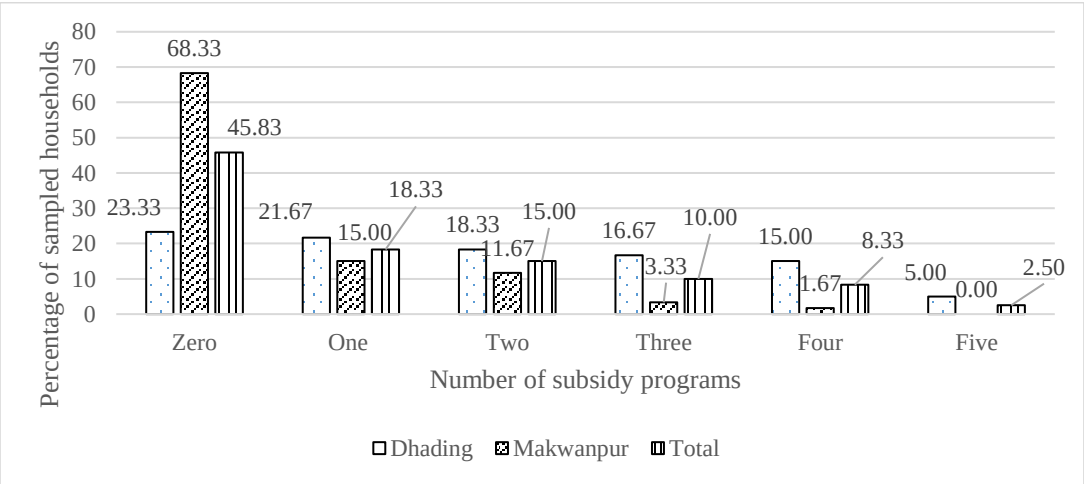

Figure 1: Distribution of sampled households accessing different numbers of agricultural subsidy programs

Magnitute of technology adoption

The farmers in the study area have adopted ten different technologies, including improved variety, mini-tiller, sprayer, water harvesting, IPM, mulching, water pump, agriculture application (*Krishi* apps), drip irrigation, and plastic tunnel for vegetable production. The result shows that the highest number of households (33.33%) were adopting four technologies out of ten and the number of households decreased with the increase in the number of technologies (Table 3).

Table 3: Distribution of sampled households by the number of technologies they have adopted

Number of technologies	Dhading n = 60	Makwanpur n = 60	Total n = 120
Two	12(20.00)	0(0.00)	12 (10.00)
Three	21(35.00)	18(30.00)	39(32.50)
Four	18(30.00)	22(36.67)	40(33.33)
Five	5(8.33)	9(15.00)	14(11.67)
Six	1(1.67)	7(11.67)	8(6.67)
Seven	2(3.33)	4(6.67)	6(5.00)
Eight	1(1.67)	0(0.00)	1(0.83)

Note: **The figure in parenthesis represents percentage**

Sources of household income

Different sources of income of sampled households were vegetable production, livestock farming, remittance, service, and business. On average, the annual household income was found to be NRs. 709958.56 and the average annual farm income was NRs. 455558.69. The major source of household income was farm income (vegetable production and livestock farming) which constituted 64.17% of total household income (Figure 2).

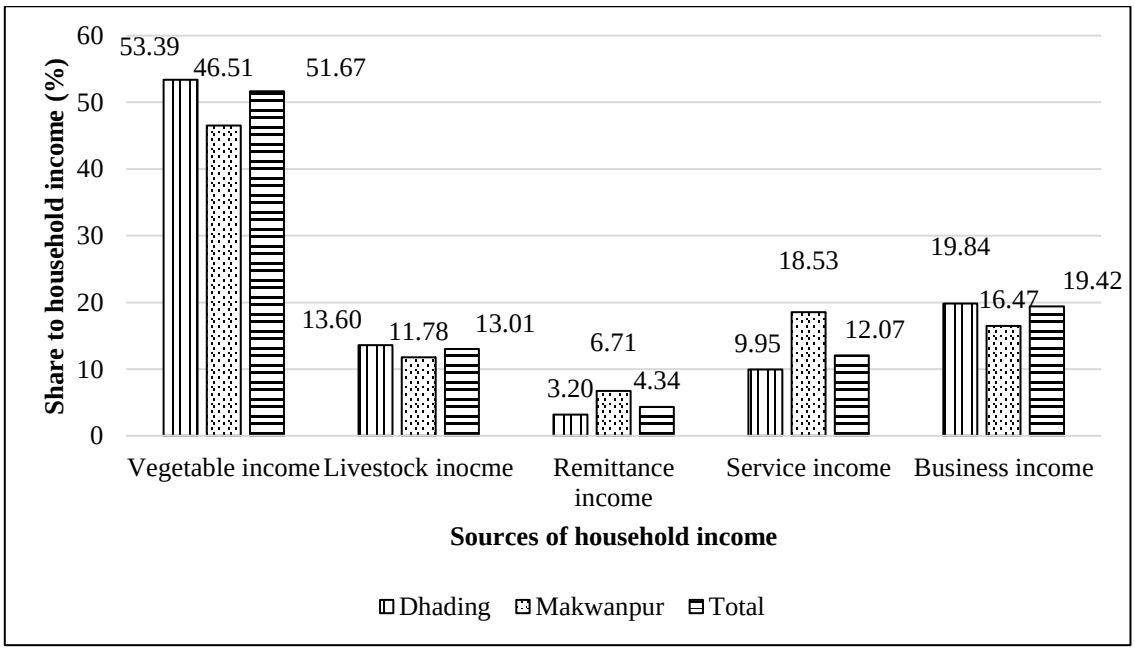

Figure 2: Composition of household income

Association among subsidy, technology adoption and farm income

Table 4 shows the result of the correlation analysis. Pearson product correlation of the number of technologies adopted and subsidy amount received by farming households was positive and statistically significant ($r = 0.458$, $p < 0.01$). This indicates subsidy enhances technology adoption at the farm level. The finding is consistent with the Kumar et al. [13] Also, Fan et al. reported subsidies in credit, fertilizer, and irrigation helped farmers to adopt the new technologies, especially the smallholders. [11]

According to Hemming et al, agricultural input subsidies make inputs available to farmers at below the market price. [14] Hence, government subsidies are taken as a vehicle for technology transfer and agriculture development, particularly for remote areas of the country. [8]

The result revealed a significant ($r = 0.153$, $p< 0.05$) and positive relation of number of technologies adopted and farm income. The findings are in agreement with Maukaila et al. [15] This is because the use of agricultural technology improves crop output and productivity, which boosts farm income. Technologies in agriculture assist farmers in lowering input costs, such as labor costs, which could increase profitability. [16] Also, subsidy and farm income are positively correlated ($r = 0.295$, $p< 0.01$). The findings are in agreement with Nguyen et al. who reported that programs providing subsidies for input result in a nearly 20% improvement in both crop yields and the income of farming households. [17]

Table 4: Result of correlation analysis between subsidy, technology adoption and farm income

Variables	Subsidy amount (NRs.)	Number of technologies adopted	Farm income (NRs.)
Subsidy amount (NRs.)	1	0.458***	0.295***
Number of technologies adopted	-	1	0.153**
Farm income (NRs.)	-	-	1

Note: **, * represents significance at 5% and 1% level**

Factors affecting farm income and the effect of subsidy

Table 5 shows the results of multiple linear regression analysis. The value of the coefficient of multiple determinations (R^2) 0.379 shows that 37.9% of the variation in annual farm income is explained by the independent variables included in this model. The F statistics (13.76) confirm the stability of the overall regression equation and joint significance at the 1% level. There is no significant multicollinearity between independent variables included in the model (mean Variance Inflation Factor = 1.091).

Regression results shows that amount of subsidy received by sampled households had significant ($p<0.01$) and positive effect on farm income. If the amount of subsidy received by farmer increases by one unit, the farm income increases by 6.38 units, considering the effect of all other explanatory variables constant. According to Hemming et al. agricultural input subsidies enhance the adoption of inputs/technology, increasing agricultural productivity and farm profitability. [14] Hence, agricultural subsidy has a positive effect on farm income.

Similarly, the area under cultivation has a positive and significant effect ($p<0.001$) indicating that the increase in land under cultivation increases the farm income. The finding is in line with the study of Mukaila et al. that the large farm size produces more vegetables and can sell more to the market which increases revenue and profits. [15]

The result shows that the age of the household head was a significant inhibiting factor to annual farm income. Younger farmers can perform farm operations effectively that contributes to increase annual farm income. The finding is consistent with the findings of Fadipe et al. and Mukaila et al. also. [18, 19]

Table 5: Results of multiple regression analysis showing effect of subsidy on annual farm income

Variables	Coefficients	S. E.	t-value	P-value
Farm Income (NRs.)				
Subsidy amount (NRs.)	6.38***	1.70	3.75	0.000
Age of HHH (Years)	-8389.99**	3933.98	-2.13	0.035
Cultivated land (ha)	872570.01***	128312.59	6.80	0.000
Farming experience	6785.40	4684.27	1.45	0.150
Active members in family	-42178.18	28484.29	-1.48	0.141
Constant	435848.89**	208489.17	2.09	0.039
Number of observations	120			
F-value	13.76(0.000)			
R square	0.379			
Adjusted R square	0.351			

***Note:* **, *** denotes significance at, 5% and 1% level, respectively**

Table 6 illustrates the comparison of the mean annual farm income of subsidy recipients (who received at least one subsidy program) and non-recipients. The result shows that the subsidy recipients have significantly higher annual farm income (NRs. 625178.20/HH) than non-recipients (NRs. 255790.09 /HH). The mean difference in farm income between the two categories is statistically significant at 1% level. The finding is in line with Wang et al. who reported that households who received a subsidy experienced three times more income compared to those who did not. [8]

Table 6: Comparison of mean annual farm income between subsidy recipients and non-recipients

Variable	Non- recipients (n = 55)	Subsidy recipients (n = 65)	Mean differences	t-value	P-value
Mean annual farm income (NRs.)	255790.09 ± 267155.78	625178.20 ± 625476.41	-369388.12	-4.318***	0.000

Note: * represents significance at 1% level**

CONCLUSION AND RECOMMENDATIONS

This study assesses the effect of agricultural subsidy on annual farm income. Agricultural subsidy enhances technology adoption and that significantly contributes to enhance farm income. So, this study suggests the concerned stakeholders to identify the most needed and best-suited technologies and provide subsidy to enhance the annual farm income of commercial vegetable growers.

Declaration by Authors

Acknowledgement: The authors are grateful to University Grants Commission, Nepal for the research fund.

Source of Funding: University Grants Commission, Nepal (Research Grant Number: FRG-77/78)

Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. MoF. Economic Survey-2021/22. Singhadhubar, Kathmandu, Nepal: Ministry of Finance, Government of Nepal; 2022.
2. NPC. Fifteenth Plan (FY 2076/77-2080/81 BS). Kathmandu: National Planning Commission, Government of Nepal; 2019. https://www.npc.gov.np
3. Bista DR, Dhungel S, Adhikari S. Status of fertilizer and seed subsidy in Nepal: Review and recommendation. Journal of Agriculture and Environment. 2018; 17:1-10. DOI: 10.3126/aej.v17i0.19854
4. Takeshima H, Adhikari S, Shivakoti S, et al. Heterogeneous returns to chemical fertilizer at the intensive margins: Insights from Nepal. Food policy. 2017; 69:97-109. DOI: http://dx.doi.org/10.1016/j.foodpol.2017.03.007
5. Dorward A, Chirwa E. The Malawi agricultural input subsidy programme: 2005/06 to 2008/09. International Journal of Agricultural Sustainability. 2011; 9:232-247. DOI: https://doi.org/10.3763/ijas.2010.0567
6. Paudel J, Cargo L. Fertilizer subsidy and agricultural productivity: Empirical evidence from Nepal. In: AgEcon Search. Annual Meeting of Agricultural and Applied Economics Association; 2017 July 31 - August 1; Chicago, Illinois. USA: University of Massachusetts Amherst; 2017. p. 1-41.
7. MoF. Economic Survey-2022/23. Singhadhubar, Kathmandu, Nepal: Ministry of Finance, Government of Nepal; 2023.
8. Wang S, Manjur B, Kim J, et al. Assessing socioeconomic impacts of agricultural subsidies: A case study from Bhutan. Sustainability. 2019; 11(12):3266. DOI: https://doi.org/10.3390/su11123266
9. Ricker-Gilbert J, Jayne TS. Estimating the enduring effects of fertilizer subsidies on commercial fertilizer demand and maize production: Panel data evidence from Malawi. Journal of Agricultural Economics. 2016; 68(1):70-97. DOI: https://doi.org/10.1111/1477-9552.12161
10. Chengyou, L, Zhouhao S, Xiaoqin S, et al. The effectiveness assessment of agricultural subsidy policies on food security: Evidences from China's poverty-stricken villages. International Journal of Environmental Resources and Public Health. 2022; 19 (21):13797. DOI: https://doi.org/10.3390/ijerph192113797
11. Fan S, Gulati A, Thorat S. Investment, subsidies, and pro-poor growth in rural India.

Washington D.C., USA: International Food Policy Research Institute; 2007. 24 p. Discussion Paper No.: 00716
12. Al-Zwainy FMS, Abdulmajeed MH, Aljumaily HSM. Using multivariable linear regression technique for modeling productivity construction in Iraq. Open Journal of Civil Engineering. 2013; 3:127-135. DOI: http://dx.doi.org/10.4236/ojce.2013.33015
13. Kumar A, Takeshima H, Thapa G, et al. Adoption and diffusion of improved technologies and production practices in agriculture: Insight from a donor-led intervention in Nepal. Elsevier. 2020; 95(1):1-14. DOI: 10.1016/j.landusepol.2020.104621
14. Hemming D, Chirwa E, Dorward A, et al. Agricultural input subsidies for improving productivity, farm income, consumer welfare and wider growth in low-and lower-middle income countries: A systematic review. Campbell Systematic Reviews. 2018; 14(1):1-153. DOI: https://doi.org/10.4073/csr.2018.4
15. Mukaila R., Falola A, Akanbi SO, et al. Effects of vegetable production on income and livelihood of rural households in Nigeria. Mustafa Kemal University Journal of Agricultural Sciences. 2022; 27(2): 213–223. DOI: 10.37908/mkutbd.1067195
16. OECD. Adoption of technologies for sustainable farming systems. In: Organization for Economic Co-operation and Development. Wageningen Workshop Proceedings; 2000 July 4-7; Netherlands. Organization for Economic Co-operation and Development; 2001. p. 1–149. https://www.oecd.org/greengrowth/sustainable-agriculture/2739771
17. Nguyen L, Russ J, Triyana M. The effect of agricultural input subsidies on productivity: A meta-analysis. Washington DC, USA: World Bank Group; 2023. 21 p. Policy Research Working Paper No.: 10399
18. Fadipe A, Adenuga A, Lawal A. Analysis of income determinants among rural households in Kwara state, Nigeria. Trakia Journal of Sciences. 2014; 12 (4): 400–404. DOI: 10.15547/tjs.2014.04.010
19. Mukaila R, Falola R., Akanbi, A. Socioeconomic determinants of income among rural women in Enugu state, Nigeria: implication for achieving first sustainable development goal. Journal of Agribusiness and Rural Development. 2021; 4(62), 363-370. DOI: http://dx.doi.org/10.17306/J.JARD.2021.01450

How to cite this article: Hari Krishna Panta, Sulochana Thapa, Srijana Poudel, Arun GC, Kamal Regmi. Effect of agricultural subsidy on farm income of commercial vegetable farmers of Makwanpur and Dhading Districts, Nepal. *International Journal of Research and Review*. 2023; 10(9): 394-400.
DOI: *https://doi.org/10.52403/ijrr.20230940*

******