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RESEARCH ARTICLE

Income diversification and household welfare in Sri Lanka

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ABSTRACT

Income diversification is globally considered as an effective way to reduce income risk and also to enhance household welfare especially in developing countries. However, much attention has not been paid to study the welfare implications of income diversification in Sri Lanka. By taking data of a nationally representative sample of 21,756 households of Household Income and Expenditure Survey 2016, this study attempted to examine the welfare implications of income diversification of households in Sri Lanka while identifying the determinants of income diversification. Data were analyzed using descriptive statistics, probit regression, and ordinary least square regression. Results suggest that income diversification significantly increased the welfare of Sri Lankan households. More than half of the households from the total population have diversified their income portfolio. Further, we explored that rural and estate households appeared to have a more diversified income portfolio relative to their urban counterparts, and households that depend on permanent employment income were less likely to diversify their income. Results depicted that the major determinants of household welfare and income diversification decision in Sri Lanka are human capital-related factors and regional differences. The study strongly recommends implementing programmes for entrepreneurial development, human capital development, and female empowerment which deserves special attention in the design of national poverty reduction strategies and enhancing the household welfare.

Keywords: *Income diversification, household welfare, Sri Lanka*

INTRODUCTION

Income risk is a central feature of households in developing countries. Generally, there are two types of risks as "Covariate risk" and “Idiosyncratic risks". Covariate risks threatening all households in rural areas include economic instabilities and climatic shocks like floods or droughts causing harvest failures while idiosyncratic shocks like illness or death of family members or livestock only have an impact on the household level (Dercon *et al.*, 2005). These effects can have long-lasting impacts on the household's income generation process and it ultimately forces households to move to low return livelihood activities having low risk. Thus, households in developing economies always attempts to cope with these kinds of risks through strategies such as diversifying income portfolios. Hence, identifying an appropriate way to reduce these risks and improving household welfare will lead to maintaining sustainable livelihoods. Alderman and Paxson (1992) show that a major topic in development economics is also how well households can mitigate the adverse effects of income risk on their welfare.

Sri Lanka is also an upper-middle income developing country with around 77.4% of people live in rural areas (Department of Census and Statistics, 2019). According to Ranathunga and Gibson (2014), regional and sectorial disparities are significantly large and key socio-economical concerns yet in Sri Lanka. Poverty in the estate sector and rural sector is high compared to the urban sector. Like many developed countries, reducing poverty is a challenging and complex task for Sri Lanka (Ranathunga, 2010). Therefore, people in poverty stricken areas and sectors tend to seek pathways of reducing the issues related to poverty through income diversifying strategies. In this juncture, one can argue that income diversification is important for poverty alleviation, though its effect on improving the total welfare of the household remains a debatable issue.

Moreover, most researchers simply consider the impact of diversification on welfare without examining the factors that influence the households to diversify while others consider only the latter (Akaahakol and Aye, 2014). Therefore, this study examines both the impact of income diversification on household welfare and the determinants of income diversification in Sri Lanka. The welfare analysis is much needed to observe the causes of poverty which ultimately leads to generating appropriate policies. Identifying the determinants of income diversification helps the government to design policies that increase the diversification pattern of households, which eventually leads to increase living standards of households.

Income sources in Sri Lankan households have unique characteristics due to differences in topography, agro-climatic conditions, and socio-economic features. Sri Lankan economy also transitioning from a predominantly ruralbased economy towards a more urbanized economy oriented around manufacturing and services. As an example, according to Dissanayake and Weeratunga (2017), employment in the service sector will continue to grow during the next 14 year period while the trend for the industry sector would grow at a slower pace. The employed population in the agriculture sector will continue to decline. It implies that the Sri Lankan economy is characterized by the ongoing structural transformation in economic activities. Since Indicators of the well-being of households also dramatically changing, the impact of these changes on the standard of living is largely unknown.

There are very limited studies on income diversification in Sri Lanka (Dharmadasa and Polkotuwa, 2016; Jayamanna *et al.*, 2015; Hewavitharana and Dharmadasa, 2016). Previous studies mainly focused on identifying the patterns and the determinants of income diversification in Sri Lankan households. Though there are unique features with these structural changes in the economy in the Sri Lankan context, to the best of our knowledge, no study has examined the impact of income diversification on household welfare in Sri

Lanka. Consequently, this study could fill this research gap to take appropriate policy measures to enhance household welfare through income diversification.

Both official and social statistical analysis prefer to identify people's place in the economy according to their main livelihood strategy and then to develop a body of theory around that activity Ellis (2000). Kassie *et al*. (2017) also stated that policies focus mainly on-farm agricultural development to the neglect of rich opportunities for non-agricultural activities. Understanding the nature of income diversification in Sri Lanka along with its impact on household welfare could improve policy formulation as to what direction to be taken to improve the welfare and what strategies to be adopted to improve the household welfare through a study of this nature.

In this study, diversification refers to a process in which households increase the number of economic activities they are involved in. This study considered 5 main income sources as income from wages and salaries, income from agriculture (seasonal crops), income from other agriculture (non-seasonal crops and livestock), income from non-agriculture (mining and quarrying, manufacturing, construction, trade, transport, guesthouse, restaurants bars, other services, etc.), and income from other cash receipts (such as pensions, dividends, rents, remittance, local and foreign and transfers). If a household adopts more than one type of income source, the household is considered as a household with diversified income.

LITERATURE REVIEW

Income diversification as a trend

According to the previous studies the income diversification patterns, determinants and trends vary from region to the region (Hussein and Nelson, 1998; Davis *et al.*, 2010). Lemi (2005) argued that the level of intensity and involvement of rural households in diversification was not uniform. As an example, research which was conducted covering four continents (Eastern Europe, Latin America, Africa, and Asia) by Davis *et al*. (2010) identified that the share of on-farm income falls and share of off-farm income rises with increasing level of Gross Domestic Production (GDP) per capita. According to Schwarze and Zeller (2005), poor households are generally involved in several different income generating activities and have fewer opportunities to participate in off-farm activities due to lower endowments of physical capital. However poorer households are having less access to non-farm activities than better-off households (Reardon, 1997). The off-farm tendency is highest in middle-income households, while law and high income receivers diversified least (Smith *et al.*, 2001). Pujiriyani *et al.* (2019) concluded that there is an emerging upper class that manages to show its prosperity through the accumulation of capital from the remittance they brought from migration. A study by Davis *et al.* (2010) shows that most countries' largest share of households has a diversified source of income.

Income diversification in Sri Lanka

Previous studies mainly focused on identifying the patterns and the determinants of income diversification of households in Sri Lanka, especially in agriculture-related households. Study by Dharmadasa and Polkotuwa (2016) found that gender and age of the household head, household size, ownership of agricultural land, number of workers above 15 y old and availability of migrants in a household have significantly contributed to the likelihood of having diversified income in the estate sector. Another study conducted by Hewavitharana and Dharmadasa (2016) focused on estate sector households in Badulla district. The results show that households in a tea estate in the Badulla district are primarily engaged in three major income-generating activities. There are land income, other agricultural income, and non-agricultural income. 72.48% of household estates derive income from non-agricultural activities. A study by Jayamanna *et al*. (2015) focused on analyzing determinants of income diversification and share of income sources to total household income of flue-cured barn owners in Galewela, Polonnaruwa, and Mahiyanganaya.

Factors influencing income diversification

Researchers have identified a variety of factors that may explain income diversification (Barrett and Reardon, 2000; Davis, 2003; Ellis, 2000). The theoretical research highlighted two types of drivers of income diversification as "pull factors" and "push factors" (Barrett *et al*., 2001). The push factors refer to external factors that cause fluctuation of farm income such as weather conditions, policy changes, etc. The "pull factors" refers to growth opportunities in terms of household income. The strategy of household income diversification is influenced by push factors rather than pull factors. Besides, pull factors play complementary roles to push factors in enabling income diversification (Barrett *et al*., 2001). "Pull factors" are positive and attract additional income sources to boost the welfare of the farm households. These factors provide incentives for farmers to expand their range of income activities outside farming by increasing the returns from nonfarm activities (Kassie *et al*., 2017). Ellis (2000) classifies the diversification decision in another way as a necessity vs. choice. The choice is a proactive decision that leads to upward well-being mobility. It relates to the voluntary decision of the household to diversity not only for survival but also for accumulation. Necessity drive results from desperation.

Kassie *et al*. (2017) stated that in developing countries farm households allocate their labor to off-farm income-generating activities for the following reasons; to reduce income risk by diversifying ex-ante; to maintain food security (income and consumption) in the face of law farm productivity and income shocks such as drought, by diversifying ex-post, in the face of insurance market failure; and to earn cash income to finance farm investment, in the face of credit market failure. Asmah (2011) stated that households who like in communities with access to fertilizers, public transport, and local produce markets are more likely to engage in non -farm activities. Further, it states that non-farm diversification decisions are mostly driven by household assets including good health, education, and household age composition. According to Minot *et al*. (2006), factors like rising income, lower domestic marketing costs, and international trade liberalization all create new opportunities for rural households thus contributing to a more diverse source of income in rural areas.

Skambraks (2014) stated engagement in non-farm activities apart from reducing uncertainties and providing a source of liquidity where credit is constrained could increase agriculture productivity as it advanced agriculture technology. Maximization of return per unit of labor is another important element in livelihood diversification choices. It means at any given period households will choose the most cost-effective opportunity to ensure the maintenance of their consumption level (Ellis, 2000). Results of the study by Warren (2002) found that the unequal distribution of benefits between genders also leads households to be more diversified. Schwarse and Zeller (2005) state that access to a formal loan in the last five years has diversified their income more out of the agriculture sector. Owning better financial capital or credit accessibility and social capital helps rural households improve income diversity (Tanaka *et al.,* 2010). Adepoju and Obayelu (2013) stated that total household income and primary education of the household head were the dominant factors influencing the choice of livelihood strategy. A study by Yizengaw (2014) revealed that adult household members, access to credit, farm size, and livestock holding determine the level of income diversification positively and significantly while age of the household head, distance from the nearest market, a household with higher education, and availability of soil conservation of the plot. Man and Sadiya (2012) concluded that labor flows from the farm sector to non-farm and off-farm sectors depend on the number of income earnings harvested from the sector, in which more labor will be shifted to higher potential return economic sectors. On the other hand, the rate of economic returns from each activity may not necessarily dictate farm households' determination in participating in off-farm diversification activities. Lemi (2005) argued that the level of intensity and participation of rural households in diversification was not uniform and demographic factors such as age and gender of the household head, dependency ratio, and several female households are determinants of the livelihood strategy participation.

Impact of income diversification on household welfare

Diversification is positively correlated with household welfare which implies farmers who have an alternative source of income are more able to cater to the food and non-farm requirements of their households (Akaakohol and Aye, 2014; Adepoju and Obayel, 2013). A study by Salam *et al. (*2019) also show that strategies based on non-farm activities along with farming activities play a significant role in the welfare determination of households. Results of a study by von Braun Pandya-Lorch (1991) reveal another interesting finding that wellendowed households diversify for "good reasons" not for survival but accumulation since they are more likely to get into the high return sector and achieve wealth and well-being (Woldenhanna and Oskam, 2001). The results of a study by Khan and Morrissey (2019) are quite a bit different from other studies. Thus, it concludes that households with more diversified income sources tend to lower consumer welfare, indicating diversification occurs mainly due to push factors. Household welfare is not always directly affected by income diversification. As an example, a study by Ersado (2006) concluded that households in Zimbabwe with a more diversified income base are better resistant to the policy changes and weather stocks.

Some studies found the most appropriate income source to be diversified to enhance household welfare without just examine the impact of income diversification on household welfare. Scharf and Rahut (2014) stated that engagement in any type of non-farm employment does not give the same level of welfare. High return sector activities increase welfare more than the law return sector does. According to the research conducted by Gautam and Andersen (2016) in Nepal, households can enhance well-being only when it pulls it into a livelihood portfolio with the high return sector. Further, it concludes that diversification is found to have a highly skewed effect leading to inequality of income and well-being. Non-farm strategies can be changed from one region to another. As example results of a study by Gautam and Andersern (2016) conclude that in Humla (Nepal), trade and salaried jobs are the key off-farm activities instrumental for well-being. Involvement in different sectors is determined by education, good social and political networks, and financial investment capacities. Salam *et al*. (2019) stated that among different non-farm activities, participation in wage employment and migration along with agricultural activities ensured significantly higher per capita household expenditure.

DATA AND METHODOLOGY

This section describes data and the methodology adopted in achieving the objective of finding the impact of income diversification on household welfare and the determinants of the income diversification decision of the Sri Lankan households.

Data

Data used in this study were obtained from the Household and Expenditure Survey 2016 (HIES) conducted by the Department of Census and Statistics due to the wider coverage of the data and it is one of the most comprehensive and updated household-level data set. The survey collected information on a broad range of topics including demographic characteristics, income and expenditure, and socio-economic characteristics. The information gathered covers all 25 districts in Sri Lanka. The data set comprises 21,756 households representing all three sectors (3,429 urban households, 17,394 rural households, and 933 estate households). As our main objective was to estimate the impact of income diversification on household welfare, data were classified into main income sources; income from wages and salaries (employment income), income from seasonal crops (agricultural income), income from non-seasonal crops and livestock (other agriculture) income from non-agricultural employments (mining and quarrying, manufacturing, construction, trade, transport, guesthouse, restaurants bars, other services, etc.), and income from other cash receipts (such as pensions, dividends, rents, remittance, local and foreign and transfers). If a household adopts more than one type of income source it is considered to be a household with diversified income.

Methodology

In achieving the objectives, we use two estimation strategies where first a probit model is estimated to find the determinants of income diversification and second, we use asset index strategy in finding the income diversification on household welfare.

Determinants of income diversification

In estimating the determinants on income diversification probit regression analysis is carried out. The major reason for selecting the probit regression model is the binary nature of the dependent variable which is taking value 1 if the household has a diversified income source and 0 otherwise. Explanatory variables include characteristics of household head, characteristics of other household, and regional dummies (Table 1). The functional form of the probit model could be written as;

$$Y_i^* = X_i\,\beta + \varepsilon$$

where Y_i^* is the latent variable that is observed through the decision to engage in income diversification. It indicates the propensity to have $Y=1$ (i.e. for the household having diversified income). X_i is a matrix of $K \times 1$ explanatory variables and β is a vector of $K \times 1$ parameter to be estimated, and is ε the error term where $\varepsilon \sim N(0,1)$. Y_i can be defined as;

Y_i - 1 if household having diversified income
Y_i - 0 otherwise

Model specification of determinants

Model impact of income diversification on household welfare specification of determinants

To analyze the effect of income diversification on household welfare Ordinary Lest Square (OLS regression) was employed. Welfare was measured by using the Aggregate Asset Index Measures. Aggregate Asset Index is prepared by using the Principle Component Analysis (PCA) including productive and consumer assets (Ajaero *et al.*, 2018). Explanatory variables include Income diversification as a dummy variable, characteristics of household head, characteristics of the other households, and regional dummies to capture the effect of those variables on household welfare.

Table 1: Explanation of the independent variable used in probit regression (Dependent variable – Income diversification).

Variable name	Explanation
Characteristics of the household head	
Age	Years
Education	Years
Marital status	Dummy if household head is married = 1, 0 = otherwise
Gender	Dummy if household head is male = 1, 0 = otherwise
Household characteristics	
Household size	Number
Number of members over age 15 with primary education	Number
Number of members over age 15 with secondary education	Number
Number of members over age 15 with Tertiary education	Number
Number of young dependents	Number of members below the age of 15
Number of old dependents	Number of members below the age of 60
Regional dummies	
Urban sector	Dummy if household located in the urban sector =1, 0 = otherwise
Estate sector	Dummy if household located in the urban sector =1, 0 = otherwise
Rural sector	Dummy if household located in the urban sector =1, 0 = otherwise

Source: Household Income and Expenditure Survey (2016)

The OLS model for this study specified as following (Akaakohol and Aye, 2014).

$$L_i = \alpha_0 + \alpha_1 z_1 + \cdots + \alpha_n z_n + u$$

Where L_i = Aggregate Asset Index
$z_1 - z_n$ = Explanatory variables
$\alpha_1 - \alpha_{n=}$ Coefficients to be estimated
u = error term of the sample added to methanol

Welfare measurement

The term welfare represents a broader area and it is explained in various ways in different works of literature. In general, poverty alleviation is mostly used as a welfare indicator (Datt and Ravallion, 2002; Holden *et al.*, 2004). In Sri

Lanka, most of the researches have used consumption expenditure for measuring poverty (Ranathunga and Gibson, 2014; Ranathunga, 2010). Some studies use food consumption or calorie intake as a welfare indicator (Muyanga and Musyoka, 2014). However, only food consumption cannot fully indicate the whole standard of living in a household. Sahn and Stifel (2002) stated that there is a considerable advantage in moving the process of poverty measurement away from expenditure-based measures, toward a more asset-based focus. Therefore, an aggregate asset index for this study is created to measure household welfare by using the PCA to give broad implications on welfare. The PCA is a multivariate technique first used by Karl Pearson (1901). It is employed in welfare analysis with the assumption that household long-run wealth explains the maximum variance in the asset variables (McKenzie, 2005). According to Filmer and Pritchett (2001), the welfare index is a proxy for the socio-economic position or living standards of a given household and is constructed using the statistical technique of principal component analysis. In this study, the scoring factors of the first principal components (efficient components) is used for constructing the asset indices using the asset indices formula by Filmer and Scott (2008).

Asset indices are calculated from variables of household ownership of assets. Asset indices according to Filmer and Scott (2008) are of the basic form:

$$A_i = b_1 . d_{1i} + b_2 . d_{2i} + ... + b_k . d_{ki}$$

A_i =Asset index of household "i"
$d_{1i}, d_{2i} \ldots d_{ki}$= k indicators of asset ownership variables
$b_1, b_2\ b_3$ = Weights to be used in aggregating the asset indicators into an index

The study used the Aggregate Asset Index which is created by using productive assets and consumer assets of a household. The independent variables of Table 1 and Table 2 were selected based on the availability of data in HIES (2016) and referring to previous studies (Ranthunga and Gibson, 2014; Dharmadasa and Polkotuwa, 2016; Deyshappriya and Minuwanthi, 2020).

Table 2: Explanation of the independent variable used in OLS regression (Dependent variable – Aggregate Asset Index).

Variable name	Explanation
Income diversification	Dummy if household has diversified income = 1 , and No = 0
Characteristics of the household head	
Age	Years
Gender	Dummy if household head is male = 1, and 0 = otherwise
Education	Years
Marital status	Dummy if household head is married = 1, 0 = otherwise
Gender	Dummy if household head is male = 1, 0 = otherwise

The ethnicity of the household head	
Sinhalese	Dummy if household head is a Sinhalese = 1, 0 = otherwise
Sri Lankan Tamil	Dummy if household head is a Sri Lankan Tamil = 1, 0 = otherwise
Indian Tamil	Dummy if household head is an Indian Tamil = 1, 0 = otherwise
Muslim	Dummy if household head is a Muslim = 1, 0 = otherwise
Household characteristics	
Household size	Number
Number of members over age 15 with primary education	Number
Number of members over age 15 with secondary education	Number
Number of members over age 15 with Tertiary education	Number
Number of young dependents	Number of members below the age of 15
Number of old dependents	Number of members below the age of 60
Regional dummies	
Urban sector	Dummy if household located in the urban sector =1, 0 = otherwise
Estate sector	Dummy if household located in the urban sector =1, 0 = otherwise
Rural sector	Dummy if household located in the urban sector =1, 0 = otherwise
Central province	Dummy if the household is located in Central Province = 1, 0 = otherwise
Northern province	Dummy if the household is located in Northern Province = 1, 0 = otherwise
Western province	Dummy if the household is located in Western Province = 1, 0 = otherwise
Southern province	Dummy if the household is located in Southern Province = 1, 0 = otherwise
North Western province	Dummy if the household is located in North Western Province = 1, 0 = otherwise
North Central province	Dummy if the household is located in North Central Province = 1, 0 = otherwise
Sabaragamuwa province	Dummy if the household is located in Sabaragamuwa Province = 1, 0 = otherwise
Uva province	Dummy if the household is located in Uva Province = 1, 0 = otherwise

Source: Household Income and Expenditure Survey (2016)

Summary statistics

Summary statistics are provided in Table 3. As a country, Sri Lanka has a male dominant society and principle male or the farther becomes the household head. Therefore, in making the decision to become a diversified household with respect to income, it could be assumed that the principle male should have much bargaining power. Hence, we used the characteristics of household head as determinants of income diversification. Accordingly, age of the household head was 52 in Sri Lanka while his average education level was 8 y.

Size of the household is also a crucial factor in making choice to diversify the income portfolio and the number dependents play a major role in this regard as they have to nourished and taken care of. According to the data extracted from HIES (2016), we could see that average household size is 4 members whereas number of old and young dependents was less than one on average. In comparison to household members with primary and tertiary education, many members in Sri Lankan household have been educated up to secondary level.

RESULTS AND DISCUSSION

This section presents the results obtained from analyzing data and findings are discussed when and where necessary. Firstly, the results are presented descriptively. Secondly, the results related to econometric estimation of the probit model of determining the factors affecting income diversification are presented and finally, the results of welfare impact of income diversification on welfare of Sri Lankan households are presented.

According to the descriptive analysis, more than half (61%) of the households in Sri Lanka have diversified their income into more than one income source. This may be due to the fact that a diverse income portfolio creates more income and distributes income evenly (Ellis, 2000) while help reduce the adverse impacts related to poverty, climate shocks etc. as it is easier to adopt more combined income sources than switching full-time between either of them (Ellis, 2000). In line with this, our results suggest that a people in Sri Lanka tend towards having more income sources per households to mitigate adverse effects due to income shocks.

Table 3: Summary statistics.

Variable name	Observation	Mean	Minimum	Maximum	Standard deviation
Characteristics of the household head					
Age	21756	52.627	18	99	14.05
Gender	21756	0.741	0	1	0.438
Education level	21756	8.278	0	17	3.710
Marital status	21756	0.776	0	1	0.416
Household characteristics					
Number of young dependents	21756	0.984	0	7	1.044

Number of old dependents	21756	0.641	0	7	0.834
Number of members over age 15 with primary education	21756	0.855	0	7	0.929
Number of members over age 15 with secondary education	21756	2.464	0	11	1.377
Number of members over age 15 with tertiary education	21756	0.090	0	5	0.163
Household size	21756	3.820	1	13	1.589
Regional dummies					
Rural sector	21756	0.800	0	1	0.799
Estate sector	21756	0.043	0	1	0.042
Urban sector	21756	0.158	0	1	0.364
Income diversification	21756	0.610	0	1	1.118
Aggregate asset index	21756	0.007	-1.881	1	0.907

Source: Household Income and Expenditure Survey (2016)

Besides, the probability of diversifying into various activities that produce more income would depend on where the household is located. Different areas have different degrees of market access, different prospects for the labor market, and agricultural suitability. In par with this argument, our results (Figure 1) indicated that income diversification in the rural sector was higher than in the other two sectors. 63.94% of total rural households have diversified into more than one income source. This is an indication of a strategy to cope up with adverse issues related to agriculture as most the rural community in Sri Lanka is engaged in agricultural activities where more risk and uncertainty could be experienced as a result of seasonal variations due to change in rainfall in Sri Lanka. The urban sector behaves totally different with respect to income diversification i.e. the income diversification is less in urban sector. This is an indication that income earning potential from one income source is more prevalent and sufficient for a living so that the people in the urban sector do not look for other incomes sources when compared to rural sector. Similar results are revealed from Minot *et al.* (2006) stating that diversification is higher among rural households than among urban households.

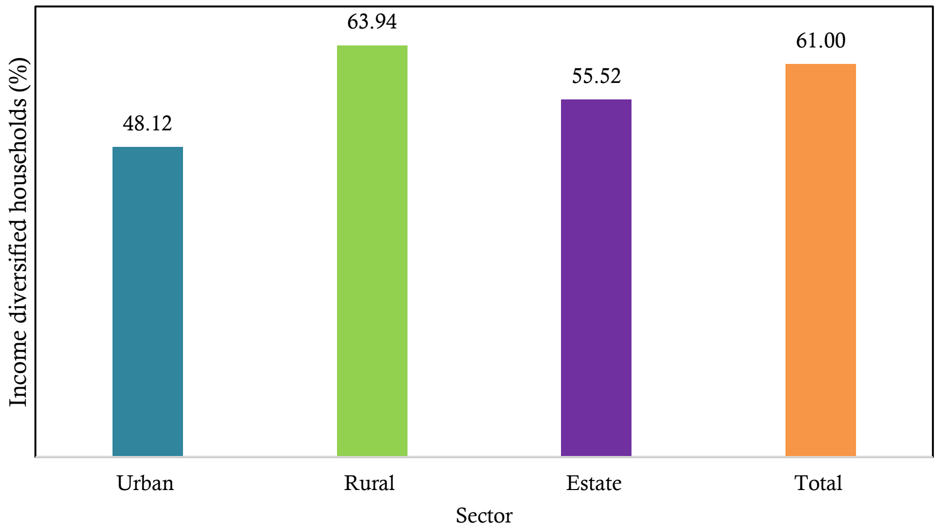

Figure 1: Percentage of income diversification by sector.

Results of Figure 2 show that households receiving agricultural income sources are having a higher tendency to diversify their income portfolio while households that depend on employment income are having the least tendency towards income diversification as they have a permanent source of income. Household heads who are engaged in employment activities may receive sufficient income or have no extra time to get involved in another activity to gain extra income. A very few households are receiving income only from Agriculture. Gebru and Beyene (2012) also concluded that although farm activities are the main source of income of agricultural households, diversification of income into off-farm and non-farm income sources, in general, is strategy adopted by the households to cope with different challenges in periods of shortage income and to improve their livelihoods.

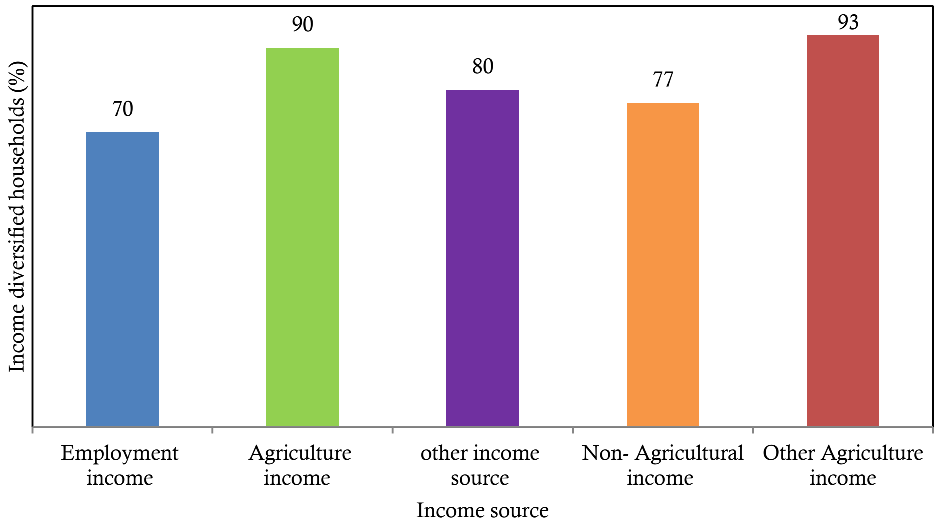

Figure 2: Income sources and percentage of income diversification by households

Determinants of income diversification

In identifying the factors affecting diversification of income, a probit regression was run and the results revealed that age of the household head has positive relationship with income diversification implying that as the age of the household head increase, the household tends diversify their income portfolio. This is because the older household members are well experienced in what they do and they have more members in their households with different income sources and earning potentials. We can also assume here that old aged household heads are more aware of the livelihood opportunities. The older household head also might have sufficient knowledge of income risk-mitigations and therefore, old household heads diversify their income easily with a more strong interest than young household heads. Similar results were revealed from the study by Dharmadasa and Polkotuwa (2016). Results further reveal that male headed households tend to diversify more which is obvious that the most of the households are headed by males in Sri Lanka. It reflects that male-headed households have many opportunities and strengths to engage in different activities and earn income from different sources. It is a general fact that literacy rate of the Sri Lankans is more than 80% showing that they have attained a certain level of education. According to our study, mean education level of household head is 8 y (Table 3). The higher education level of a person facilitates a higher paying job so that the tendency to diversify the income would be low. The education level of the household head negatives affects the decision to diversify the income in Sri Lanka.

This could further be explained by the fact that as one gains higher education they obtain specialized skills and hence they are more likely to engage in nonfarm high paying salaried employments. Our results suggest that having young dependents reduces diversifying their income into different sources while having old dependents increases the tendency of diversifying their income into different sources. This may be due to the fact that the household members may not have extra time to engage in other income-generating activities when they have more young dependents as they have to be very well taken care of. On the other hand, having old dependents means many members live in the same household and they too have to be taken care of and more mouths are to be fed. Therefore, it could be expected that these households tend to diversify their income portfolio. We used two dummies to denote regional differences in rural and estate sectors concerning income diversification. Accordingly, income diversification in the rural sector is higher than that of the other two sectors (Table 4).

Table 4: Results of the probit regression.

Variable name	Marginal change (dy/dx)	Significance	Z
Characteristics of the household head			
Age	0.001	**	2.48
Gender	0.019	**	1.83
Education level	-0.007	**	-5.44
Marital status	-0.016	***	-1.71
Household characteristics			
Number of young dependents	-0.075	***	-12.22
Number of old dependents	0.019	***	3.90
Number of members over age 15 with primary education	0.006		0.95
Number of members over age 15 with secondary education	0.004		0.68
Number of members over age 15 with tertiary education	0.04	**	3.31
Household size	0.09	***	13.22
Regional dummies			
Estate sector	0.06	**	3.44
Rural sector	0.18	***	17.60

Note: ***significant at 1%; **significant at 5%; *significant at 10%

Figure 1 shows that income diversification in rural and estate sectors in Sri Lanka is higher than that of urban sector. Households in rural and estate sectors are mostly engaged in agricultural activities and their main source of income is agriculture. However, if they have members with tertiary education, they may not engage in agricultural activities as they have more opportunities outside the agriculture. Therefore, they are more away from agriculture and work elsewhere. As a result of this, the income diversification of those families could be expected to be high. Hence, our results also support the fact that number of members over age 15 with tertiary education is positively associated with income diversification. Previous studies also support the fact that higher levels of education among household members have a positive effect on income diversification (Barrett and Reardon, 2001; Dharmadasa and Polkotuwa, 2016).

Members in larger households are much likely to engage in income diversification activities. Several studies also have shown that rural households diversify their income due to the large household size (Barrett *et al.*, 2001; Dharmadasa Polkotuwa, 2016; Yizengaw, 2014). Changes in household size changes the supply of labor making it easier for the household to encourage certain members to participate in off-farm and other revenue-generating activities. On the other hand, an additional member living in a household leads to an increase in the need for total household income as their total expenditure increases. Therefore, tendency to earn more income through different income generating activities is high in Sri Lanka.

Impact of income diversification on household welfare

To assess the impact of income diversification on household welfare, we estimated an OLS model using aggregate asset (both productive and consumer assets) index as the dependent variable (Table 5). Results revealed that income diversification has a significant and positive impact on the household asset index at a 5% significant level implying that more income diversified households can have higher welfare in terms of the Asset Index. Most of the poor members in Sri Lanka live in rural and estate sectors. Their main income source is agriculture. Therefore, they tend to get rid their poverty by diversifying income portfolio. This could be captured through examining the assimilation of assets using asset index. As we know that household poverty, welfare and living standards are interconnected phenomena. As suggested by our study, if household welfare increases as a result of income diversification, it indicates that the household tries to averse income risk and increase their welfare as result of diversification. Household size also affects the asset index positively implying that household size increases the need for consumer assets and productive assets. This may be due to the fact that when there are more members in the household they tend to diversify their income thus leading to increase the welfare. Theoretically, high educational attainment is strongly associated with the standard of living. Results also revealed that completing educational qualifications by the household head or by other members leads to an increase in household assets as education creates better employment opportunities which essentially determine household income which ultimately pushes them to acquire new assets. On the other hand, education enhances social networks and human capital.

Table 5: OLS regression (Dependent variable: Aggregate Asset Index).

Variable name	Coefficient	Significance	t value
Income diversification	0.024	**	2.18
Characteristics of the household head			
Age	0.005	***	9.57
Gender	-0.116	***	-7.41
Education level	0.095	***	48.94
Marital status	0.188	***	1078
Household characteristics			
Number of young dependents	-0.078	***	-9.02
Number of old dependents	0.040	***	5.45
Number of members over age 15 with primary education	-0.601	***	-6.62
Number of members over age 15 with secondary education	0.004		0.46
Number of members over age 15 with tertiary education	0.365	***	19.50
Household size	0.138	***	14.20
The ethnicity of the household head			
Sri Lankan Tamil	-0.083	**	-2.30
Muslim	0.046		1.18
Sinhalese	-0.005		0.98
Regional dummies			
Rural sector	-0.185	***	-11.63
Estate sector	-0.3614	***	-9.73
Western Province	0.498	***	22.12
Northern Province	-0.087	**	-2.73
Central Province	0.245	***	10.40
Southern Province	0.247	***	11.01
Eastern Province	0.064	**	2.39
North Central Province	0.294	***	10.88
North Western Province	0.306	***	12.50
Sabaragamuwa Province	0.168	***	6.79
Constant	-1.644	***	-29.83

Number of obs	= 21,756
F (25, 21730)	= 610.95
Prob > F	= 0.0000
R-squared	= 0.3861
Root MSE	= 0.7154

Note: ***significant at 1%; **significant at 5%; *significant at 10%
Source: Household Income and Expenditure Survey (2016)

According to the results, the number of old dependents positively and significantly contributes to household welfare in Sri Lanka while number of young dependents in a household negatively affect household welfare. These young dependents can be assumed not to contribute to income generating activities so that they do not contribute to the asset accumulation. On the other hand, when the number of old dependents increases they also might own some productive assets which can include in the household assets. However, when there are younger dependents in a family the money allocated for their education, health, maintenance tends to be high. Thus, it will lead to less saving and gaining less assets. Regional disparities can be seen when looking into geographical variables. Despite geographical variables, compared to living in an urban area, living in the other two sectors generates negative effects on household welfare. This might be due to the regional disparities in Sri Lanka in terms of economic and social factors. Estate sector households are more likely to have less household welfare in Sri Lanka. It might be because most of the estate sector households depend on income from plantations and those lands are owned by respective plantation companies, not by them.

CONCLUSIONS AND RECOMMENDATIONS

This study investigates the impact of income diversification on the household welfare of households in Sri Lanka while emphasizing the determinants of income diversification. According to the results, income diversification can be considered as the most important and significant strategy for raising household welfare in Sri Lanka. The findings of this study revealed that the majority of the people in Sri Lanka diversify their income portfolio.

From the above findings, it is clear that several steps can be taken for enhancing the tendency towards diversification strategies and enhance household welfare. The study identified the regional disparities among sectors in Sri Lanka and it needs to be reduced by proper policy interventions. Households in the urban sector are well off rather than households in the rural sector. But, in terms of income diversification, households in urban areas have the least tendency towards diversifying income. Most of them who have not diversified their income are engaged in employment income. Encouraging them to start medium or small-scale enterprises, concepts like flexible working hours will lead to attract them to adopt different income sources and it will ultimately help to upgrade their household welfare. In increasing the extent of income diversification in the rural and estate sector it is necessary to provide incentives for entrepreneurial development, encourage small-scale businesses in the rural area, expansion of the existing credit market, development of infrastructure, and improvement of information facilities. Especially agro-based industries in the rural areas can also be developed. The government can enhance the awareness or opportunities on income sources for the households. The government can enhance education status for instance by giving scholarships for higher education, subsidized primary and secondary education, developing skills at working place, policies facilitating investment in education, etc. Income diversification is low in female-headed households. The government can encourage females through women empowerment programmes and by making entrepreneurial opportunities. In conclusion, this study has shown that income diversification has important effects on household welfare, as depicted in ownership of consumer and durable assets of households.

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