

# Original Research Article

## Analyzing the Impact of Agricultural Landownership on Poverty and Food Security in Sri Lanka A Household Level Econometric Analysis

### ABSTRACT

**Aims:** This study examined the impact of agricultural landownership on poverty and food security in Sri Lanka. The current study enriches the literature by extending traditional two way poverty classification into four groups: Extremely Poor, Poor, Vulnerable Non-Poor and Non-Poor and quantifies the impact of agricultural landownership on each type of poverty. Similarly, the impact of agricultural landownership on food security is was also estimated considering the four types of food security such as, Extremely Food Insecure, Food Insecure, Vulnerable to Food Insecure and Food Secure, based on Minimum Dietary Energy Requirements.

**Methodology:** The analysis is was based on the secondary data from the Household Income and Expenditure Survey (HIES) of Sri Lanka. Ordered Probit Models were estimated to examine the impacts of agricultural landownership on poverty and food security to accomplish the objectives of the study.

**Results:** The results highlighted that the probability of being non-poor of the households with agriculture land is was higher by 6.42% compared to the households without agricultural lands. Similarly, having agriculture land also reduces the probability of being extremely poor, poor and vulnerable to poverty by 0.1%, 2.2% and 4.1% respectively. In addition, the empirical findings indicated that ownership of agricultural land lessens the probability of being extremely food insecure (0.8%), food insecure (1.4%) and vulnerable to food insecure (0.7%). Moreover, the probability of being food secured of the for households with agricultural lands is was higher by 0.9% compared to the households without agricultural lands.

**Conclusion:** Therefore, the study emphasized the significance of agricultural landownership to mitigate the poverty and food insecurity which ultimately enhances the household wellbeing. Hence, the current study strongly recommends implementing appropriate policies to address land-right related issues faced by developing countries ensuring long term wellbeing of the households.

**Keywords:** *Landownership, Poverty, Food Security, Minimum Dietary Energy Requirement, Ordered Probit Model*

### 1. INTRODUCTION

#### 01.1. Agriculture Land Ownership, Food (In) security and Poverty

Sri Lanka has been an agricultural country albeit the current economy is led by the service sector. However, agriculture sector is still crucial to the economy as it provides wide-range of

21 employment opportunities while also securing the country's food requirements.  
 22 Nevertheless, uneven distribution of agriculture lands has also been hampering the  
 23 productivity of the agriculture sector and has created adverse impacts particularly on low  
 24 income households. Table 01 indicates ownership of agricultural land at national level  
 25 along sectoral disparities. As Table 01 indicated, the higher agriculture land ownership at  
 26 national level which is mainly explained by the agriculture land ownership at rural sector  
 27 where 92.84% of households own agriculture lands. In contrast, estate sector reported the  
 28 lowest ownership of agriculture land, reporting only 38.05% which is remarkably lower  
 29 than the national average.

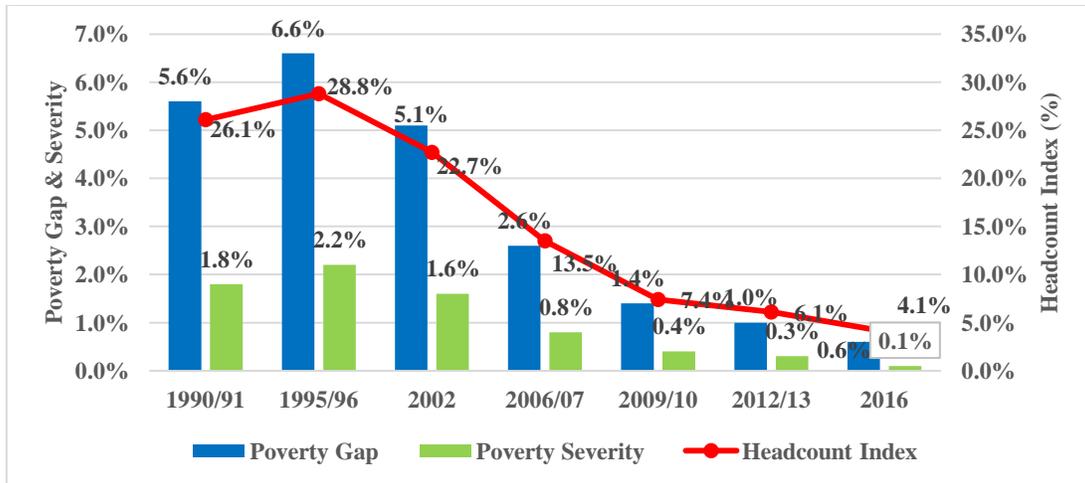
30 **Table 01: Sectorial Ownership of Agriculture Land**

| Sector   | Ownership of Agriculture Land |
|----------|-------------------------------|
| National | 88.15 %                       |
| Urban    | 77.98 %                       |
| Rural    | 92.84 %                       |
| Estate   | 38.05 %                       |

31 Source: Calculated by authors based on HIES of Department of Census & Statistics of Sri  
 32 Lanka

33 According to International Food Policy Research Institute (2016), each and every country is  
 34 encountered with a number of issues related to food insecurity which costs 11% of GDP  
 35 annually, especially in Africa and Asia. Conversely, a dollar which is invested on any  
 36 malnutrition prevention program, adds extra 16\$ to the economy in return on the investment  
 37 (International Food Policy Research Institute, 2016). Therefore, addressing the issue of food  
 38 insecurity and ensuring food security are vital at both national and global levels. Thus,  
 39 Sustainable Development Goals (SDGs) also incorporated this issue and the second goal of  
 40 SDGs aims to end hunger by 2030 by ensuring food security and required nutrition levels.  
 41 Food security is a broad concept which was defined as "food security exists when all people,  
 42 at all times have physical, social and economic access to sufficient, safe and nutritious foods  
 43 which satisfy their dietary needs and food preferences for an active and healthy life." (Food  
 44 and Agriculture Organization - FAO, 1996). According to the Medical Research Institute  
 45 (MRI) of Sri Lanka, a person who is unable to take 2030 Kcal per day is considered as food  
 46 insecure in the context of Sri Lanka. However, the threshold proposed by the MRI may vary  
 47 across the countries, time periods and also gender.

48 In terms of poverty, Sri Lanka has experienced declining poverty rates during last two  
 49 decades. Figure 01 illustrated trends in poverty incidence, depth and severity for Sri Lanka  
 50 during the period of 1990-2016. It is evident that the headcount index reached a peak  
 51 (28.8%) in 1995/96 up from 26.1% in 1990/91. However, poverty then declined to 4.1% by  
 52 2016. Similarly, other poverty measures such as the poverty gap and squared poverty gap  
 53 indices also dropped significantly over the time. Specifically, the Poverty Gap Index (PGI)  
 54 which measures the depth of poverty and the Squared Poverty Gap Index (SPGI) reflects  
 55 severity of poverty declined by 6% and 2.1% respectively during this period. In 2002,  
 56 approximately 3,841,000 people were in poverty. In 2016, this had decreased 843,913.  
 57 Similarly, in 2016, 3.1% of total households which accounted for approximately 169,392  
 58 households in Sri Lanka were estimated as poor households.

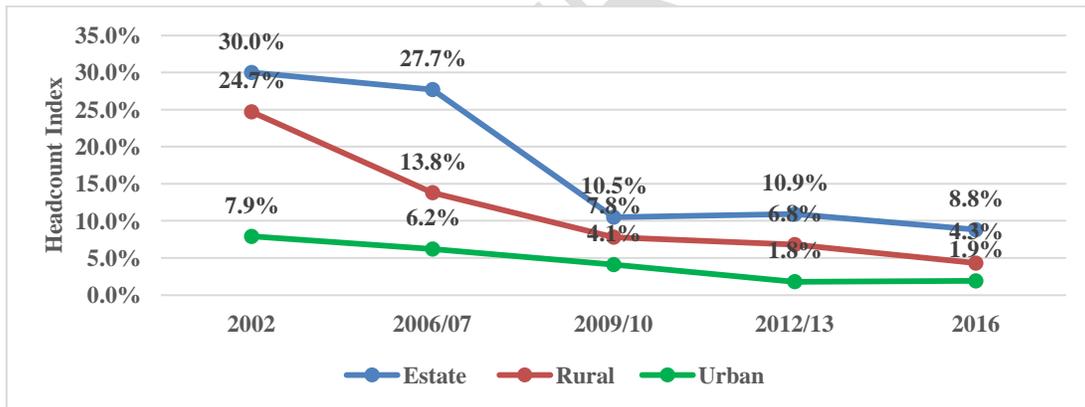


59

60 **Figure 01: Poverty trends at national level of Sri Lanka during the period of 1990-2016**

61 Source: Created by authors based on HIES reports (Various years)

62 Though the poverty incidence at a national level has been significantly decreasing over the  
 63 time, the declining across sectors has been uneven. Poverty disparities which exist across  
 64 the sectors of urban, rural and estate are illustrated in Figure 02.



65

66 **Figure 02: Sectoral poverty trends in Sri Lanka during the period of 2002-2016**

67 Source: Created by authors based on HIES reports (Various years)

68 Poverty levels in both estate and rural sectors have been significantly higher compared to  
 69 poverty levels of national and urban sectors. The Figure 02 demonstrated that 30% and  
 70 24.7% of people in estate and rural sectors respectively were below the poverty line in 2002  
 71 while only 7.9% of urban people were poor. A more dramatic trend in poverty reduction in  
 72 the estate sector can be seen after 2006/07. In fact, in the estate sector, poverty incidence  
 73 had reduced by 17.2% within a three-year period (2006/07 – 2009/10). The sharp decline in  
 74 income poverty in the estate sector was mainly driven by the increase of tea prices and  
 75 higher real wages of estate workers. Tea production is the key output in the estate sector  
 76 and the price of tea increased by 82% during the period of 2006-2009, resulting in high  
 77 returns for the industry. Some of these profits were shared with the estate workers leading to

78 the evident dramatic drop of poverty. In addition, wage increases for estate workers in 2010  
79 also helped the sharp decline in poverty in the estate sector, as the increased real wages  
80 essentially ensured a better living standard for the workers.

## 81 **01.2. Objectives and the Structure of the Study**

82 The study attempts to recognize how agriculture land ownership affects poverty and food  
83 (in) security in Sri Lanka. More specifically, following two objectives were expected to be  
84 accomplished through the current study.

85 01. Analyzing the impact of land ownership on different types of poverty such as  
86 Extreme Poor, Poor, Vulnerable Non-poor and Non-poor.

87 02. Examining the impacts of land ownership on different types of food insecurity  
88 such as Extremely Food Insecure, Moderately Food Insecure, Vulnerable to Food  
89 Insecure and Food Secure.

90 The next sections of the paper include literature review, methodology, results and discussion  
91 followed by the conclusions and recommendations.

92

## 93 **2. LITERATURE REVIEW**

94  
95 Food insecurity is multifaceted itself and its consequences are also multidimensional (Abafita  
96 & Kim, 2014). In 1974, the World Food Conference held in Rome highlighted the issues of  
97 global food insecurity for the first time and thereafter, a growing discussion on food insecurity  
98 at global, regional and national levels has been arisen. (Maxwel, 1996, Napoli et al. 2011).  
99 According to FAO (1996), food (in) security has four main dimensions: availability, utilization,  
100 stability and sustainability. Webb et al. (2006) highlighted that it is difficult to find a precise  
101 measure for food insecurity due to this multifaceted nature of food (in) security. However,  
102 Maxwell et al. (2008) summarized the commonly used measure such as households'  
103 expenditure on foods, nutritional status, actual household food consumption level, dietary  
104 requirement and diversity and household food insecurity access scale. Most of the empirical  
105 analyses which used these measurements have ended up with mixed findings. An analysis  
106 of food insecurity in Pakistan by Sultana & Kiani (2011) concluded that educational  
107 attainments beyond intermediate level reduce food insecurity while dependency ratio  
108 increases level of food insecurity at household level. Moreover, they confirmed that both  
109 social capital and status of employment have no significant impact on food insecurity in  
110 Pakistan. Kidane (2004) and Rose et al. (1998) have also stressed the importance of  
111 education on food security in Ethiopia and USA respectively. More specifically, Kidane  
112 (2004) has highlighted that even the primary level education significantly improves food  
113 insecurity while ensuring higher income for households. Apart from that, size of households  
114 and dependency ratio are also found to be positively related with food insecurity.  
115 Ramakrishna & Demeke (2002) and Amaza (2006) observed that family size and dependency  
116 ratio increase food insecurity in Ethiopia and Nigeria respectively. Social Safety Net  
117 Programs (SSNP) such as food stamps, elderly and disability allowances are much common  
118 in most of developing countries especially in order to reduce poverty. However, Subbarao et  
119 al. (1997) found that these kinds of SSNPs reduce not only poverty, but food insecurity as  
120 well. In addition to SSNPs, accumulated assets of households also play a crucial role in  
121 reducing food insecurity. According to Demeke et al. (2011), assets and resource  
122 endowment of households depend on human capital, physical capital, financial capital,  
123 natural capital and social capital as well. Therefore, accumulated assets or recourse

124 endowment apparently reduces the level of food insecurity (Demeke et al.2011).  
125 Particularly, Putnam (1995) elaborated the linkages between social capital and food  
126 insecurity by considering social connections. As Putnam (1995) highlighted social  
127 connections reduce the probability of being food insecure, since social connections allow  
128 sharing staples and better nutritious habits among households. Apart from these  
129 international studies, empirical analyses focus on food insecurity in Sri Lanka is relatively  
130 low. Studies by Wickramasinghe (2008), De Silva (2007), Nanayakkara & Premaratne  
131 (1987), Nanayakkara (1994) and Mayadunne & Romeshun (2013) have computed incidence  
132 of food insecurity of Sri Lanka at national and district levels. However, none of these studies  
133 have examined the determinants of food (in) security in Sri Lanka. Similarly, the link between  
134 agriculture land ownership and food security has not been observed especially in the context  
135 of Sri Lanka. Apart from that, these empirical works have not attempted to recognize  
136 extremely food insecure households and the households who are vulnerable to food  
137 insecure. Similarly, various studies by scholars such as Datt & Gunewardena (1997),  
138 Gunewardena (2000) and World Bank (2002) have identified series of determinants of  
139 poverty such as household size, number of dependents, living sector, employment of the  
140 head of the household, age of the head of the household, education, receiving remittances  
141 and disability. However, the impact of agriculture land ownership on poverty has not been  
142 addressed sufficiently in the context of Sri Lanka. In addition to that, all the existing studies  
143 on poverty is are based on conventional two-way poverty classification which ignore the  
144 disparities within poor and non-poor groups. Consequently, examining the link between  
145 agriculture land ownership, poverty and food insecurity is timely important.

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### 149 **3. METHODOLOGY**

#### 150 151 **03.1. Data**

152 The current study is was entirely based on the data from Household Income and  
153 Expenditure Survey (HIES) was conducted by the Department of Census and Statistics of  
154 Sri Lanka in 2012/2013. This is the most updated and accurate household data series  
155 available in Sri Lanka. HIES (2012/2013) covered the whole of Sri Lanka for the first time in  
156 Sri Lanka and surveyed 20,536 households across 24 Districts located in nine provinces.  
157 HIES data set is the key data source for calculating poverty estimates in Sri Lanka and  
158 widely used for empirical analysis due to its wide coverage. Hence, data requirements of the  
159 econometric model and descriptive analysis were collected from HIES (2012/2013).

#### 160 161 162 **03.2. Analytical Tool and Calculation of Dependent Variables**

163  
164 The study applies Ordered Probit Model which was introduced by Aitchison and Silvey  
165 (1957) as the main analytical tool in order to accomplish the objectives of the study. The  
166 generalized nature of the Ordered Probit Model used to estimate the relationship between  
167 poverty agriculture landownership can be expressed as follows.

168  
169 
$$y_i^* = x_i\beta + u_i \dots \dots \dots (01)$$

170  
171 Where  $y^*$  is a discrete variable which can take any value from 1- 4 which indicate the  
172 different poverty levels as follows:

173

174 **Extreme Poor** ( $y_i^* = 1$ ): if the household's monthly expenditure is less than or equal to  
175 half of official poverty line<sup>1</sup>. (HH expenditure  $\leq$  Rs. 7067)  
176

177 **Poor** ( $y_i^* = 2$ ): if the household's monthly expenditure lies between half of official  
178 poverty line and official poverty line. (Rs. 7067 < HH expenditure  $\leq$   
179 Rs. 14134)  
180

181 **Vulnerable Non-Poor** ( $y_i^* = 3$ ): if the household's monthly expenditure lies between the  
182 official poverty line and 1.5 times the official poverty line. (Rs. 7067 < HH  
183 expenditure  $\leq$  Rs. 21201)  
184

185 **Non-Poor** ( $y_i^* = 4$ ): if the household's monthly expenditure is higher than 1.5 times the  
186 official poverty line. (HH expenditure > Rs. 21201)  
187

188 Similarly, to achieve the second objective of the study, the second model was estimated  
189 assigning food security variable as the dependent variable. In fact, food security variable is  
190 also classified into four categories in order to avoid wide disparities within the traditional two-  
191 way categories such as 'food security' and 'food insecurity'.  
192

193 
$$y_i^* = x_i\beta + u_i \dots \dots \dots (02)$$
  
194

195 Where  $y_i^*$  is a discrete variable which can take any value 1- 4 which indicates the different  
196 levels of food insecurity as follows.  
197

198 **Extreme Food Insecure:** The households' whose daily Calorie Consumption (CC) is  
199 less than or equal to half of the Recommended Calorie Consumption  
200 (RCC).  
201 (HH's CC  $\leq 0.5(RCC)$ )  
202

203 **Moderately Food Insecure:** The households' whose daily CC lies between half of the  
204 RCC and the RCC.  
205 ( $0.5(RCC) < \text{HH's CC} \leq RCC$ )  
206

207 **Vulnerable to Food Insecure:** The households' whose daily CC lies between the RCC  
208 and 1.5 times the RCC.  
209 ( $RCC < \text{HH's CC} \leq 1.5(RCC)$ )  
210

211 **Food Secure:** The households' whose daily CC is higher than 1.5 times the RCC.  
212 (HH's CC >  $1.5(RCC)$ )  
213

214 Both Ordered Probit models were estimated with marginal effects to provide more realistic  
215 interpretation.  
216

### 217 218 219 **3. RESULTS AND DISCUSSION**

#### 220 221 **04.1. Impact of Agricultural Land Ownership on Poverty**

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<sup>1</sup> The used official poverty line is Rs. 3624 (HIES, 2012/13). However, the official poverty line for household was calculated by multiplying the official poverty line by average household size of 3.9 (HIES, 2012/13).

222 Ordered Probit Model was applied to examine the impact of having agricultural lands on  
 223 poverty in Sri Lanka. Four aspects of poverty – “Extremely Poor”, “Poor”, “Vulnerable Non-  
 224 Poor” and “Non-Poor” as explained in the methodology were incorporated into the Ordered  
 225 Probit Model. In addition to the key variable – having agriculture land, series of other  
 226 variables which affect poverty are also included into the model. The estimated results are  
 227 summarized in Table 2 below. The most focused and objective oriented variable of the  
 228 Ordered Probit Model is, ‘Agri Land’ and the estimated coefficients indicated that the  
 229 probability of being extremely poor, poor and vulnerable non-poor for the household who  
 230 have agricultural lands is was significantly lower than both the households who don’t have  
 231 agricultural lands. Particularly, the probabilities of being extreme poor, poor and vulnerable  
 232 non-poor for the household who have agricultural lands are lower by 0.1%, 2.2% and 4.1%  
 233 respectively, compared to those who don’t have agricultural lands. Interestingly, the  
 234 probabilities of being non-poor for the households who have agricultural land are higher by  
 235 6.42% compared to the households who don’t own agricultural lands. In fact, all of the  
 236 estimated coefficients for the considered variable are were statistically significant at 1%  
 237 level. Agriculture sector has been a crucial sector of the economy, despite its relative  
 238 importance has been declining over time. In terms of the employed population by major  
 239 economic sectors, agriculture sector accounts for approximately 27% of employed people,  
 240 accommodating the second highest proportion of employed people. (Department of Census  
 241 & Statistics, 2016). Apart from that, large proportion of people engages with informal-  
 242 agriculture sector and also as self-employees. Under this scenario, ownership of agricultural  
 243 land is was extremely important for them to sustain livelihood in a smooth manner. As the  
 244 results highlight, the households having agricultural lands have lower probability of being  
 245 poor compared to the households who don’t own agriculture lands. In fact, agricultural  
 246 workers who don’t own agricultural land have to pay off the rental for rented lands in cash or  
 247 in-kind. Consequently, a larger share of agricultural income is transferred to the land owners  
 248 while the agricultural workers end up with remaining which is even not sufficient for their  
 249 living till the next season. As this process continuous as a cycle, majority of landless  
 250 households are suffering from poverty or are vulnerable to poverty. This is also consistent  
 251 with Daniel (2017) who examined the link between rice farming and poverty in Asian  
 252 countries including Sri Lanka.

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**Table 02: Results of Ordered Probit Estimation on Poverty**

| Variables                  | Coefficients | Robust Standard Error | Marginal Effects (%) |             |                 |            |
|----------------------------|--------------|-----------------------|----------------------|-------------|-----------------|------------|
|                            |              |                       | Extreme Poor         | Poor        | Vulnerable Poor | Non-Poor   |
| Age                        | 0.012***     | 0.005                 | -0.01**              | -0.11***    | -0.23***        | 0.35***    |
| Age Squared                | 0.000***     | 0.000                 | 0.00***              | 1.34E-03*** | 2.7E-03***      | -4.E-03*** |
| HH Size                    | 0.401***     | 0.010                 | 0.20***              | 3.64***     | 7.48***         | -11.27***  |
| <b>Sector (Estate)</b>     |              |                       |                      |             |                 |            |
| Urban                      | 0.478***     | 0.060                 | -0.20***             | -3.37***    | -8.13***        | 11.63***   |
| Rural                      | 0.18***      | 0.056                 | -0.06***             | -1.51***    | -3.28***        | 4.85***    |
| <b>Gender (Female)</b>     |              |                       |                      |             |                 |            |
| Male                       | 0.126***     | 0.036                 | -0.10***             | -1.21***    | -2.37***        | 3.63***    |
| <b>Ethnicity (Sinhala)</b> |              |                       |                      |             |                 |            |
| SL Tamil                   | -0.26***     | 0.031                 | 0.14***              | 2.80***     | 5.01***         | -7.96***   |
| IND Tamil                  | -0.006       | 0.062                 | 0.01                 | 0.05        | 0.10            | -0.16      |
| SL Moors                   | 0.020        | 0.043                 | -0.01                | -0.17       | -0.36           | 0.55       |
| Burgher                    | -0.144       | 0.264                 | 0.07                 | 1.46        | 2.75            | -4.29      |
| <b>Civil Status</b>        |              |                       |                      |             |                 |            |

|   |          |        |                               |          |           |          |
|---|----------|--------|-------------------------------|----------|-----------|----------|
| Married                                     | 0.424*** | 0.067  | -0.30***                      | -4.70*** | -8.11***  | 1.31***  |
| Widowed                                     | 0.434*** | 0.071  | -0.10***                      | -3.10*** | -7.43***  | 10.65*** |
| Divorced                                    | 0.205    | 0.139  | -0.06**                       | -1.57**  | -3.62     | 5.25     |
| Separated                                   | 0.248*** | 0.089  | -0.10***                      | -1.85*** | -4.35***  | 6.27***  |
| <b>Education (No Schooling)</b>             |          |        |                               |          |           |          |
| Primary                                     | 0.406*** | 0.046  | -0.10***                      | -3.09*** | -7.11***  | 10.31*** |
| Secondary                                   | 0.923*** | 0.046  | -0.6***                       | -9.69*** | -16.64*** | 26.91*** |
| Tertiary                                    | 1.628*** | 0.062  | -0.2***                       | -6.72*** | -18.80*** | 25.76*** |
| Degree or<br><                              | 2.178*** | 0.178  | -0.1***                       | -4.89*** | -16.52*** | 21.56*** |
| <b>Employment (Unemployed)</b>              |          |        |                               |          |           |          |
| Government                                  | 0.400*** | 0.068  | -0.1***                       | -2.73*** | -6.76***  | 9.59***  |
| t   | 0.307*** | 0.087  | -0.08                         | -2.19*** | -5.28***  | 7.55***  |
| Semi Gov.                                   | -0.15*** | 0.035  | 0.06***                       | 1.41***  | 2.80***   | -4.26*** |
| Private                                     | 0.682*** | 0.119  | -0.10***                      | -3.61*** | -10.19*** | 13.91*** |
| Employer                                    | 0.028    | 0.035  | -0.01                         | -0.25    | -0.52     | 0.78     |
| Self<br>Employ<br>Fam. Work                 | -0.045   | 0.225  | 0.02                          | 0.43     | 0.85      | -1.30    |
| <b>Agri Land (No Agri Land)</b>             |          |        |                               |          |           |          |
| Have Agri<br>L.                             | 0.215*** | 0.032  | -0.10***                      | -2.21*** | -4.10***  | 6.42***  |
| <b>Disability (Head of HH is a Disable)</b> |          |        |                               |          |           |          |
| No<br>Disabilit.                            | 0.102*** | 0.024  | -0.10***                      | -0.91*** | -1.89***  | 2.85***  |
| <b>Remittances (No Remittances)</b>         |          |        |                               |          |           |          |
| Have<br>Remitt.                             | 0.449*** | 0.045  | -0.10***                      | -2.98*** | -7.48***  | 10.56*** |
| <b>Expen/Inco<br/>me</b>                    | 0.061*** | 0.012  | -0.10***                      | -0.55*** | -1.14***  | 1.72***  |
| <b>Ancillary parameters</b>                 |          |        | <b>Marginal Effects after</b> |          |           |          |
| <b>Ordered Probit</b>                       |          |        |                               |          |           |          |
| /cut1                                       | 0.4159   | 0.1562 | 0.0012                        | 0.0436   | 0.1561    | 0.7989   |
| /cut2                                       | 1.7578   | 0.1557 |                               |          |           |          |
| /cut3                                       | 2.6168   | 0.1567 |                               |          |           |          |
| Prob > chi <sup>2</sup>                     | 0.0000   |        |                               |          |           |          |
| Pseudo R <sup>2</sup>                       | 0.2078   |        |                               |          |           |          |
| <b>Observations</b>                         | 20,536   |        |                               |          |           |          |

255 Source: Author's calculation based on HIES (2012/13) data from DCS, Sri Lanka.

256 In addition to the key factor focused in the study, age of the head of household non-linearly  
257 (U Shaped) associates with each type of poverty. In fact, the more realistic story behind the  
258 U shaped relationship is, younger or middle-aged households' heads reduce the poverty  
259 level while relatively elder heads of household may account for higher poverty rates.  
260 Similarly, size of the household indicated that one extra household member increases the  
261 probability of being extreme poor, poor and vulnerable non-poor by 0.2%, 3.6% and 7.4%  
262 respectively, and reduces the probability of being non-poor by 11.27%. Male headed  
263 households have had less probability of being poor compared to female headed households;  
264 specifically, being a male headed household increases the probability of being non-poor by  
265 3.6% compared to female headed household counterparts. According to the civil status

266 variable, being a married household head rather than being a single, reduced the  
 267 probability of being extreme poor, poor and vulnerable non-poor by 0.3%, 4.7% and 8.1%  
 268 respectively. Apart from that, education has become one of the key factors of getting  
 269 households out of poverty, and the heads of household with primary, secondary, tertiary, and  
 270 degree or higher educational qualifications increase the probability of being non-poor by  
 271 10.3%, 26.8%, 25.7% and 21.5% respectively, compared to the heads of the household with  
 272 no schooling. Moreover, employment in any sector (except in the private sector and family  
 273 work) compared unemployment, receiving remittances and household heads with no  
 274 disability, reduce the probability of being poor in each aspect, and increase the probability of  
 275 being non-poor.

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#### 04.2. Impact of Agricultural Land Ownership on Food Security

281 The table 03 indicates the determinants of food (in) security of Sri Lanka along with  
 282 estimated coefficient using Ordered Probit Regression. As elaborated in the methodology,  
 283 the food (in) security has categorised into four categories in order to conduct a detailed  
 284 analysis. As the results indicate, having agricultural lands also significantly affects reducing  
 285 food insecurity. The rural economy of Sri Lanka mainly depended on agriculture and hence  
 286 owning agricultural lands ensure availability of staple foods, particularly such as rice for  
 287 households' consumption. Consequently, the probabilities of being extremely and  
 288 moderately food insecure of the households having agriculture lands are lower by 0.18% and  
 289 1.45%, compared to the households have no agriculture lands. Similarly, the probabilities of  
 290 being vulnerable for food insecurity and being food secure of the households having  
 291 agricultural lands is was lower by 0.69% and higher by 0.94% respectively compared to the  
 292 households who don't have agricultural lands. In fact, studies such as Gebre-Selassie (2005)  
 293 and Madeley (2000) have also confirmed that holding agricultural lands and livestock  
 294 essentially reduce food insecurity.

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**Table 03: Results of Ordered Probit model Estimation on Food (in)security**

| Variables                       | Coefficients | Robust<br>Standard<br>Error | Marginal Effects (%)          |                                |                                   |                |
|---------------------------------|--------------|-----------------------------|-------------------------------|--------------------------------|-----------------------------------|----------------|
|                                 |              |                             | Extremely<br>Food<br>Insecure | Moderately<br>Food<br>Insecure | Vulnerable<br>to Food<br>Insecure | Food<br>Secure |
| HH Size                         | 0.0008       | 0.0049                      | -0.0033                       | -0.0271                        | 0.0126                            | 0.0178         |
| Assets Index                    | 0.0057***    | 0.0015                      | -0.025***                     | -0.201***                      | 0.0931***                         | 0.1318***      |
| <b>Sector (Estate)</b>          |              |                             |                               |                                |                                   |                |
| Estate                          | 0.0208       | 0.0334                      | -0.0860                       | -0.7278                        | 0.3317                            | 0.4821         |
| Rural                           | 0.0101       | 0.0189                      | -0.0429                       | -0.3557                        | 0.1654                            | 0.2332         |
| <b>Gender (Female)</b>          |              |                             |                               |                                |                                   |                |
| Male                            | 0.0346**     | 0.0153                      | -0.1261**                     | -1.0470**                      | 0.4854**                          | 0.6877**       |
| <b>Education (No Schooling)</b> |              |                             |                               |                                |                                   |                |
| Primary                         | 0.0135       | 0.0401                      | -0.0564                       | -0.4723                        | 0.2174                            | 0.3113         |
| Secondary                       | -0.0721*     | 0.0393                      | -0.3015*                      | -2.5237*                       | 1.1603*                           | 1.6649*        |
| Tertiary                        | -0.1007**    | 0.0454                      | -0.4594**                     | -3.5146**                      | 1.7465**                          | 2.2275**       |
| Degree or <                     | -0.1077*     | 0.0650                      | -0.5058                       | -3.7493*                       | 1.9115                            | 2.3437*        |
| <b>Employment (Unemployed)</b>  |              |                             |                               |                                |                                   |                |

|                                 |          |                                       |           |           |           |          |
|---------------------------------|----------|---------------------------------------|-----------|-----------|-----------|----------|
| Government                      | 0.0994** | 0.0346                                | -0.3832** | -3.4812** | 1.4758**  | 2.3885** |
| Semi Gov.                       | 0.1109** | 0.0469                                | -0.4190** | -3.8811** | 1.6115**  | 2.6890** |
| Private                         | -0.0060  | 0.0219                                | 0.0252    | 0.2091    | -0.0972   | -0.1372  |
| Employer                        | 0.0544   | 0.0567                                | -0.2171   | -1.9067   | 0.8379    | 1.2859   |
| Self-Employ                     | 0.0633*  | 0.0226                                | -0.2584** | -2.2166** | 0.9962**  | 1.4788** |
| Fam. Work                       | -0.0750  | 0.1581                                | 0.3423    | 2.6178    | -1.3025   | -1.6576  |
| <b>Agri Land (No Agri Land)</b> |          |                                       |           |           |           |          |
| Have Agri L.                    | 0.0415*  | 0.0222                                | -0.1797** | -1.4499** | -0.6896** | 0.9401*  |
| <b>Ancillary parameters</b>     |          | <b>Marginal Effects after Ordered</b> |           |           |           |          |
| <b>Probit</b>                   |          |                                       |           |           |           |          |
| /cut1                           | -1.6159  | 0.1379                                | 0.0012`   | 0.0436    | 0.1561    | 0.7989   |
| /cut2                           | 0.3207   | 0.1367                                |           |           |           |          |
| /cut3                           | 1.5539   | 0.1371                                |           |           |           |          |
| Prob > chi <sup>2</sup>         | 0.0000   |                                       |           |           |           |          |
| Pseudo R <sup>2</sup>           | 0.0019   |                                       |           |           |           |          |
| Observations                    | 20539    |                                       |           |           |           |          |

298 Source: Author based on HIES (2012/13)

299

300 In addition to the key variable, several other factors also affect food (in) security as  
301 discussed below. Despite size of household is was not a significant factor of food insecurity  
302 in Sri Lanka, the impact of level of assets on food insecurity is significant at 1% level. More  
303 specifically, 1% increase in asset index would reduces the probability of being extremely  
304 food insecure, moderately food insecure by 0.025% and 0.201% respectively. Asset index is  
305 a composite index which accounts for all household level assets including domestic  
306 equipment, electronic appliance and agricultural equipment as well. Further, similar result  
307 has been found by Abafita & Kim (2014) in the context of Ethiopia. Apart from that, male-  
308 headed households arewere more food secure than that of female-headed. According to  
309 Table 03, male-headed households have 0.69% of higher probability of falling into food  
310 secure category compared to female-headed households. Similarly, the probabilities of  
311 falling into extremely food insecure and moderately food insecure of male-headed  
312 households are also lower by 0.13% and 1.05% compared to female-headed households. In  
313 fact, male-headed households have better access to nutritious food as their income levels  
314 are higher than that of female-headed. It is apparent that higher educational attainments  
315 seem to be the most crucial household factor of ensuring food security. In general, all  
316 education levels reduce the probability of being extremely and moderately food insecure  
317 while increasing the probability of being food secure compared to no schooling category.  
318 However, only the education levels such as secondary, tertiary and degree and above show  
319 statistically significant relationship with each type of food insecurity. Empirical works by  
320 Sultana & Kiani (2011), Kidane (2004) and Rose et al. (1998) have also found similar impact  
321 of education on food (in) security in the context of Pakistan, Ethiopia and USA respectively.

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323

324

## 05. Conclusions and Recommendation

325 The current study used the HIES data to examine the impact of agriculture land ownership  
326 on both poverty and food security in Sri Lanka. The study goes beyond the conventional  
327 empirical studies as the current study recognized four-way poverty and food (in) security  
328 classifications based on national poverty line and daily dietary requirement proposed by MRI  
329 of Sri Lanka respectively. The analyses elaborates that having agricultural lands  
330 considerably reduces the probability of being extreme poor, poor and vulnerable non-poor  
331 while increasing the probability of being non-poor. Similarly, owning agricultural lands also

332 reduces the probability of being extremely food insecure, food insecure and vulnerable to  
333 food insecure while increasing the probability of falling into food secure category. In addition  
334 to the key variable - ownership of agricultural land, other factors such as educational  
335 qualification of the head of household, gender, employment status, living sector, civil status  
336 and receiving remittances also significantly affected both poverty and food insecurity in Sri  
337 Lanka. However, land-right related issues are common among the rural and estate sector  
338 and also among the lower income groups. Therefore, it is has been strongly recommended  
339 that to imposing necessary polices to secure the land-rights of the public while providing  
340 agricultural lands for the respective groups should be put in place.

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