Original Research Article

# Assessment of Livelihood Security of Cassava Farmers in Hill Areas of Western Tamil Nadu – An Economic Analysis

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The present study is concerned with the livelihood security of cassava farmers in hill areas of western Tamil Nadu. Salem and Namakkal districts were purposively selected since these are the major cassava growing districts of western Tamil Nadu. The multi-stage random sampling procedure was adopted to choose 180 sample farmers.The methodology used for the study was Gini coefficient, Livelihood Security index, Composite index and Tobit model. The results of Gini coefficient of Kalvarayan and Kolli hills were 0.56 and 0.66 respectively. It is evident that income inequality was higher in Kolli hills when compared to that of Kalvarayan hills. The results of livelihood security index revealed that the overall livelihood security of both Kalvarayan and Kolli hills was just around 50 per cent, indicating that welfare of the cassava farmers were under deprived situation. The Tobit analysis revealed that only education level, farm size and annual income are positively significant in case of Kalvarayan hills. While in case of Kolli hills, age, education level, farming experience, farm size and annual income are positively significant.

## Introduction

Cassava (*Manihot esculenta*) is a perennial vegetable crop and belongs to family Euphorbiaceae and originated in the regions of west-central Brazil. It is now being cultivated all over the world particularly in the Tropical and Sub-tropical regions (Bhandari, *et al.,* 2007). Cassava continues to be a crop of food security for the millions of people especially in the developing countries of the globe. It is an important alternate source of energy to meet the demands of increasing population. India acquires significant position in the global cassava scenario due to its highest productivity in the world. It is

largely cultivated in the states of Tamil Nadu, Kerala, parts of Nagaland, Meghalaya, Andhra Pradesh, Karnataka, Pondicherry and Assam. It is a food security crop in Kerala. Tamil Nadu occupies first position in terms of area and production of cassava in India and its productivity is the highest in the world (Conway, 1992; Ebenezer, *et al.,* 2004). It is cultivated both under irrigated and rainfed conditions. This crop is predominantly cultivated in the western part of Tamil Nadu and 50 per cent of total cassava cultivated area is under rainfed condition.

## Materials and Methods

The present study is concerned with the cassava production and livelihood security of farmers in hill areas of western Tamil Nadu. Salem and Namakkal district were purposively selected since these are the major cassava growing districts of western Tamil Nadu.

Kollimalai block and Pethanaikenpalayam block (Kalvarayan hills) are the highest contributors to area under cassava cultivation in Namakkal and Salem districts respectively. These two districts constituted 41 per cent of the area under cassava cultivation in the state. Besides, a large number of cassava processing units are also functioning in these two districts. In the second stage, one block *viz*, Pethanaikenpalayam block from Salem district and Kollimalai block from Namakkal district were purposively selected based on the highest area under cassava in hilly area. In these areas, cassava is being cultivated mostly under rainfed condition.

In the next stage, three villages were selected randomly from each blocks. Totally six villages were selected. A list of cassava cultivators was obtained from Village Administrative Officer, from which, 30 farmers were selected randomly from each village. Thus the total sample size was 180.

## Tools of Analysis

Gini ratio which was defined as twice the area between Lorenz curve and egalitarian line. This ratio

varies between zero (for total equality) and one (for total inequality). The important feature of Gini ratio is that equi-proportional increase at all income levels would not affect the Gini ratio. However, it is sensitive to disproportionate changes at all levels of income.

$$Gini\ Ratio = 1 - \sum_{j=1}^{n} P_j(Y_j - Y_{j-1})$$

Where,

$P_j$ = proportion of households in the $j^{th}$ group

$Y_j$ = cumulative proportions of income in the $j^{th}$ group

$Y_{j-1}$ = cumulative proportions of income in the $(j-1)^{th}$ group

$N$ = total number of groups

## Livelihood Security Index

Household livelihood security index have become very useful tool for assessing and measuring the wellbeing of the people at household level. It allows creative thinking about the complex needs of families. Household livelihood security index is an eight component measure focused directly on the resources, its potentials and constraints to family wellbeing.

The components of livelihood security included income and assets, food and nutrition, education, participation, water, sanitation, primary health and reproductive health. Each of the components was identified separately and an aggregate measure of livelihood security has been derived.

The aggregate measure is based on equal weight of each of the eight components. The subcomponents were grouped into four household livelihood security areas viz., economic security, food security, health security and educational security.

## Composite index

When the observed values are positively related to the development, the standardization is achieved by employing the formula,

$$y_{id} = (X_{id} - Min\ X_{id}) / (Max\ X_{id} - Min\ X_{id})$$

If not so,

$$y_{id} = (Max\ X_{id} - X_{id}) / (Max\ X_{id} - Min\ X_{id})$$

Where, $X_{id}$ is observed value of $i^{th}$ parameter of the $d^{th}$ household. Obviously, the standardized indices lie between zero and one. The level of security (Livelihood) of $d^{th}$ farmer is assumed to be a linear sum of $Y_{id}$ as

$$Y_{id} = \sum w_i y_{id}$$

Where w's (0<w<1 and wi = 1) are the weights determined by

$$w_i = \frac{k}{\sqrt{variance\ (y_i)}}$$

$$k = (\sum \frac{1}{\sqrt{variance\ (y_i)}})^{-1}$$

## Results and Discussion

### Pattern of income distribution

The income distribution of sample farmers in both the hills were studied by Gini-coefficient and Lorenz curve. The results of the Lorenz curves are furnished in fig 1 and 2 of the Kalavarayan and Kolli hills farmers respectively. The Gini-ratios of the two hills farmers are furnished in the table 2. The Gini coefficient is the proportion of area under the diagonal line. The distribution of income for different categories of sample farm households is furnished in Lorenz-curve. The egalitarian line in each case represents that zero per cent of the

population would receive zero per cent of income while 100 per cent of the population would receive 100 per cent of income and so the line would run from one corner (0,0) of the units square to the opposite corner (1,1). The Lorenz-curve obtained for the each category of farmers would lie between two extremes. The curve lie below the diagonal and its slope increasingly rises, as one would move to higher and higher levels of income. This inequality arising out of Lorenz-curve that is divergence from the ideal situation of perfect equality was revealed by the Gini coefficient. The Lorenz-curve showed the income inequality among Kalvarayan and Kolli hills farmers. The results shows that the Gini coefficient of Kalvarayan and Kolli hills were 0.56 and 0.66 respectively. It's evident that income inequality was high in Kolli hills compared to Kalvarayan hills.

### Livelihood Security of Sample Households

The livelihood security index of the sample households was estimated and presented in Table 3. The overall livelihood security of the sample households in both Kalvarayan and Kolli hills was just around 50 per cent, indicating that welfare of the cassava farmers has to be increased. In both hilly regions, food security contributes significantly in the overall welfare of the cassava farmers. Women empowerment was very less in both the hills and women empowerment security was observed as only 0.26 in each hills. Security in education was 0.59 and 0.58 for Kalvarayan and Kolli regions, respectively. Food insecurity was the major component of the livelihood security of the Kalvarayan and Kolli hills. Food insecurity may be coupled with low agricultural productivity and severe poverty (Ghanim, 2003). Similarly, Frankenberger, (1996) showed that 53 % of the sampled rural households were in the condition of severely food insecure and causes to less livelihood security. Hence it is recommended to concentrate moreon increasing cassava productivity, production and profitability in these hilly regions to ensure better livelihood security of the cassava farmers.

**Table.1** Determinants of Livelihood Security (Tobit Model)

| S. No. | Variables | Measurement of Units | Description |
|---|---|---|---|
| I | | Dependent Variable | |
| 1. | Livelihood security | Index | It indicates level of livelihood security in a family level |
| II. | | Independent Variables | |
| 1. | Age | Younger age = 1, Middle age =2,Old age =3 | It measures the maturity of the farmers in decision making process in improving the livelihood of the family. |
| 2. | Education | Illiterate = 1, primary = 2, SSLC = 3, HSC = 4 and Collegiate = 5 | It measures the exposure of farmers to contemporary social issues and information dissemination directly related to welfare of the family. |
| 3. | Type of family | Nuclear family = 1, Joint family = 2 | It is used to surrogate for the subsistence pressure on the health, sanitary and other wellbeing of the family. |
| 4. | Members of Family | Nos | |
| 5. | Farming Experience | in years | It measures the maturity of the farmers in decision making process in improving the livelihood of the family. |
| 6. | Farm size | in hectare | It measures the capacity of a farmer to increase the welfare of the family members. |
| 7. | Annual income | Rupees | It measures the capacity of a farmer to increase the welfare of the family members. |

**Table.2** Gini-coefficient of the sample farmers in the study area

| S. No | Particulars | Kalvarayan hills farmers | Kolli hills farmers |
|---|---|---|---|
| 1. | Gini-coefficient | 0.56 | 0.66 |

**Table.3** Livelihood Security of Sample Households

| Sl. No | Particulars | Kalvarayan Hills | | | | Kolli Hills | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Index | Maxi | Mini | CV | Index | Maxi | Mini | CV |
| 1 | Education security | 0.59 | 0.85 | 0.47 | 18.27 | 0.58 | 0.85 | 0.47 | 16.26 |
| 2 | Health security | 0.45 | 0.79 | 0.31 | 21.38 | 0.54 | 0.86 | 0.29 | 24.63 |
| 3 | Food security | 0.71 | 0.90 | 0.55 | 7.91 | 0.73 | 0.84 | 0.61 | 5.77 |
| 4 | Economic security | 0.47 | 0.88 | 0.35 | 17.97 | 0.54 | 0.80 | 0.39 | 13.99 |
| 5 | Women empowerment | 0.26 | 0.44 | 0.00 | 35.55 | 0.26 | 0.45 | 0.00 | 39.61 |
| | **Livelihood** | 0.50 | 0.58 | 0.41 | 7.47 | 0.53 | 0.63 | 0.44 | 7.77 |

**Table.4** Determinants of overall livelihood security index

| Sl. No | Variables | Kalvarayan hills Co efficient (Standard error) | Kolli hills Co efficient (Standard error) |
|--------|-----------|------------------------------------------------|-------------------------------------------|
| 1 | Age (reference category: youngsters) | | |
| | Middle age | -0.001$^{NS}$ (0.005) | 0.017*** (0.003) |
| | Old age | -0.009$^{NS}$ (0.005) | 0.025*** (0.006) |
| 2 | Education (reference category: illiterate) | | |
| | 1$^{st}$ to 5$^{th}$ standard | 0.019*** (0.003) | 0.009*** (0.003) |
| | 6$^{th}$ to 10$^{th}$ standard | 0.027*** (0.005) | 0.018*** (0.004) |
| | 11$^{th}$ and 12$^{th}$ standard | 0.023*** (0.007) | -0.013** (0.007) |
| | College Level | 0.059$^{NS}$ | |
| 3 | Type of family | -0.0004$^{NS}$ (0.004) | -0.017*** (0.005) |
| 4 | Farming Experience | 0.0001$^{NS}$ (0.00) | 0.001*** (0.00) |
| 5 | Farm size | 0.048*** (0.009) | 0.042*** (0.003) |
| 6 | Number of family members | -0.001$^{NS}$ (0.001) | -0.001$^{NS}$ (0.001) |
| 7 | Annual income | 0.001** (0.00) | 0.001** (0.00) |
| 8 | Constant | 0.042$^{NS}$ (0.007) | 0.437$^{NS}$ (0.003) |
| | Pseudo R$^2$ | -0.864 | -1.154 |
| | LR chi$^2$ | 280.23 | 352 |

Note: *** Significant at 1 per cent level, **Significant at 5 per cent level,* Significant at 10 per cent level and NS – Non Significant

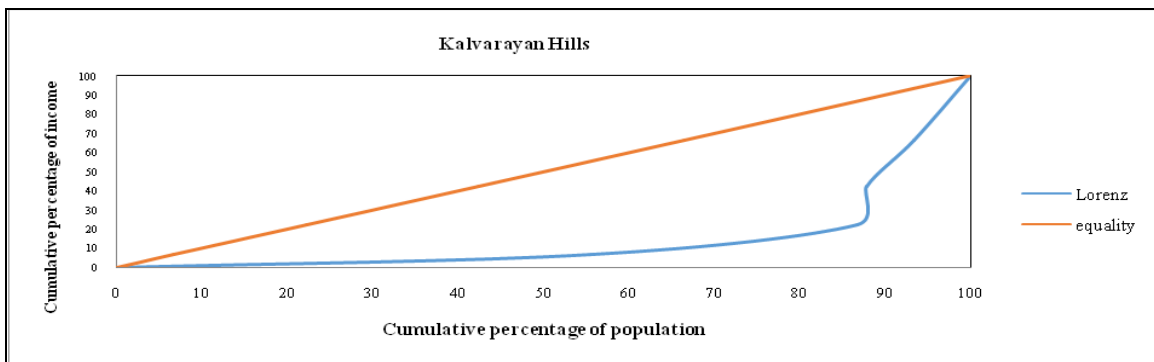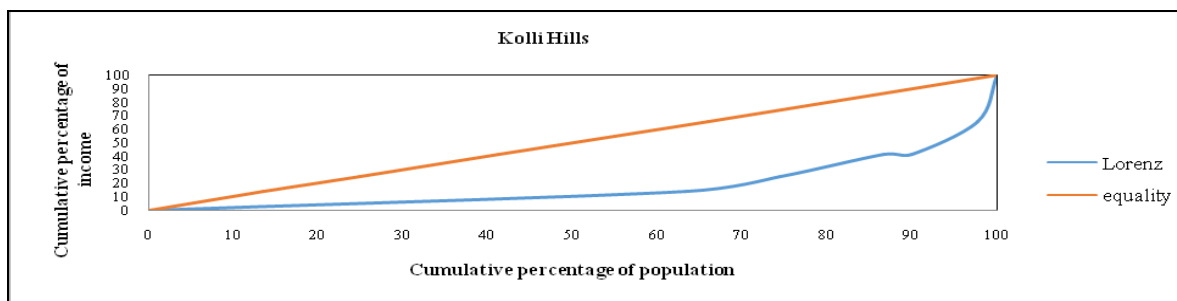**Fig.1** Income Distribution among the Kalvarayan Hills Farmers

**Fig.2** Income Distribution among the Kolli Hills Farmers



## Determinants of livelihood security

The estimated results of Tobit regression function on the determinants of overall livelihood security index is presented in Table 4. It is observed that education level, farm size and annual income are positively significant. When compared to the illiterate, all the higher levels of education increase the livelihood of the farmer of Kalvarayan hills, confirming that education has the major role on the improvement of better livelihood index. Farm size is significant at one per cent level and has positive relationship with livelihood security, indicating that larger farm size may increase the living condition of the farmers. Annual income was positive and significant at five per cent level. Thus, resource-rich farmers engage in better livelihoods (Chambers, 1998). In the case of Kolli hills, it is observed that age, education level, farming experience, farm size and annual income are positively significant. When compared to the young farmers, livelihood security was more among the middle and old age farmers in Kolli hills. When compared to the illiterate, middle and high levels of education increase the livelihood of the farmer of Kolli hills, confirming that education has the major role on the improvement of better livelihood index. Farm experience, farm size and annual income are significant at one per cent level and has positive relationship with livelihood security.

Based on the study, it is concluded that the income inequality was higher in Kolli hills when compared to that of Kalvarayan hills. The livelihood security index revealed that the overall livelihood security of both Kalvarayan and Kolli hills was just around 50 per cent, indicating that welfare of the cassava farmers were under deprived situation. The Tobit analysis revealed that only education level, farm size and annual income are positively significant in case of Kalvarayan hills. While in case of Kolli hills, age, education level, farming experience, farm size and annual income are positively significant.

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