

# Socio-economic Characteristics and Its Impact on Onion Cultivation in Jaffna District of Sri Lanka

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**Abstract:** The aim of this study is to investigate the impact of socio-economic characteristics on production of onion in Jaffna district and for this purpose, 04 major regions where mostly the farmers cultivation the onion in the district. A set of questionnaires was used to conduct the study and 25 onion farmers were selected randomly from each region and finally total of 100 onion farmers were taken as a sample in the study. The collected data was analyzed using frequency analysis and independent sample t-test, correlation and multiple regression analysis also applied to identify the impact of socio-economic characters on onion farmers in the study. In the sample 79% of the farmers are male while 21% of them are female and 77% of the onion cultivators used rental land and 23% of them used own land. According to descriptive statistics, it implied that average age of the farmers was 56 years with 23 years of average farming experience. Results of independent sample t-test revealed that, average production of onion differ across gender, types of fertilizer usage and ownership of land whereas correlation of coefficient suggested that onion production has 50% and 56% of positive correlation with age and farming experience respectively. Multiple regression results proved that out of five characters, only sex of the farmers and farming experience were significantly affecting the production of onion in the study area. Findings of the study may help the agricultural officers and the onion farmers to make the policy implications and strategies to enhance the production of onion in future.

**Keywords:** Socio-economic Characteristics, Average Production of Onion, Farming Experience, Independent Sample t-Test

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## 1. Introduction

Onion is one of the crops in Sri Lanka that has high contribution to the households to food and income of farmers. It is one of the sources of spicy for food as well as usage as one of ingredients for other take away foods. Despite the cited overall importance of the other vegetable crops and paddy amongst smallholder farmers in the country, the factors determining yield of onion are less understood. Agriculture sector contributes nearly 7% to GDP in Sri Lanka and also it is an important sector to provide the employment, especially in the rural areas, and a major earner of income of the rural community in the economy. Among the agricultural crops, onion cultivation plays a vital role in the economy of Sri Lanka which helps to ensure rural empowerment opportunity. Onion production is more labor intensive than other cultivation and mostly it is cultivating

for internal consumption as a spicy crop.

In Sri Lanka, Jaffna district is predominantly an agricultural area and always has enormous potential for agriculture produce such as red onion, chillies, potatoes, tobaccos, vegetables, banana, and grapes, cultivated for commercial purposes. Other crops cultivation such as paddy, pulses, and coconut are in substantial level and palmyrah products also substantial source of income in the district. The Department of Agriculture-Jaffna District said that onion cultivation was undertaken only in a land area of 1,250 hectares until now and the onion farmers have made necessary arrangements to cultivate onion in a land area of 1,800 hectares in the Jaffna peninsula. In Jaffna district, majority of the farmers are in Valikamam-East and Vadamarachchi area where they cultivating red onions and

they used seed onion for cultivation.

Hag Hame Abdelaziz [9] has examined the economics of onion production in the Northern Part of Omdurman Province in Khartoum State to identify the constraints affecting onion production as well as to determine the most important cost items in onion production. The primary data was collected from the farmers in the agricultural season 2003/04 and from the analysis he found that irrigation, fertilizer and family size were highly significant and the cost items indicated that the costs of land preparation, fertilizer, labour and irrigation were the most important cost items in onion production

Bongiwe G. Xaba., & Micah B. Masuku [5] has analyzed the factors affecting the productivity and profitability of vegetables production in Swaziland. They applied a two-stage sampling technique with 100 vegetable farmers and the results implied that, determinants of profitability of vegetable production were level of education, land under vegetable production and type of marketing agency in the study.

Rameez Ahmed Baloch [12] examined the economic analysis of onion (*Allium cepa* L.) production and marketing in district Awaran in Balochistan. His results showed that, more than 50 years old farmers, the percentage of onion farmer age group 21.66 percent. Literacy status of the educational level of selected respondents were analyzed and found that 21.66 percent onion farmers were illiterate in the study. A study focuses on the economic analysis of onion production along river Komadugu area of Yobe State, Nigeria done by Grema. Gashua, [7] and the findings indicated that most of the out growers are male and majority were middle age (35-44 years) and have had substantial experience in onion production in Nigeria.

Onion production for income generation in small scale irrigation Users agro-pastoral households investigated by Akililu Nigussie et al in Ethiopia [3]. This survey was undertaken in 500 households and information was collected on demographics, landholdings and family labor, irrigation, returns of cultivation, behaviours of consumption, farmer perceptions and experiences, and other related variables in the study. The results showed that using irrigation the Bombie red yield on average was 193 quintal per ha with maturity date of 90-100 days. Theresa Ukamaka Anigbogu, [14]. examined the socio-economic factors influencing agricultural production among Cooperative farmers in Anambra State, Nigeria. The findings revealed that age, educational qualification, farming experience, farm size, income, seedling obtain, fertilizer obtain and fertility of the land are significant in the study.

Asif Reza Anik, Abdus Salam [1] examined the Determinants of adoption of improved onion variety in Bangladesh and their results found that, cultivation of improved variety gives higher returns to the farmers than the traditional varieties in the study. Another study done by Amin, Sumaya Mohammed Mustafa [2] to identify the factors affecting onion production and productivity in Kassala area and for this purpose the data were collected

from a selected sample of 100 onion farmers in season 1995/96, using a stratified random sampling technique. The results indicate that, seed rate, fertilizer quantity and harvesting time significantly affect onion yield in the study.

Berhan Tegegne Haile [4] analyzed the determinants of technical, allocative and economic efficiencies among onion producing farmers in irrigated agriculture in Ethiopia. Their findings revealed that land distance, land ownership, and fragmentation explained the technical inefficiencies and among socio-economic characteristics age, market access, training access, and years of experience in onion production, farm income, responsibility and field visit were the significant factors in determining the technical efficiency.

Budathoki, K. & Bhattarai S. P. [6] examined the constraints of onion production and improvement measures adopted by farmers in Nepal. They found that, farmers possess considerable knowledge and skills that need to be evaluated and utilized.

Opeyemi Eyitayo Ayinde, Tohib Oyeyode Obalola [11] studied on effect of socio-economic Characteristics and income status on onion farmers risk attitude in Sokoto State in Nigeria. They used primary data used which were obtained from structured questionnaire administered to 120 randomly selected farmers and those data was analyzed using binary logistic regression model. The results showed that farmers' age, farm size and access to extension service significantly influenced the farmers' risk attitude In Nigeria.

Chavan, V. R., Salunkhe, S. V and Perke, D. S [13] examined the socio-economic characteristics of exported onion growers and non-exported onion growers in Nasik District of Maharashtra. They found that the average age of non-exported onion farmers was 40.86 years and exported onion farmers was 42.65 years. The middle-aged farmers mostly preferred domestic marketing of their onion produces while the young age group of farmers were seen to export the onion in the country. Kumud Shukla and Nahar Singh [10] studied of socio-economic status of onion farmers in Nashik District of Maharashtra and their results showed that most of the onion farmers in the study area acquired education up to high school level, belonged to medium family size and nuclear family type. It was found that considerable onion farmers had agriculture as main occupation.

Factor affecting outlet choice of onion producers in Northwest Ethiopia done by Habtamu Mossie, Zewdu Berhanie and Getachew Alemayehu [8] using in multivariate probit approach. They used multistage sampling procedure was used to select the sample of 275 farm household in the study. Results of the model showed that the probability of choose wholesales, retailer, rural collectors, and consumers market outlet was significantly affected by post-harvest value addition, amount of onion production, land size allocated for onion production, ownership of motor pump, educational status of the household head and the total livestock owned were significant in determining the outlet choice of onion producers in the study.

## 2. Objectives of the Study

This study has mainly considered the following objectives.

- 1) Identify whether average production of onion differ across the selected socio-economic characters of farmers in Jaffna district of Sri Lanka.
- 2) Estimate the coefficient of correlations among onion production and the farmers’ age and their farming experience.
- 3) Examine the selected socio-economic characteristics and its impact on onion production in the study area.

## 3. Methods of Analytical Techniques

This study has mainly based on primary data which has been collected from the selected sample villages during the periods of 2018/2019 where the farmers cultivating onion in Jaffna district of Sri Lanka. In the district, four regions were considered as the study area where the farmers mostly engaging in onion cultivation. Finally, a total of 100 onion farmers were randomly selected and twenty-five were randomly selected from each of the four villages in the study area. The collected data were analyzed using frequency and descriptive statistics, independent sample t-test, correlation and multiple linear regression model.

## 4. Results and Discussions

The sample of the study was analysed using descriptive statistics which shows that average production of onion is 4109 Kg with the standard deviation of 2269.93. Also, table 1 reveals that, the average age of onion farmers was seen to be 56 years shows that the mostly the farmers are middle aged who preferred onion produce to produce in the farming with average farming experience of 22 years

in the study.

The socio-economic characteristics of the sample farmers considered in this study were composition of gender, age of the farmer, experience in farming, usage of types of fertilizer and land ownership. Out of them gender, usage of types of fertilizer and land ownership were taken to analyze the frequency and its results shown in table 2. According to that, majority of the farmers are male and 91% of the farmers applying partially organic fertilizers in the onion cultivation. Further, 77% of the onion farmers using tenant land for their cultivation in the district.

Table 1. Descriptive statistics of the variables.

| Variables           | Sample size | Mean    | Median  | Standard deviation |
|---------------------|-------------|---------|---------|--------------------|
| Production of onion | 100         | 4109.90 | 4500.00 | 2269.993           |
| Age                 | 100         | 56.03   | 58.50   | 11.856             |
| Farming experience  | 100         | 22.36   | 20.00   | 10.192             |

Source: Authors’ calculation, 2018/2019

Table 2. Frequency analysis of explanatory variables.

| Variables                    | Frequency | Percentage (%) |
|------------------------------|-----------|----------------|
| Gender                       |           |                |
| Male                         | 79        | 79             |
| Female                       | 21        | 21             |
| Usage of types of fertilizer |           |                |
| Organic                      | 9         | 9              |
| Partially organic            | 91        | 91             |
| Ownership of land            |           |                |
| Own land                     | 23        | 23             |
| Tenant land                  | 77        | 77             |

Source: Authors’ calculation, 2018/2019

The following graph shows the average production of onion across male and female farmers under two different conditions of fertilizer usage.

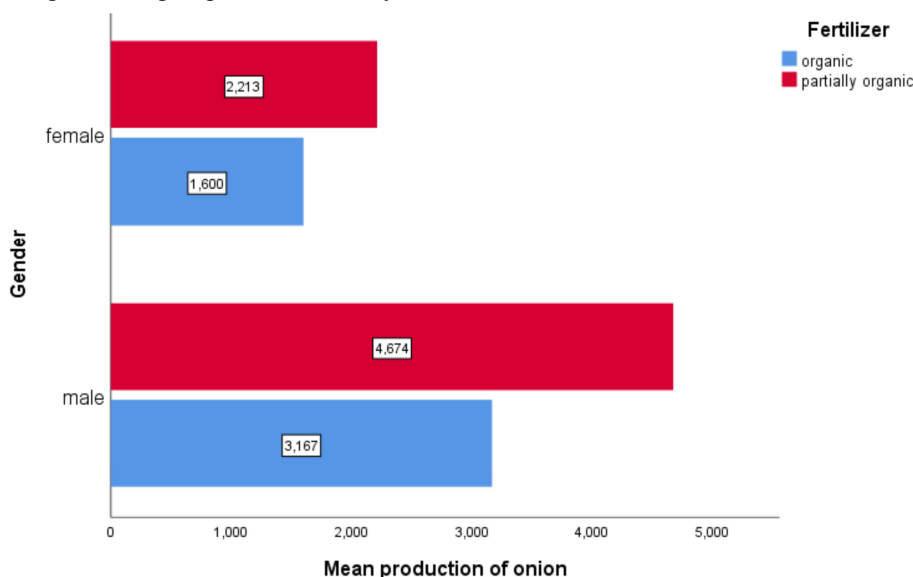


Figure 1. Average production of onion across gender.

The above clustered bar chart illustrates that, compared to female farmers, average production of onion derived by male

farmers are high and among male farmers average production of onion is high when they using partially organic fertilizer in the cultivation.

To identify whether the average production of onion differ across gender, fertilizer usage and ownership of land, independent sample t-test was applied in the study.

**Table 3.** Results of independent sample t-test.

| Items              | Onion production across |         |                             |                   |                    |         |
|--------------------|-------------------------|---------|-----------------------------|-------------------|--------------------|---------|
|                    | Gender***               |         | Types of fertilizer usage** |                   | Ownership of land* |         |
|                    | Male                    | Female  | Organic                     | Partially organic | Own                | Tenant  |
| Mean               | 4578.35                 | 2347.62 | 2476.56                     | 4272.03           | 3418.91            | 4316.30 |
| Standard deviation | 2159.60                 | 1786.02 | 2545.47                     | 2190.17           | 2270.33            | 2243.33 |

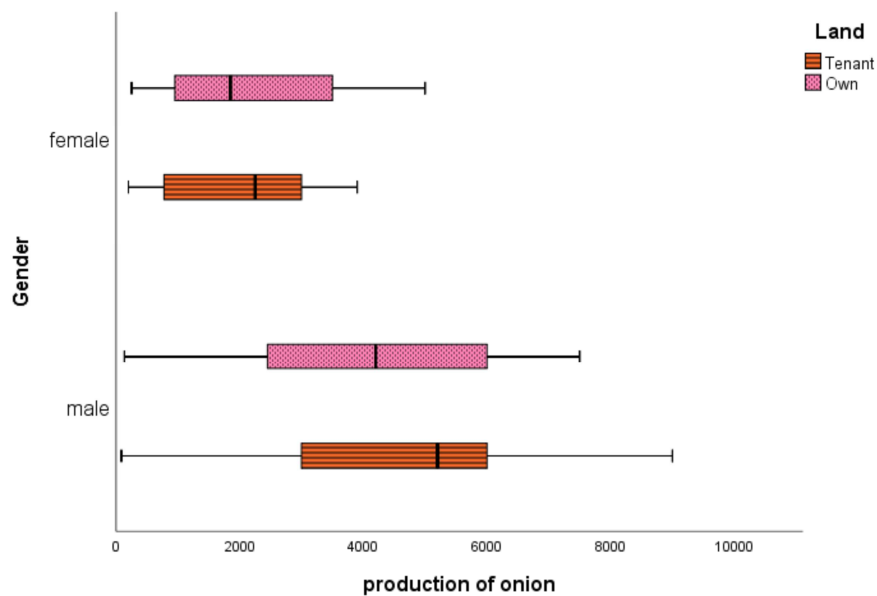
Note: \*\*\*, \*\* and \* represents the statistically significant levels at 1%, 5% and 10% respectively.  
Source: Authors' calculation, 2018/2019.

The above results reveal that, average production of onion for male farmers is higher than females and it is statistically significant at 1% level whereas, the farmers who applies organic fertilizers partially got higher yield than who are the farmers apply organic fertilizer.

Average production of tenant onion farmers is 4316.30

which is higher than own land farmers and it is significant at 10% level.

Clustered box plot graphically displays the median differences in onion production across male and female farmers under two different ownership of land.



**Figure 2.** Clustered box plot of onion production across gender.

In the figure shows that production of male farmers differs from females based on whether they have own land or tenant.

The following table used to identify how the onion production correlates with age and farming experience and the results represent they have significantly correlated each other.

**Table 4.** Coefficients of correlation among the variables.

| Variables Items     |                     | Onion output | Age     | Experience |
|---------------------|---------------------|--------------|---------|------------|
| Production of onion | Pearson Correlation | 1            | .501*** | .585***    |
|                     | Sig. (2-tailed)     |              | .000    | .000       |
| Age                 | Pearson Correlation | .501***      | 1       | .754***    |
|                     | Sig. (2-tailed)     | .000         |         | .000       |
| Experience          | Pearson Correlation | .585***      | .754*** | 1          |
|                     | Sig. (2-tailed)     | .000         | .000    |            |

Note: \*\*\* represents the significant level at 1%.  
Source: Authors' calculation, 2018/2019.

The coefficient of correlation between production and age has 0.501 and the coefficient of correlation between production and farming experience has 0.585 and shows that

they have 50% and 58% correlation each other respectively. Further, custom table on production of onion across land ownership, types of fertilizer and gender also analyzed and

its results reveal that average production of onion is 4818Kg which is higher among the male farmers who cultivates the

onion using tenant land with application of organic fertilizers partially.

**Table 5.** Custom table of onion production and land ownership.

|      |        |                     |                   |        |        | Production of onion |
|------|--------|---------------------|-------------------|--------|--------|---------------------|
|      |        |                     |                   |        |        | Mean                |
| Land | Tenant | Types of fertilizer | Organic           | Gender | Male   | 1100                |
|      |        |                     |                   |        | Female | 2250                |
|      |        |                     | Partially organic | Gender | Male   | 4818                |
|      |        |                     |                   |        | Female | 2450                |
|      | Own    | Types of fertilizer | Organic           | Gender | Male   | 4545                |
|      |        |                     |                   |        | Female | 950                 |
|      |        | Partially organic   | Gender            | Male   | 3929   |                     |
|      |        |                     |                   | Female | 2658   |                     |

Source: Authors' calculation, 2018/2019

On the other hand, average production of onion is low at 950Kg among the female farmers who has own land with the application of organic fertilizer usage in the study area.

Another way of custom table also analyzed on average age of the farmers across ownership of land and types of fertilizer usage and its results illustrated in table 6.

**Table 6.** Custom table of farmers' age and land ownership.

|      |        |                     |                   |        |        | Age  |
|------|--------|---------------------|-------------------|--------|--------|------|
|      |        |                     |                   |        |        | Mean |
| Land | Tenant | Types of fertilizer | Organic           | Gender | Male   | 48   |
|      |        |                     |                   |        | Female | 40   |
|      |        |                     | Partially organic | Gender | Male   | 58   |
|      |        |                     |                   |        | Female | 55   |
|      | Own    | Types of fertilizer | Organic           | Gender | Male   | 62   |
|      |        |                     |                   |        | Female | 41   |
|      |        | Partially organic   | Gender            | Male   | 56     |      |
|      |        |                     |                   | Female | 53     |      |

Source: Authors' calculation, 2018/2019.

According to the above results showed that, the highest age of the farmers is 62 years who is male cultivates the onion using own land with organic fertilizers whereas, the lowest age of the farmers is 40 years who is a female using organic fertilizer with tenant farming in the study.

Empirical model is used to determine how the selected socio-economic factors of the farmers affecting the onion production and the amount of onion production considered as dependent variables and other five characters taken as independent variables in the model as below:

$$Y_i = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon$$

Where,

$Y_i$ =Yield of onion

$X_1$ =Age in years

$X_2$ =Gender coded as 1 for female and 0 for male

$X_3$ =Farming experience in years

$X_4$ =Types of fertilizer usage coded as 1 for partially organic uses and 0 for organic

$X_5$ =Ownership of land coded as 1 for own land 0 for tenant land

$\epsilon$ =Error term

Using the above model, linear regression model estimated and its results depicted in table 7 and according to the results, the overall significant model illustrated by F-test which has the value of 13.59 at statistically significant at 1% level. This implied that all the explanatory variables were important for explaining the variations in total production of onion in the study.

**Table 7.** Estimated results of regression analysis.

| Variables                 | Un standardized beta | Standard error | Standardized beta | t-ratio  |
|---------------------------|----------------------|----------------|-------------------|----------|
| Constant                  | 663.29               | 1111.92        |                   | .597     |
| Age                       | 27.74                | 23.07          | 0.14              | 1.20     |
| Gender                    | -1454.91             | 457.43         | -0.26             | -3.18*** |
| Farming experience        | 87.63                | 28.00          | 0.39              | 3.12***  |
| Types of fertilizer usage | 288.11               | 663.31         | 0.03              | 0.43     |
| Ownership of land         | -103.33              | 445.30         | -0.01             | -0.23    |

Adjusted R<sup>2</sup>=0.389

F-Value=13.59 at significant at 1% level.

Note: \*\*\* represents the significant level at 1%.

Source: Authors' calculation, 2018/2019.

Five independent variables were included in the model and out of them only two variables were statistically significant. The coefficient of gender has negative sign with 1% of significant level reveal that, average production of onion derived by female farmers are less by 1454 Kg than male farmers in the study area. This finding supported to the results obtained by independent sample t-test also. Compared to females, male farmers have motivation and capacity to adopt new farming methods and technical skills which may motivate their production of onion. As expected, sign, farming experience has positively affected on onion production and the coefficient is significant at 1% level. As experience in farming increases one more year, on average production of onion increase by 87.63Kg assume that other factors held constant. Positive sign of age reveals that, older farmers are getting more production than young farmers even though it is not significant in the model. Types of fertilizer usage has positive sign shows that, the farmers who applied organic fertilizers partially, will get more onion production than purely organic farmers, but it is insignificant in the model. Similarly, ownership of land also was not significantly influencing the onion production in the study area.

## 5. Conclusion

The study examined the determinants of onion production in Vavuniya district of Sri Lanka and for the data collection, total of 100 farmers were selected across four villages using random sampling technique. The socio-economic characteristics of the farmers were analyzed using descriptive statistics such as percentages and frequencies, correlation, independent sample t-test and multiple regression technique in the study. Results of independent sample t-test proved that, average onion production differ across gender, types of fertilizer usage and ownership of land. The results obtained from regression model revealed that  $R^2$  value was 0.389 indicating that 39% of variation in onion production was accounted for by gender and farming experience where these variables were significant and important in the determination of onion production in the study area.

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