



Socioeconomic factors affecting vegetable production in Kullu district of Himachal Pradesh

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Abstract

The present study was based on primary data collected from a representative sample of 60 vegetable growers in Kullu District of Himachal Pradesh in order to examine the relationship of some socio-economic variables with productivity of selected vegetables. The study revealed that the female headed families were obtaining 10 to 18% higher productivities than male headed in case of cucumber, cauliflower, cabbage and pea. Families having size of more than 4 persons were obtaining higher yields in case of cauliflower, cabbage, tomato, Iceberg and cucumber. Further, higher yields in most of the vegetable crops were obtained by those households whose heads were in the age group of greater than 30 years. The educational-level of the head of the sample households was found to have a direct relationship with the productivity of all the vegetable crops. The marginal and small farmers were getting higher yield in vegetables than the farmers having more than 2 hectares of land. Regression analysis revealed that 1% increase in the area under crop would increase gross income of the farmers by 1.21% in case of pea crop. The study emphasized that the rural unemployed youth with education upto graduation should be encouraged to engage themselves in vegetable production as a profession.

Key words: Socio-economic factors, productivity, regression analysis, marginal value productivities (MVPs)

Vegetables play a pivotal role in Indian agriculture by providing food, nutritional and economic security to the people of India with higher returns per unit area to the producers. In addition, vegetable crops have higher productivity and shorter maturity cycle, which leads to higher returns per unit area and time. Worldwide, India holds the second position by contributing 15.70 and 14.50% to global vegetable area and production, respectively. In our country, vegetable production is threatened by fragmentation of land, climate change, decreasing natural resources and uneven growth across the country. In Himachal Pradesh, 90% of the population live in rural areas and depend on agriculture for their livelihoods. The agricultural sector of Himachal Pradesh has adopted a diversification approach that demands to focus on the vegetable production including potato. Himachal Pradesh has earned much reputation by producing tomato, cauliflower, cabbage, capsicum, cucumber, pea, brinjal, radish, carrot and other

vegetables. The farmers of the state focus more upon generating the cash crops for more revenue earning as these suit the agro-climatic conditions of the state. Shimla, Sirmour, Solan, Kangra, Mandi and Kullu are the main districts producing vegetables. The strategy to reduce poverty in the state is impossible without significant increase in yield of different vegetable crops. In addition to land and expenses on various farm inputs, the quality and productivity of vegetables depend upon the adoption of latest technology. There are several worthwhile technologies, but farmers have not yet succeeded in taking full advantage of these. Further, various social and economic factors like land holding, available livestock, education-level and family size play a significant role in the adoption of modern technologies in agriculture. Therefore, the present study has been undertaken to examine the affect of these social and economic factors in the vegetable production and factors affecting resource use efficiency in Kullu District of Himachal Pradesh.

Materials and Methods

The study was based on primary data collected from a representative sample of 60 vegetable growers in Kullu District of Himachal Pradesh on well prepared pre-tested schedule by personal interview method for agricultural year 2011-12. Three-stage sampling technique was used to select vegetable growers in the study area. In the first stage, two blocks viz. Kullu and Naggar were selected purposely out of five blocks of Kullu District because of their potential to grow vegetable crops. In the second stage, 3 villages viz. Kalehali, Jia and Hurla in Kullu Block and 3 villages viz. Seobagh, Bari and Nashala in Naggar Block were selected randomly thereby making a total sample of six villages. In the third stage of sampling, 10 vegetable growers from each of the 6 villages were selected randomly to draw a representative sample of 60 vegetable growers. The following type of Cobb-Douglas production function was employed to examine the input-output relationship in vegetables grown on sample farms:

$$Y = a X_1^{b_1} X_2^{b_2} X_3^{b_3} e^U$$

In natural log form:

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + U$$

Where,

Y = Total income from different vegetables (INR per bigha i.e. 0.08 ha)

a = Constant term (efficiency parameter)

X₁ = Area under crop (Bigha per farm)

X₂ = Livestock (Number per farm)

X₃ = Working capital i.e. expenditure on planting materials, fertilizers, FYM, insecticides, fungicides, bullock/power-tiller/tractor, human labour and irrigation (INR per farm)

b₁ to b₃ = Regression coefficients

U = error term

Results

Relationship of socio-economic factors on vegetable productivity

Socio-economic status of the farmers had a significant relationship with the productivity of different crops as it is an important indicator of mental attitude and socio-economic soundness of the farmers. Table 1 depicted the extent of relationship between the genders of head of sample household on productivity of different vegetables. The female headed families were obtaining 10 to 18% higher productivities than male headed in case of cucumber, cauliflower, cabbage and pea. In case of tomato crop, it was 90% higher. The higher productivity in case of most of the vegetables grown may be due to the preferred choice and active participation of females in view of

employing themselves in their own enterprise. Further, several operations like sowing and interculture are performed by females with more devotion and efficiency than the males.

Table 1. Gender-wise relationship of head of sample households on productivity (t/ha) of different vegetables

Crop	Gender of the head of family	
	Male	Female
Cauliflower	23.29	25.79
Cabbage	22.05	26.04
Tomato	23.24	44.55
Iceberg (Lettuce)	18.55	8.34
Pea	7.24	8.58
Cucumber	28.84	23.93
Others*	14.11	7.78

*Broccoli, turnip, okra, carrot, brinjal, chilli, etc.

Families having strength of more than 4 persons were obtaining higher yields in case of Cauliflower (22%), cabbage (10%), tomato (40%), Iceberg (36%) and cucumber (30%), while in case of pea, it was found to be better managed by the small families having less than 4 family members because labour requirement in this particular crop is comparatively low as compared to other vegetable crops in the study area (Table 2).

Table 2. Relationship of total family members on productivity (t/ha) of different vegetables

Crop	Family members (Number)		
	< 4	5 to 7	> 7
Cauliflower	20.80	25.45	26.04
Cabbage	20.69	22.79	26.66
Tomato	21.30	29.90	29.31
Iceberg (Lettuce)	8.91	29.16	16.66
Pea	8.34	7.23	7.09
Cucumber	28.60	37.50	21.00
Others*	7.81	16.70	17.28

*Broccoli, turnip, okra, carrot, brinjal, chilli, etc.

Higher yields in most of the vegetable crops were obtained by those households whose heads were greater than 30 years of age (Table 3). This may be due to the experience of the farmers. Further, the heads in age group between 30 to 45 years were found to manage their crops in a better manner as they were having dual characteristic

of experience and energy. Therefore, emphasis should be given on this particular group giving regular trainings in combination with the frequent exposure visits to the major vegetable growing areas of the state.

Table 3. Relationship of age of the head of sample households on productivity (t/ha) of different vegetables

Crop	Age-group (Years)		
	15 to 30	30 to 45	> 45
Cauliflower	23.73	25.78	21.60
Cabbage	25.00	24.28	20.45
Tomato	25.58	34.71	18.84
Iceberg (Lettuce)	25.00	17.68	23.75
Pea	6.00	7.81	8.25
Cucumber	25.00	26.50	28.19
Others*	12.83	13.59	13.93

*Broccoli, turnip, okra, carrot, brinjal, chilli, etc.

From the Table 4, it can be envisaged that the educational-level of the head of the sample households have a direct relationship with the productivity of all the vegetable crops. The productivity obtained by the literate groups with primary to plus 2 were higher than those either illiterate or having education as a graduate or post-graduate. This may be due to the reason that usually graduates go for service sector rather than employing themselves in agriculture, thus, making agriculture as a subsidiary source of income to them. While, illiterates were found to fall under old age group and usually follow traditional practices on the field due to the lack of knowledge regarding modern inputs. Therefore, there is a scope for employing and encouraging the farmers with at least primary education in their existing enterprises or providing them with the conditions required for getting higher returns through proper supply of critical farm inputs. This would ultimately help in reducing the extent of unemployment among rural youth and, hence poverty in the state.

The results in Table 5 revealed that marginal (<1 ha of land) and small (1 to 2 ha of land) farmers were getting higher yield in vegetables than those having more than 2 ha of land. This may be due to their sensitive and labour intensive nature, which needs proper care throughout the whole production process. Ease in management was found to be another reason for higher productivity on small and marginal farms. Scarcity of labour and increasing wages were also found to be the major constraints in profitable production of vegetables by large farmers.

Table 4. Relationship between education-level of the head of sample households and productivity (t/ha) of different vegetables

Crop	Education-level				
	Illiterate	Primary	Matric	Plus 2	Graduate
Cauliflower	25.18	26.08	25.16	26.16	19.23
Cabbage	25.00	25.29	25.00	23.23	17.25
Tomato	35.41	32.13	31.85	35.79	9.78
Iceberg (Lettuce)	NA	17.11	15.74	38.46	NA
Pea	6.25	8.13	7.14	8.50	7.50
Cucumber	NA	20.00	30.00	31.11	15.00
Others*	5.63	11.09	21.65	17.46	6.78

Table 5. Relationship of total land holdings on productivity (t/ha) of different vegetables

Crop	Land holding		
	< 1 ha	1 to 2 ha	> 2 ha
Cauliflower	25.75	27.95	18.51
Cabbage	24.00	22.41	19.83
Tomato	31.16	39.31	15.99
Iceberg (Lettuce)	15.19	20.00	NA
Pea	7.69	8.13	8.75
Cucumber	26.88	NA	NA
Others*	13.71	16.59	11.11

*Broccoli, turnip, okra, carrot, brinjal, chilli, etc.

Resource use efficiency in vegetable production

Table 6 depicted the results of Cobb-Douglas production function for different vegetable grown in the study area. The adjusted coefficient of multiple determination (R^2) for all the major crops grown except iceberg were found to be significant at 1% level of significance. It was observed to be 0.9591, 0.8024, 0.7081, 0.8420 and 0.8343 for cauliflower, cabbage, tomato, pea and cucumber indicating that the explanatory variables included in the regression analysis explains around 95, 80, 71, 84 and 83% of the total variation in the gross returns of the farmers through respective vegetables. The results of the regression analysis revealed that in most of the crops, the area under the crop was significantly affecting the gross returns of the farmers. The 1% increase in the area under crop would increase gross income of the farmers by 1.21%, 0.96%, 0.89%, 0.65% and 0.60% in case of pea, cabbage, cucumber, tomato and cauliflower, respectively. The regression

coefficients were significant at 1% level for cabbage, cucumber, tomato and cauliflower while, in case of pea crop, the coefficient was significant at 5% level of significance. As far as the second factor of production (Number of livestock) is concerned, it was found to have positive significant influence on cucumber and cauliflower (1% level), which imply that the gross returns of farmers could be increased by 0.12% and 0.05% with the increase of 1 % livestock on sample farms. Working capital had also positive significant (1% level) impact on gross returns obtained from growing of cucumber, tomato and cauliflower. The value of production elasticities for cucumber (0.9952), tomato (0.6517) and cauliflower (0.2903) implied that 1% increase in the total working capital on mentioned crops would increase the gross returns of the farmers to about 1.00%, 0.65% and 0.29%, respectively.

Further, the returns to scale to the tune of 1.3055 and 1.2059 obtained in case of tomato and pea revealed that there would be more than 1% increase in the gross returns of the farmers if all the three factors of production will simultaneously be increased by 1% showing a condition of increasing returns to scale. It indicates that farmers are operating in first stage of production in these crops. However, in case of cabbage (0.9611) and cauliflower (0.9348), it shows diminishing returns to scale if all the factors of production will be increased by 1% indicating that there could be less than 1% increase in the gross returns from cabbage and cauliflower to the farmers of the study area. The results were found to be statistically significant at 1% level of significance. It indicated that farmers are operating in rational zone of the production function in these crops.

Table 6. Results of Cobb-Douglas production function

Variable		Crop					
		Cauliflower	Cabbage	Tomato	Iceberg	Pea	Cucumber
Constant term	a	7.3665** (1.0502)	9.8088** (1.1090)	4.2484 ^{NS} (2.4159)	7.7153 ^{NS} (6.8702)	9.0154 ^{NS} (4.2035)	0.1473 ^{NS} (3.4726)
X_1 / Area under crop (Bigha per farm)	b_1	0.5955** (0.1247)	0.9611** (0.1199)	0.6538** (0.2342)	0.7647 ^{NS} (0.6133)	1.2059* (0.4907)	0.8866** (0.2763)
X_2 /Livestock (Number per farm)	b_2	0.0490** (0.0158)	-0.0203 ^{NS} (0.0178)	-0.0314 ^{NS} (0.0257)	0.0233 ^{NS} (0.0479)	-0.0138 ^{NS} (0.0527)	0.1185** (0.0372)
X_3 /Working capital (INR per farm)	b_3	0.2903* (0.1157)	-0.0056 ^{NS} (0.1210)	0.6517* (0.2571)	0.2665 ^{NS} (0.7222)	0.0242 ^{NS} (0.4717)	0.9952* (0.3812)
Adjusted coefficient of multiple determination (R^2)		0.9591**	0.8024**	0.7081**	0.7002 ^{NS}	0.8420**	0.8343**
Degree of freedom		40	36	37	6	7	7

Figures in the parentheses are the standard errors of regression coefficients; * Significant at 5% level of significance; ** Significant at 1 % level of significance; NS, Not significant

The marginal value productivities (MVPs) for area under cauliflower, cabbage, tomato and cucumber were significant at 1% level of significance while in case of pea, it was significant at 5% level (Table 7). The MVPs were found to be 24701.0, 15665.0, 14792.1, 10496.9 and 10110.1 for tomato, cabbage, pea, cauliflower and cucumber, respectively. It indicated that the addition of one bigha (0.08 ha) of land under above mentioned vegetables will increase the farmer's income by INR 24701, 15665, 14792, 10497 and 10110, respectively. This suggested that the farmers of the study area could increase their income to a significant amount by increasing the area under different vegetable crops. MVPs for number of livestock available on farms were computed to be 1084.5 and 743.1 for cauliflower and cucumber. It indicated that increase in one unit of livestock available will increase the farm income by INR 1084 and INR 743, respectively. The results were found to be positively significant at 1% level. These results suggested that farmers growing cauliflower and cucumber could also raise their income by addition of more animals to their available livestock which showed a complementary relationship with the respective crops. MVPs for working capital *i.e.*

investment on seeds/seedlings, fertilizers, plant protection measures, labour, irrigation, etc. were positively significant at 5% level with values 2.27, 1.23 and 0.70 for tomato, cucumber and cauliflower crops, respectively. It indicated that an investment of INR 1 by the farmers for all the inputs used in production process will raise the farmer's income by INR 2.27, INR 1.23 and INR 0.70, respectively. As the one rupee investment in tomato and cucumber crops will increase the farmer's income by more than one rupee keeping all other factors constant at their geometric mean level. Therefore, the farmers of the study area were advised to make more investment on different farm inputs used in tomato and cucumber crops to fetch more returns.

It can be concluded from the above analysis that the families having family size of more than 4 persons headed by females with higher education level were obtaining higher yields in vegetable production. Furthermore, vegetable growers can increase their farm income by adding more area under vegetables; with additional number of livestock on their farm; and with the additional working capital expenditures on tomato and cucumber crops especially.

Table 7. Marginal value productivities of vegetables for different inputs in the study area

Variable	Crop					
	Cauliflower	Cabbage	Tomato	Iceberg	Pea	Cucumber
X ₁ /Area under crop (Bigha per farm)	10496.85** (2197.56)	15665.01** (1954.25)	24701.02** (8849.00)	20648.81 ^{NS} (16560.37)	14792.11* (6019.11)	10110.06** (3150.37)
X ₂ /Livestock (Number per farm)	1084.47** (350.94)	-142.86 ^{NS} (125.31)	-516.60 ^{NS} (422.69)	2749.82 ^{NS} (5660.72)	-71.70 ^{NS} (273.69)	743.11** (233.50)
X ₃ /Working capital (INR per farm)	0.70* (0.28)	-0.01 ^{NS} (0.24)	2.27* (0.89)	0.82 ^{NS} (2.21)	0.05 ^{NS} (0.90)	1.23* (0.47)

Figures in the parentheses are the standard errors; * Significant at 5% level of significance; ** Significant at 1 % level of significance; NS, not significance

References

- Bala B, Sharma N and Sharma RK. 2013. Marketing of off-season vegetables in Himachal Pradesh. *Indian Journal of Agricultural Marketing* **27** (2): 78-90
- Rana RK, Kumar NR, Pandit A, Verma MR and Pandey NK. 2014. Effects of various socio-economic factors on the consumption of processed potato products in Punjab. *Journal of Agricultural Marketing* **28** (1): 24-35
- Ratna J. 2013. A study of farm inputs use of vegetable growers in District Kullu of Himachal Pradesh. M Sc Thesis, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India (unpublished).
- Sharma RK, Kumar A and Bala B. 2007. Female participation in hill agriculture: a comparative study of female headed and male headed households in Himachal Pradesh. Report submitted to Indian Council of Social Science Research. Department of Agricultural Economics, Extension Education and Rural Sociology, CSKHPKV, Palampur.
- Thakur DR, Saini AS and Sharma KD. 2008. Socio economic impact of production technology on mountain agriculture - a study of Himachal Pradesh. CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India.