

## RESEARCH ARTICLE

### Income diversification of tea estates households in Badulla district

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#### ABSTRACT

*The poverty prevailing estate sector is of great importance to the Sri Lankan economy and it should be a source of lesson to other sectors in Sri Lanka. Estate poverty could generally be reduced by diversifying income portfolio of estate households. Although, poverty is a major determinant of income diversification, it is very important to study the household level determinants of income diversification. By taking representative sample of 298 households using cluster sampling technique, this study attempts to find household level determinants of income diversification of tea estate households in Badulla district of Sri Lanka. The data for the study come from a primary survey carried out in 5 tea estates. Tobit Model was used to find the determinants. Moreover, Shannon Equitability Index was used to measure the overall diversity while a Tobit Model was estimated to find the determinants of overall diversity. This study finds that tea estates households in Badulla district are mainly involved in three broad income generating activities. Those are estate income, other agricultural income and non-agricultural income. 72.48% of estates households generate their income from the non-agricultural activities. It is the highest income activity among the major income activities. 71.47 and 23.82% from total households generate their income respectively by estate income and other agricultural activities. The study concludes that overall diversity of income is very low in the estate households and education level of the household heads play a major role in diversifying into non-agricultural activities. Working age population is the major determinant to diversify the income into non-agricultural activities other than estate income.*

**Keywords:** Income diversification, Tobit model, Shannon equitability index

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#### INTRODUCTION

Diversification is considered to be the expansion of the range of rural activities outside the farm and is seen as a dynamic adaptation process created through pressures and opportunities (Ellis, 2000). Much literature shows that income diversification is one of the strategies that are adopted to mitigate the risk associated with income shortage of households. In Sri Lanka, there are three commonly known sectors *viz* urban, rural and estate. Estate sector consists of all plantations, which are 20 ac or more in extent and ten or more resident laborers. Estate households are still considered to be the poorest households in Sri Lanka and the poverty headcount ratio is 10.9% according to the Department of Census and Statistics of Sri Lanka (2015). Being the households in the poorest sector in

Sri Lanka, people in the estate sector started to diversify their income portfolio by incorporating non-farm income sources as their major income source is estate income.

Tea is one of the major foreign exchange earners in Sri Lanka. Estate laborers are one of the major players in tea industry. Tea industry economically depends on sweat and blood of these estate workers. In initial stage of tea industry, laborers who were working in tea industry had estate income as sole income source. They had not enough facilities to engage in other income earning activities. Tea estate management provided facilities to estate households to work only in estates. According to Central Bank Report (2013), wage rate of tea estate laborers is still very low in comparison to daily wages of workers of rubber, coconut and paddy farming. Workers in the sector live in a congested and unsanitary housing with little access to social services. In case of human development indicators, estate sector is lagging behind even those in rural areas (World Bank, 2007). Therefore, to improve the living condition of estate workers, engaging in alternative income earning activities plays a significant role. Low income and high poverty rates in estate have motivated estate workers engaged income diversification activities. On the other hand, educated youth has a few opportunities to climb the ladder of estate hierarchy. Therefore, they tend to migrate from estates in search of better opportunities outside them. Thus, migration also has become a very important strategy in income diversification of estate households. World Bank (2007) points out that those estate workers earn income from three broad categories; estate wages, outside wages, and enterprise incomes that include income from non-agricultural household businesses and from sales of crops, livestock, and livestock products. Although, poverty is one of the major contributory factor for income diversification of estate households, what household level factors affect on the income diversification still remains a question. On the other hand, what household level factors determine the overall income diversity is also questionable. Therefore, this study attempts to find the household level factors that determine the income diversification and overall income diversity in estate households.

#### ***Income diversification and its determinants***

Throughout the vast definitions related to income diversification, Ellis (2000) and Minot *et al.* (2006) define income diversification as a process in which households increase not just the number of sources of income but achieve a greater balance in terms of the relative share of the various income sources in their income portfolio. Income diversification is a key way of ex ante risk management or ex post coping with shocks (Rosenzweig and Binswanger, 1993) *i.e.* income diversification is linked to lowering risk associated with income shocks to the households. Alderman and Paxson (1992) opine that households diversify their income in order to minimize their income variability and to ensure minimum level of income. As Sri Lankan tea estate households belong to the poorest category of people in Sri Lanka, it could be assumed that they diversify their

income into different sources as a risk spreading strategy and a means of poverty alleviation. However, Murdoch (1990) points out that those poorer households choose less risky production strategies than do other households. On the other, poorer households are less diversified and their strategy is to be more risk averse (Dercon and Krishnan, 1996). Escobal (2001) finds that access to public assets such as roads and private assets such as education and credit is an important factor for diversification.

Available literature also shows that there is wide variety of determinants of income diversification. Many studies have found that demographic factors such as age, number of household members, level of education, farming experience, and presence of small children are major determinants of income diversification while farm characteristics such as farm size, seasonality of farm labor requirements, and proximity to urban areas are the determinants of both on-farm and off-farm diversification (Goodwin and Mishra, 2004). Education level of farmer has a strong and positive influence on the number of crops grown, as the level of education is of great importance to understand information coming from extension services or other information sources (Minot *et al.*, 2006). According to Ersado (2006), the number of income sources are directly associated with gender of household head and the number of adult household members in households of rural areas. The author further highlights that income diversification is negatively associated with gender of household head while the age of the household head is one of factors affecting on the income diversification positively. On the other hand, young household heads like to engage more on on-farm work (Mishra *et al.*, 2010). Barrett *et al.* (2001) find out a strong positive relationship between education and non-agricultural incomes. Years of schooling has a negative impact on income share from agricultural self-employment, whereas it has a positive impact on total and non-agricultural income. A study carried out by Babatunde and Qaim (2009) revealed that education of the household head is positively associated with the number of income sources. According to the findings of Lay and Schuler (2007), income diversification increases with the age of the household head, but it decreases after the age 55 yr. They explain that decline in diversification is driven by a sharp decline in non-agriculture sector participation in old-age.

## **METHODOLOGY**

This section describes the methodology adopted in achieving the objective of finding the determinants of income diversification and overall income diversity of tea estate households. The data for this study was gathered using household survey carried out in Badulla district by selecting nine tea estates from the five plantation companies. Badulla district was purposely selected because it has the second largest extent of tea lands of Sri Lanka. The sample of the research consists of 298 tea estate households, which were selected through a cluster sampling technique. Each division of each tea estate was considered as a cluster. Finally, 5% of households were selected from each estate randomly. The data

were collected from late June to mid-July in 2014. A standardised questionnaire was used to collect information on household socio-economic characteristics and income sources, including details of participation in estate income, other agricultural income and non-agricultural income activities.

Censored Tobit regression was used to examine the determinants of income diversification of tea estate households in Badulla district. The major reason for selecting the Tobit regression model is the nature of the dependent variable where there are zero values for some income categories of estate households. For example, there are some estate households in the estates that they do not work in the estates. Thus their income from estate is zero. The general form of the model is implicitly stated as,

$$Y = \beta_0 + \beta_1 AHH + \beta_2 GHH + \beta_3 YRSH + \beta_4 NDP + \beta_5 NM + \beta_6 NF + \beta_7 MEX + \beta_8 DCTY + \beta_9 LR + \epsilon_i$$

To measure the overall diversity, we used Shannon diversity index, which takes the following form. Table 1 gives a description of dependent variables whereas the Table 2 provides details about independent variables.

$$H_{income} = - \sum_{i=1}^s [(income\ share_i) \cdot \ln(income\ share_i)]$$

H = the Shannon diversity index

Income share<sub>i</sub> = fraction of the entire income made up of income source i

S = numbers of income sources

**Table 1:** Description of dependent variables.

Dependent variable	Income activity	Description	Data type
Y <sub>E</sub>	Estate income	Monthly income share from estate activities	Rupees
Y <sub>O</sub>	Other agricultural	Monthly income share from other agricultural	Rupees
Y <sub>N</sub>	Nonagricultural income	Monthly income share from Nonagricultural	Rupees

Source: Sample Survey (2014)

**Table 2:** Description of independent variables.

Independent variables	Description	Data type
AHH	Age of household head	Years
GHH	Gender of household head	Dummy (1=Male, 0= otherwise)
NDP	Number of dependent	Number
NM	Number of male	Number
NF	Number of female	Number
MEX	Monthly expenditure	Rupees
DCTY	Distance to city	Kilometer
YRH	Years of schooling of household	Years
RLN	Loan receipt	Dummy (1 = received, 0=otherwise)

Source: Sample Survey (2014)

## RESULTS AND DISCUSSION

We first present the results of descriptive analysis and then the results of the Tobit regression model. Descriptive analysis was mainly focused on analysing the socio-economic characteristics used in the study.

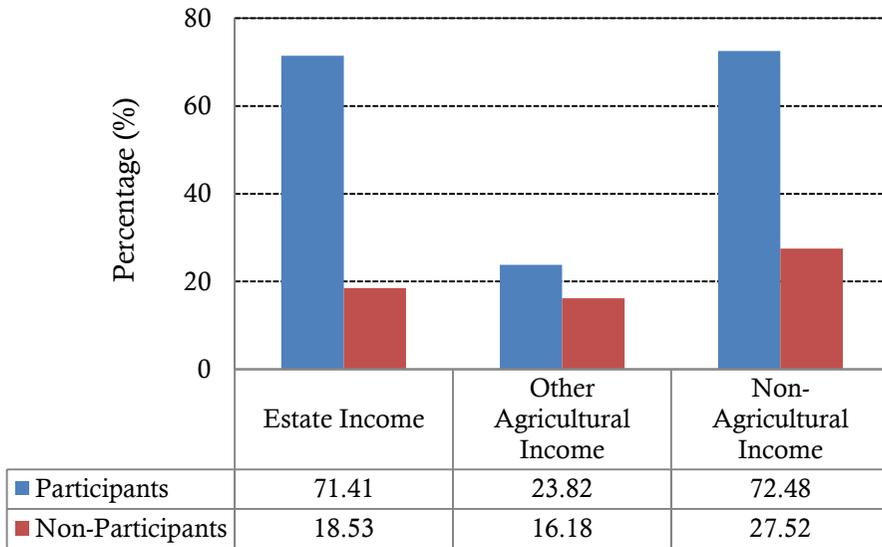
The results in Table 3 indicate that total number of household members in the sample is 1526 out of which 49.01 % are male members. The age distribution of the individual estate households in the sample shows that 43.97% household members belong to the age category of below 25 yr while 17. 23% members are between 26 and 35 yr, 11. 40% are between 36 and 45 yr, 11. 27% are between 46 and 55 yr. Only 16.12% belong to the age category of above 56 yr old.

46.52% of the household members are married while 6.61% are widow/widowers and 1.24% members are divorced. It is surprising to notice that most of the people in tea estates have not educated properly and about 45.80% of household members belong to the category of below G.C.E. (Ordinary Level) education. About 22.34% have educated up to G.C.E. (Ordinary Level) while 7.60% have educated up to G.C.E. (Advanced Level). Only 1.44% members have diplomas and 0.32% members have a degree.

Figure 1 shows the percentage of participation in income earning activities. 72.48% of households are participating in non-agricultural activities while 71.47% are participating in estate activities from the total household in the sample. Only 23.82% of estate households participate in other agricultural activities.

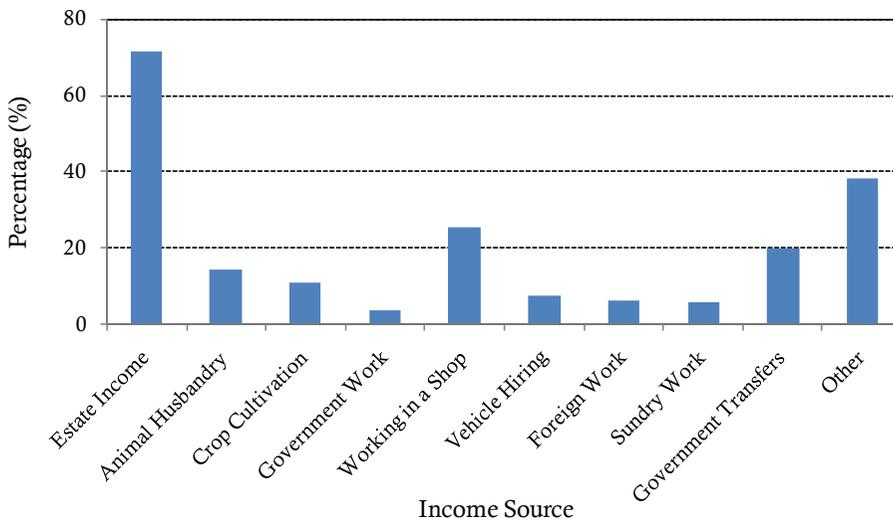
**Table 3:** Socio-economic characteristics of the tea estates households.

Socio-economic characteristics	Frequency	Percentage (%)
<b>Gender Status</b>		
Male	748	49.02
Female	778	50.98
Total	1526	100.00
<b>Age category</b>		
Below 25	671	43.97
26-35	263	17.23
36-45	174	11.40
46-55	172	11.27
Above 56	246	16.13
Total	1526	100.00
<b>Marital status</b>		
Married	710	46.52
Unmarried	697	45.63
Widow/Widower	100	6.61
Divorce	19	1.24
Total	1526	100.00
<b>Education level</b>		
No schooling	343	22.47
Below O/L	699	45.80
O/L passed	341	22.34
A/L passed	116	7.63
Diploma	22	1.44
Degree	5	0.32
Total	1526	100.00
<b>Family Size</b>		
Below 5	114	38.25
6-10	180	60.41
Above 11	4	1.34
Total	298	100.00
<b>Received of Loan</b>		
Yes	190	36.25
No	108	63.75
Total	298	100.00



**Figure 1:** Participation to the main income activities by estates households.

Figure 2 also confirms that major income source of estate households is income from estate work while crop cultivation and animal husbandry play an important role in income source of other agricultural activities. Government work, working in shops, vehicle hiring, foreign work, sundry work, government transfers etc. are the other income sources of estate households.



**Figure 2:** Different income sources of tea estate households in Badulla district.

**Determinants of the income diversification**

This section presents the summary statistics of variables used in the Tobit model and the results of the estimated Tobit models. Table 4 shows the data used for the Censored Tobit Regression. Mean monthly income of the estate households is Rs. 16,058.34 while they earn Rs. 1,864.81 per month. However, they earn a higher income from non-agricultural activities than that of other two income earning activities. As indicated in the Table 4, 45.62% of mean income share comes from estate income while 5.29 and 49.00% income shares represent incomes from other agricultural activities and non-agricultural activities, respectively. These results clearly indicate that although the main income source of estate households is estate income, the contribution to total income is less than that of non-agricultural income. Most of the estate households have 3 dependents in their families and they have about five females and 5 males per two households. On average they spend Rs. 20,844.02 per month for their day to day consumption and other activities. Most of the household heads are females and their mean age is 51 yr. These household heads are educated up to grade 6 to 7. Most of them do not receive loans for their household purposes.

**Table 4:** Summary statistics of variables used in Tobit model

Variables	Observations	Mean	Std. Dev.	Min.	Max.
Estate income (per month)	298	16058.34	15050.07	0	83000
Other Agricultural Income (per month)	298	1864.81	4915.89	0	40000
Non-Agricultural Income (per month)	298	17276.07	18230.26	0	90000
Number of dependents	298	2.94	1.56	0	9
Number of Male	298	2.52	1.32	0	8
Number of female	298	2.62	1.27	0	7
Monthly Expenditure	298	20844.02	11185.53	1300	76100
Distance to city	298	6.64	3.07	1	14
Age of Household Head	298	51.01	12.88	24	90
Gender of Household Head	298	0.90	0.30	0	1
Years of Schooling of Household Head	298	6.43	3.51	0	13
Receipt of Loan	298	0.36	0.48	0	1

Table 5 shows the determinants of the income diversification. We used nine variables and Censored Tobit model to identify the factors affecting the income diversification. Three different variables (Estate income, other agricultural income, and non-agricultural income) were taken as dependent variables and three separate models were run to find the determinants. In a fourth Tobit model,

we investigated the factors influencing the overall diversity of the income measured by the Shannon equitability index. In all regressions, we used the same set of explanatory variables.

The results suggest that the number of dependents in a household is a major determinant in income diversification and the income shared taken from each method of diversification is reduced with the increase in number of dependents. All the family member who are schooling and infants are considered as their dependents whereas and all the family members who are not working and age above 65 yr are considered as old dependents. Therefore, the negative sign implies that more number of dependents discourage diversification. It is a fact that most of the young members are school aged children and old dependents are retired old aged adults. Therefore, it is the responsibility of the household members to take care of these dependents. Thus, household members may not be able to engage in diversification activities. However, number of males and females contribute a lot to diversify into different income sources. Here, males and females belong to working age category and they are the human capital in the household. Therefore, they tend to find job opportunities inside or outside the estates. According to the results, they positively contribute to diversify into estate and non-farm income. Monthly expenditure and diversification into different income sources shows a positive relationship implying that estate households tend to diversify into different income sources when their monthly expenditure increases. Specifically, they tend to diversify into estate and other agricultural income in this regard. Although, they diversify into other agricultural activities, the income generated from those activities is very low as depicted by summary statistics. The major reason is the less availability of lands for them to engage in those activities as most of them still live in line rooms.

Age of the household head is a major determinant in diversification into estate and non-agricultural income sources. However, age is a negative determinant in estate income while it is a positive determinant in non-agricultural income. So is the case with the gender of the household head. The summary statistics confirms that mean age of the household head is 51 yr and most of them are males. They have the experience in working in estates. Therefore, they do not promote their sons and daughters to work in the sector. As a result, their sons and daughters tend to engage in off-farm activities *i.e.* non-agricultural activities. That is the reason for diversifying into non-agricultural activities with the increase in age. Mean education level of household heads is 6.43 yr. This indicates that they are not very well educated. Most of these household heads work in the estates. It could be seen here that with the increase in the education levels, the household heads promote non-farm diversification. It was assumed that the receipt of loans promotes diversification strategies whereby it leads to increase the living standards. On the other hand, the loans can be used as inputs in other agricultural activities as they can utilize the money taken from loans for buying inputs for other diversification activities. The results reveal that with the receipt of loans they tend not to diversify into non-agricultural activities.

**Table 5:** Determinants of income diversification of estate households.

Explanatory variables	Estate income	Other agricultural income	Non-agricultural income
	Coefficients	Coefficients	Coefficients
Number of dependents	-7871.38***	-2256.289**	-4596.13***
Number of males	5566***	87.85	8231.96***
Number of Females	7416.03***	686.48	6434.54***
Monthly Expenditure	.27**	.25**	.19
Distance to City	133.50	191.65	-540.05
Age of Household Head	-225.41***	52.19	279.71***
Gender of Household Head	1307.72	1898.89	4320.42
Education level of Household Head	-557.26*	767.52	629.92*
Receipt of Loans	9767.18***	1926.04	-13556.9***
Constant	6192.53	-21952.22	-28368.1
Log likelihood	-2431.31	-861.88	-2511.89
LR chi2(12)	117.26	20.32	87.63
Prob> chi2	0.0000	0.0161	0.0000
Left-censored observations	85	227	82
Uncensored observations	213	71	216
Right-censored observations	0	0	0

\*, \*\*, \*\*\* Significant at 10, 5 and 1 percent probability level

### **Determinants of income diversity**

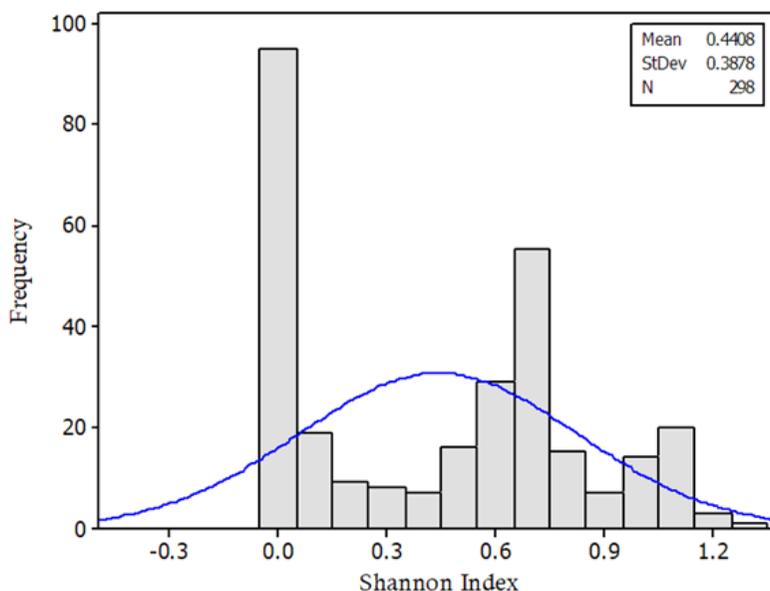
Censored Tobit model has been estimated to identify the factors affecting the overall income diversity. Shannon Equitability Index was used as a measure of overall diversity. The results of the model estimates are presented in the Table 6.

Accordingly, the Table 6 reveals that the major determinants of overall income diversity of estate households are number dependents, number of males and females in the household and the gender of the household head. These findings also reveal that income diversity in tea estate of Badulla district reduces with more number of dependents in the households. On the other hand, working age males and females contributes positively to diversify into different income sources. Male household heads also promote diversification strategies in the households.

**Table 6:** Tobit estimate of the determinants of income diversity.

Explanatory Variables	Coefficients
Number of dependents	-.211789***
Number of Males	.2052123***
Number of Females	.1909119***
Monthly Expenditure	3.2706
Distance to City	-.001316
Age of Household Head	.0019952
Years of Schooling Household Head	.0117853
Gender of Household Head	.2090939**
Received of Loan	-.0331064
Constant	-.4633564
Log likelihood	-204.36932
LR chi2(12)	87.61
Prob> chi <sup>2</sup>	0.0000
Left-censored observations	92
Uncensored observations	206
Right-censored observations	0

Figure 3 shows that income diversity of tea estate households in Badulla district. As a measure of the overall diversity of income the Shannon Equitability Index increases with the number of income sources and their evenness (Schwarze and Zeller, 2005).



**Figure 3:** Income diversity of tea estate households.

High values of Shannon index would be representative of more diverse income. Households with only one income would have an index value of near to the 0. If the income is evenly distributed, then the index value would be high. Thus, the Shannon value allows us to know not only the number of income sources but how the abundance of the income is distributed among all the households in the sample. In the Figure 3, there are nearly 92 households who earn their income from only one source. Mean of the sample income diversity distributes around the 0.4 *i.e.* their income diversification is very low although, they diversify into different income sources. Only 12.17% of estate households have highly diversified into different income sources while 31.87% of the households have not diversified their income. Their Shannon index is zero.

## **CONCLUSIONS**

In this study, we mainly focused on analysing the determinants of income diversification of tea estate households and factors affecting the overall income diversity of the households. In finding the determinants we used Censored Tobit model and overall diversity was measured through Shannon Equitability Index. This study finds that tea estates households in Badulla district are mainly involved in three broad income generating activities. Those are estate income, other agricultural income and non-agricultural income. 72.48% of estates households generate their income from the non-agricultural activities. It is the highest income activity among the major income activities. 71.47 and 23.82% from total households generate their income respectively by estate income and other agricultural activities. The study concludes that overall diversity of income is very low in the estate households and education level of the household heads play a major role in diversifying into non-agricultural activities. Working age population is the major determinant to diversify the income into non-agricultural activities other than estate income. It is a fact that age indirectly provides us an indication about someone's experience. Accordingly, old aged households promote diversification of income into non-agricultural activities. This is also an indirect implication that more people will diversify more into non-agricultural activities other than estate income.

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