

# 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

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

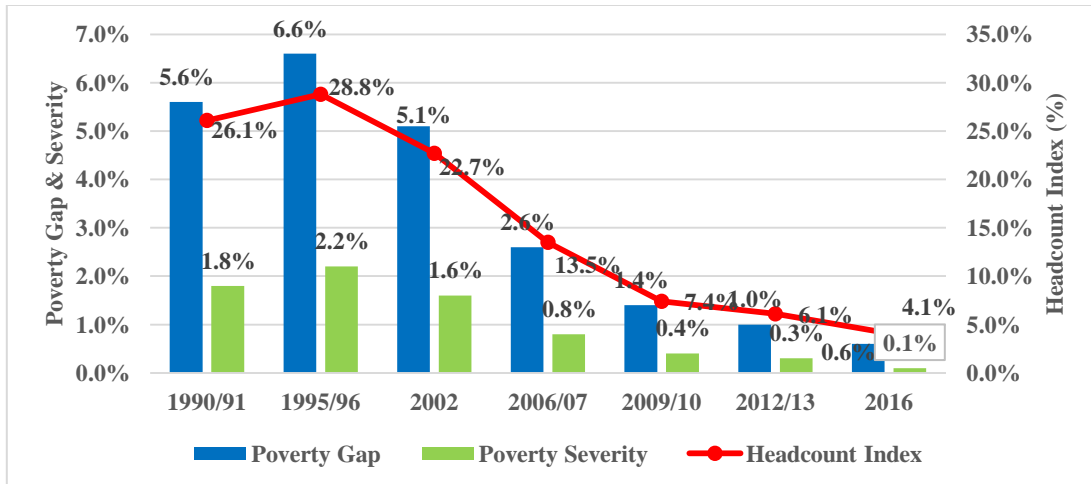
**Table 01: Sectorial Ownership of Agriculture Land**

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

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

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

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

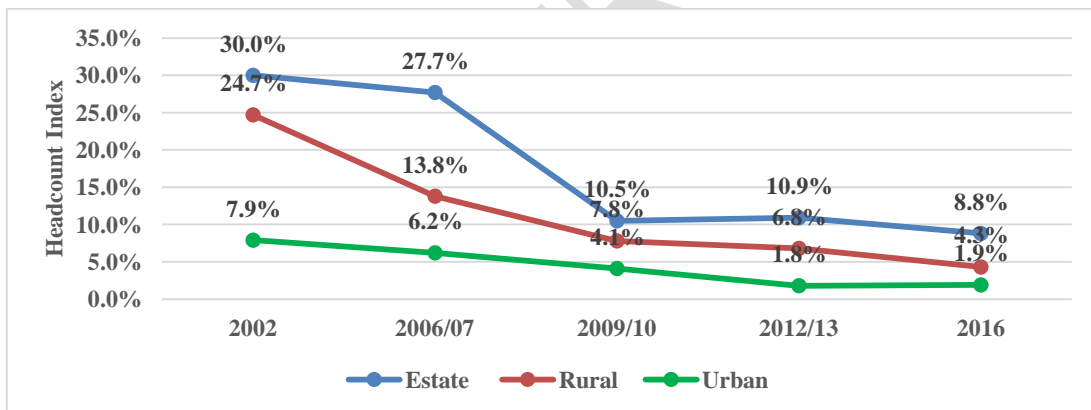


59

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

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

147  
148

### 149 **3. METHODOLOGY**

150  
151

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

The current study is was entirely based on the data from Household Income and Expenditure Survey (HIES) was conducted by the Department of Census and Statistics of Sri Lanka in 2012/2013. This is the most updated and accurate household data series available in Sri Lanka. HIES (2012/2013) covered the whole of Sri Lanka for the first time in Sri Lanka and surveyed 20,536 households across 24 Districts located in nine provinces. HIES data set is the key data source for calculating poverty estimates in Sri Lanka and widely used for empirical analysis due to its wide coverage. Hence, data requirements of the 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 (1957) as the main analytical tool in order to accomplish the objectives of the study. The generalized nature of the Ordered Probit Model used to estimate the relationship between poverty agriculture landownership can be expressed as follows.

166  
167  
168

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

169  
170

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

172  
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**

---

<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).



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 <	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	-0.045	0.225	0.02	0.43	0.85	-1.30
Employ Fam. Work						
<b>Agri Land (No Agri Land)</b>						
Have Agri L.	0.215***	0.032	-0.10***	-2.21***	-4.10***	6.42***
<b>Disability (Head of HH is a Disable)</b>						
No Disabilit.	0.102***	0.024	-0.10***	-0.91***	-1.89***	2.85***
<b>Remittances (No Remittances)</b>						
Have Remitt.	0.449***	0.045	-0.10***	-2.98***	-7.48***	10.56***
<b>Expen/Income</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					
Observations	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





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
Agri Land (No Agri Land)						
Have Agri L.	0.0415*	0.0222	-0.1797**	-1.4499**	-0.6896**	0.9401*
Ancillary parameters		Marginal Effects after Ordered				
Probit						
/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					

Source: Author based on HIES (2012/13)

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

## 05. Conclusions and Recommendation

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

332 reduced 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 policies to secure the land-rights of the public while providing  
340 agricultural lands for the respective groups should be put in place.

341

342

## 343 **References**

344 Abafita J, Kim KR. Determinants of household food security in rural Ethiopia: An empirical  
345 analysis. *Journal of Rural Development*. 2014; 37(2): 129-157

346 Aitchison J, Silvey SD. The generalization of probit analysis to the case of multiple  
347 responses. *Biometrika*, 44. 1957; (1/2), 131-140.

348 Amaza SP. Determinants and Measurements of Food Insecurity in Nigeria: Some Empirical  
349 Policy Guide. International Association of Agricultural Economists Conference, Gold Coast,  
350 Australia Daniel. 2006.

351 Datt G, Gunewardena D. Some Aspects of Poverty in Sri Lanka, 1985-90. World Bank  
352 Publications. 1997

353 Demeke AB, Keil A, Zeller M. (2011). Using panel data to estimate the effect of rainfall  
354 shocks on smallholders' food security and vulnerability in rural Ethiopia. *Climate Change*.  
355 2011;108(1-2). 185-206

356 Department of Census & Statistics. Poverty Indicators 2016. Department of Census &  
357 Statistics, Sri Lanka. 2016.

358 De Silva RP. Food Insecurity and Vulnerability Assessment for Sri Lanka. FIVIMS  
359 Secretariat, Colombo. 2007.

360 Food and Agriculture Organization. Rome Declaration on World Food Security and World  
361 Food Summit Plan of Action, FAO, Rome. 1996.

362 Gebre-Selassie S.amuel. Poverty and food security in Ethiopia: Some evidences from Wollo.  
363 2nd International Conference on the Ethiopian Economy. EEA, Addis Ababa. 2005.

364 Gunewardena D. Consumption poverty in Sri Lankan, 1985-1996: A profile of poverty based  
365 on household survey data. 2000.

366 HIES. Household Income and Expenditure Survey. Department of Census & Statistics, Sri  
367 Lanka. 2012/13

368 International Food Policy Research Institute. 2016 Global Food Policy Report. Washington,  
369 DC: International Food Policy Research Institute. 2016.

370 Kidane H. Causes of Food Insecurity in Koredegaga Peasant Association, Oromiya Zone,  
 371 Ethiopia. Shaping the Future of African Agriculture for Development: Proceedings of  
 372 Inaugural Symposium, Kenya. 2004.

373 Madeley J. Hungary for trade: How the poor pay for free trade, Cox and Wyman. Cumbria,  
 374 UK.2000.

375 Mayadunne G, Romeshun K. Estimation of Prevalence of Food Insecurity in Sri Lanka. Sri  
 376 Lankan Journal of Applied Statistics. 2013; (14)1

377 Maxwell DG Measuring food insecurity: the frequency and severity of "coping strategies".  
 378 Food Policy. 1996. 21(3). 291-303.

379 Maxwell DG, Caldwell R. Langworthy, M. Measuring food insecurity: Can an indicator based  
 380 on localized coping behaviors be used to compare across context? Food Policy. 2008; 33(6).  
 381 533-540.

382 Nanayakkara AGW. An analysis of poverty in Sri Lanka. Sri Lanka Journal of Social  
 383 Sciences. 1994; 17:49-78.

384 Nanayakkara AGW, Premaratne HAG. Food Consumption and Nutritional Levels. In Korale  
 385 R.M.B. (Ed) Income Distribution and Poverty in Sri Lanka, Department of Census and  
 386 Statistics, Colombo. 1987.

387 Napoli M, De Muro P, Mazziotta M. Towards a food insecurity multidimensional index. 2011.

388 Putnam R. Bowling Alone: America's Declining Social Capital. Journal of Economic Plan.  
 389 1995; 22: 256-267.

390 Ramakrishna G, Demeke A. An empirical analysis of food insecurity in Ethiopia: The case of  
 391 North Wollo. Africa Development. 2002; 27(1-2)

392 Rose D, Gunderson C, Oliveria V. Socio-Economic Determinants of Food Insecurity in  
 393 United States: Evidence from SIPP and CSFII Datasets, Food and Rural Economic Division,  
 394 United States. 1998.

395 Sibrian R. Indicators on Food Deprivation and Income Deprivation at National and Sub-  
 396 national levels: Methodological Issues. 4th International Conference on Agriculture Statistics.  
 397 China. 2007.

398 Subbarao K, Bonnerjee A, Braithwaite J, Carvalho S, Ezemenari D, Graham C, Thompson  
 399 A. Safety Net Programs and Poverty Reduction: Lessons from Cross-Country Experience.  
 400 Directions in Development. The World Bank, Washington, D.C. 1997.

401 Sultana A, Kiani A. Determinants of food security at household level in Pakistan. African  
 402 Journal of Business Management. 2011; 5(34): 12972-12979

403 Webb P, Coates J, Frongillo EA, Rogers BL, Swindale A, Bilinsky P. Measuring household  
 404 food insecurity: why it's so important and yet so difficult to do? The Journal of Nutrition.  
 405 2006; 126(5). 1404S-1408S.

406 Wickramasinghe W. Sub-National Food Insecurity and Vulnerability Assessment for Policy  
407 Interventions in Sri Lanka: Vulnerability Matrix Approach, Hector Kobbekaduwa Agrarian  
408 Research and Training Institute, Colombo (Unpublished). 2008.

409 World Bank. Sri Lanka: Poverty Assessment. Report 22535-CE. Washington, DC: Poverty  
410 Reduction and Economic Management Sector Unit, South Asia Region, World Bank. 2002.

UNDER PEER REVIEW