



An Analysis Poverty in Sri Lanka : the Causes of Poverty Reduction between 2007 and 2010

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**An Analysis of Poverty in Sri Lanka: the Causes
of Poverty Reduction between 2007 and 2010**

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Summary

Sri Lanka is considered as one of the outliers in Asia in relation to improved human development given its low level of GDP per capita. This trend has been studied by several studies to find out how Sri Lanka achieved such progress in human development. But reducing poverty (measured by monetary standards) in Sri Lanka was not impressive until recent years. Nevertheless, according to the Household Income and Expenditure Survey (HIES) data of the Department of Census and Statistics, Sri Lanka records a significant reduction of monetary poverty between 2007 and 2010. National poverty headcount ratio decreased nearly by half while poverty headcount of the estate areas decreased by more than 60 per cent between the HIES 2006/07 and 2009/10. According to the author's best knowledge, no study has examined this impressive reduction of poverty in Sri Lanka in detail.

Therefore, this study first estimates poverty in Sri Lanka using a multidimensional approach to measure poverty as an alternative estimation method and to check the validity of monetary poverty estimates. The Alkire and Foster multidimensional poverty estimation method (AF method) is used in this analysis by examining the possibility of using statistical techniques to select the dimensions and weights. Polychoric Principal Component Analysis (PPCA) proposed by Kolenikov and Angeles is used to find the dimensions and weights. The study secondly estimates both multidimensional and monetary poverty levels of one of the poorest areas – estate areas – in Sri Lanka using data gathered by the author, by conducting a household survey as an alternative data source to the HIES data. Poverty estimations using both an alternative measuring approach (multidimensional approach) and an alternative data source (the author's survey data) confirms the recent reduction of poverty shown by the Department of Census and Statistics of Sri Lanka. Therefore, the study finally investigates the sources of the recent reduction of poverty in Sri Lanka using a descriptive analysis of recent macroeconomic changes, poverty decomposition analysis, and an analysis of determinants of poverty.

Chapter 1 of the study provides a background to the study while outlining the research questions, objectives and limitations of the study. It shows that economic growth was around 5 per cent until the mid-2000s, while economic inequality was increasing. Reduction of poverty was also not satisfactory during the same period. However, Sri Lanka recorded a higher rate of economic growth, and a higher rate of poverty reduction with decreasing inequality between 2007 and 2010. This chapter also briefly discusses the historical background of estate workers and their socio-economic conditions. Estate workers are a group of immigrant workers from southern India, brought to Sri Lanka, by British colonials more than 150 years ago, and they were confined to the plantation areas without citizenship until 2002.

Chapter 2 discusses the literature and theoretical background of the study. It first elaborates the four major approaches to measuring poverty, i.e. monetary, capability, social exclusion, and participatory. The monetary approach defines poverty as lesser command over commodities, while the capability approach defines it as weaker capability to function properly in the society. Social exclusion defines poverty as the full or partial exclusion of individuals from full participation in the society and in the participatory approach poor people themselves define poverty. This chapter secondly discusses the three major approaches of allocating weights for multidimensional poverty indexes such as data driven, normative and hybrid approaches. The data driven approach allocates weight for each dimension by analysing the actual distribution of data. In contrast to the data driven approach, the normative approach defines weights based on value judgements while the hybrid approach uses a mix of both. Thirdly, the chapter elaborates on the two decomposition techniques applied in this study, namely the Machado and Mata and Fortin, Lemieux, and Firpo decomposition techniques. Both of them are extensions of the Blinder-Oaxaca decomposition technique, which decomposes the change in welfare indicator into a component due to the changes in household characteristics and a component not explained by the changes in household characteristics (termed as returns

to characteristics). The chapter finally discusses the methodological development of estimating the determinants of poverty.

Chapter 3 elaborates the estimation techniques of Foster, Greer, and Thorbecke (FGT) one dimensional poverty measures and multidimensional counterparts of the FGT poverty measures (Alkire and Foster approach to multidimensional poverty). The chapter secondly explains the use of Polychoric Principal Component Analysis (PPCA) in developing alternative weights and selecting dimensions for the Alkire-Foster estimation method of multidimensional poverty. The chapter thirdly discusses the application of the Machado and Mata decomposition (MM) technique and the Fortin, Lemieux, and Firpo (FLF) decomposition technique in estimating the sources of reduction of poverty in Sri Lanka. The chapter also explains the use of quantile, logit, and probit regression analysis in estimating the determinants of poverty. The chapter finally presents the two data sources of the study, namely Household Income and Expenditure Survey (HIES) 2006/07 and 2009/10 of Sri Lanka and the author collected data.

Chapter 4 contributes to poverty literature empirically by developing a multidimensional poverty profile for Sri Lanka and theoretically proposing an alternative approach to select dimensions and respective weights for the dimensions for the Alkire and Foster multidimensional approach to poverty measurement. The chapter estimates multidimensional poverty using HIES 2006/07 and HIES 2009/10 data and confirms that poverty in Sri Lanka considerably decreased in between the two survey years. Poverty in the estate areas of Sri Lanka is still higher than the national averages, yet a considerable reduction of poverty can be observed in estate areas between the two survey periods. Chapter 4 also reveals that multidimensional poverty in Sri Lanka is relatively higher than the monetary poverty estimates, especially in the rural and estate areas. The chapter finds that the reduction of multidimensional poverty is less than the monetary poverty in recent years. The chapter also analyse multidimensional poverty for the ten indicators of the multidimensional poverty index and finds that different households needs different interventions for the reduction of poverty depending on their endowments.

The author conducted a household survey covering 300 households in two districts in estate areas of Sri Lanka, and this data is used in the poverty measurements in Chapter 5. This chapter confirms that there is a significant reduction of poverty levels in estate areas. Both monetary and multidimensional poverty levels of the author's survey data are higher than the estimations using HIES 2009/10 data. But a significant reduction of poverty can be observed between the author's survey data and HIES 2006/07 which suggests that poverty in the estate areas considerably decreased in recent years. Analysis of the perception of the poor suggests that the poor people do not feel huge improvements in their welfare levels, yet they find that their welfare levels are improving in recent years, especially in terms of education and health conditions. Furthermore, they stated that their income levels are significantly affected by the recent domestic and international migration. Though their income and consumption levels are increased in recent years, they find that their savings are negligible; therefore, the risk of falling into poverty is high among the estate poor.

Chapter 6 finds that the GDP of the country significantly improved during the study period while the growth is rather equally distributed among different provinces and areas. Household income has significantly improved and, consumption also follows the same trend of income, which suggests that increased income led to an increase in consumption, therefore, reduction of poverty. A significant increase in government expenditure on social welfare such as expenditure on health, education, fertilizer subsidy, poverty reduction programme (*Samurdhi*) and direct payments to needy people can also be observed during the study period. The inflation rate decreased to a record low towards the latter survey. Moreover, the country was experiencing relatively stable socio-political conditions during the latest survey due to the ending of civil war. The study also finds that three major products – tea, rubber and coconut – of estate areas recorded the highest average prices and production levels towards the latter survey with favourable climatic conditions for plantation sector. Worker unrest in the estate areas was minimal during the

latest survey, while it was at the peak during the previous survey, which led to a waste of more than five million work days to the industry.

The decomposition analysis of Chapter 6 restates that there is a considerable reduction of poverty between 2007 and 2010. In decomposing this reduction of poverty into two components, the study reveals that more than 85 per cent of the reduction of poverty is due to the differences in returns to household characteristics. And only around 15 per cent of the difference can be attributable to the differences in household characteristics between the two survey periods. Analysis of national and estate areas generates similar results, though the statistical significance is weaker for the decompositions at estate level, possibly due to the smaller sample sizes.

The analysis of determinants of poverty finds that area and province of living, education, employment, receiving remittances, access to household utilities, gender of the head of the household, and size of the household are the major determinants of poverty in Sri Lanka. Signifying the difference between monetary poverty and multidimensional poverty, health related variables, gender of the household head, size of the household, and land availability had opposite results for the two specifications of the dependent variable in logit and probit analysis. Also, health related variables are statistically significant only for the multidimensional definition of the dependent variable while remittances are statistically significant only for the monetary poverty definition of the dependent variable.

Therefore, it can be concluded that Sri Lanka has recorded an impressive reduction of monetary and multidimensional poverty in recent years. Higher economic growth, stable socio-political conditions, low inflation, fair redistribution, favourable weather and price conditions (especially in the estate areas) are the major causes of the higher reduction of poverty in recent years. Furthermore, the recent regional development programmes of the government have also positively affected the reduction of poverty in remote areas. Moreover, increased migration (remittances), decreased household sizes, and improved educational levels also have positively affected the recent reduction of poverty.

Dedication

To *Kazumi*

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Abbreviations

AF: Alkire and Foster

CEPA: Centre for Poverty Analysis

DCS: Department of Census and Statistics of Sri Lanka

FGT: Foster Greer Thorbecke

FLF: Fortin, Lemieux and Firpo

GDP: Gross Domestic Product

GIC: Growth Incidence Curve

HCI: Headcount Index

HDI: Human Development Index

HIES: Household Income and Expenditure Survey

HPI: Human Poverty Index

ID: Intensity of Deprivations

ILO: International Labour Organization

ISI: Import Substitution Industrialization

IV: Instrumental Variable

LPG: Liquid Petroleum Gas

LTTE: Liberation Tigers of Tamil Eelam

MDGs: Millennium Development Goals

MM: Machado and Mata

MPH: Multidimensional Poverty Headcount

MPI: Multidimensional Poverty Index

OB: Blinder and Oaxaca

OLS: Ordinary Least Squares

PCA: Principal Component Analysis

PCs: Principal Components

PGI: Poverty Gap Index

PHDT: Plantation Human Development Trust Fund

PPCA: Polychoric Principal Component Analysis

PRA: Participatory Rural Appraisal

QR: Quantile Regression

RHCEPC: Real Household Consumption Expenditure Per Capita

RIF: Recentered Influence Function

SPGI: Squared Poverty Gap Index

TV: Television

UNDP: United Nations Development Programme

UNESCO: United Nations Educational, Scientific and Cultural Organization

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Chapter 1

Introduction

Reducing poverty is one of the prominent objectives of development (Glewwe and Gaag, 1990). Institutions ranging from international organizations to local development institutions emphasise the importance of reduction of poverty. This higher emphasis for the reduction of poverty indicates the economic, social and political importance of it. Increased economic growth with fair redistribution reduces poverty to a greater extent (Bourguignon, 2003; Fosu, 2011). Changes of the distribution of household characteristics such as increased education levels, increased productive assets can also lead to changes in the poverty levels (Diamond et al. 1990; Glewwe 1991).

According to the estimates of the Department of Census and Statistics of Sri Lanka (DCS), Sri Lanka achieved an impressive reduction of monetary poverty levels in recent years after recording decades of trivial reductions of poverty. Monetary poverty estimates at national and regional levels drastically declined in the late 2000s. There is ample research on how Sri Lanka achieved a remarkable progress in human development with a low GDP per capita (Isenman, 1980; Sen, 1988; UNDP 1998, 2013), yet to the best of the author's knowledge there is no research that analyses the recent progress in reducing poverty in Sri Lanka. It is interesting to see how Sri Lanka achieved such a greater reduction of poverty and which factors contributed for the reduction of poverty. Studying the recent reduction of poverty in Sri Lanka will be helpful in developing policies for further reduction of poverty in Sri Lanka and in other developing countries. Therefore, this study aims at analysing the recent reduction of poverty in Sri Lanka to understand the possible causes of reducing poverty.

Poverty that can be defined as insufficient wellbeing depends both on monetary and non-monetary attributes (Bourguignon and Chakravarty, 2003). Though it is true that a higher level of income or consumption may increase the welfare level of a person, it is not guaranteed that the increase of income or consumption improves all the monetary and non-monetary attributes that matter in deciding the level of welfare (Chakravarty, 2006). Therefore, this study first estimates the recent poverty levels of Sri Lanka using a multidimensional approach to measuring poverty, as an alternative measurement method, but using the same data applied for estimating the monetary poverty levels by Department of Census and Statistics of Sri Lanka (DCS). Secondly, the study estimates the poverty (both monetary and multidimensional) among one of the poorest groups (estate workers) in Sri Lanka using data collected by the author to estimate the recent trends in poverty using an alternative data source to the Household Income and Expenditure Survey data. For this purpose, a household survey of 300 households was conducted in two districts (Badulla and Nuwara Eliya) where most of the tea plantations are concentrated. As the estimations using an alternative estimation method and alternative data sources confirmed the recent reduction of poverty in Sri Lanka, finally the study examines the recent changes of socio-economic conditions of the country and determines the sources of reduction of poverty in Sri Lanka using poverty decomposition analyses and an analysis of poverty determinants.

1.1 Background

Sri Lanka was one of the highly regulated economies during the 1970s where the Import Substitution Industrialization (ISI) was dominant in economic policy making. This strategy generated a stagnant economy, high unemployment and rationing of consumer goods (Gunatilaka & Chotikapanich, 2006). Sri Lanka liberalized the economy in the late 1970s and replaced the ISI with the Export Oriented Industrialization. Consequently, a moderate level of economic growth and lower level of unemployment were observed.

Nevertheless, the government did not account for the distributional effect of economic liberalization (Gunatilaka & Chotikapanich, 2006).

Table 1.1 shows that Sri Lanka recorded about a five per cent annual average GDP growth rate during the last two decades. The industrial and services sectors contributed more to the growth while contribution from the agricultural sector was minimal and stagnant. Moreover, the agricultural sector's share of GDP declined significantly while dominance of the services sector strengthened.

Table 1.1: Growth rates and shares of GDP by sector from 2004 to 2012

Sector	Annual growth (%)					Share of GDP (%)				
	2004	2006	2008	2010	2012	2004	2006	2008	2010	2012
Agriculture	0.0	6.3	7.5	7.0	5.8	12.5	11.3	13.4	12.1	11.1
Industry	5.4	8.1	5.9	8.4	10.3	28.6	30.6	29.4	29.4	31.5
Services	6.7	7.7	5.6	8.0	4.6	58.8	58.0	57.2	57.8	57.5
Sri Lanka	5.4	7.7	6.0	8.0	6.4	100.0	100.0	100.0	100.0	100.0

Source: Central Bank of Sri Lanka (Annual Reports, 2004-2012)

Nevertheless, the economic growth was uneven across different regions (Table 1.2). Western Province produced more than 50 per cent of the total GDP while contributions from North Central and Uva Provinces remained less than five per cent.

Table 1.2: Growth rates and shares of GDP by province from 2004 to 2011

Province	Annual growth (%)					Share of GDP (%)				
	2004	2006	2008	2010	2011	2004	2006	2008	2010	2011
Western	9.5	4.9	3.5	5.7	7.2	51.4	50.1	45.4	44.8	44.4
Central	13.6	10.3	7.6	10.8	6.1	9.2	8.8	9.8	10.0	9.8
Southern	5.0	10.5	5.8	9.6	12.5	8.9	10.0	10.5	10.7	11.1
Northern	12.9	3.6	14.6	13.5	17.9	2.9	2.8	3.2	3.4	3.7
Eastern	-16.2	6.1	14.2	11.4	4.2	4.9	4.9	5.6	6.0	5.7
North Western	-1.8	11.8	6.6	6.9	13.1	8.5	9.1	9.9	9.5	10.0
North Central	3.9	1.4	24.6	12.4	4.2	3.6	4.0	4.7	4.8	4.6
Uva	10.4	8.6	-2.8	7.6	7.1	4.3	4.3	4.5	4.5	4.5
Sabaragamuwa	13.1	3.2	4.9	10.9	7.5	6.4	6.1	6.4	6.3	6.2
Sri Lanka	5.4	7.7	6.0	8.0	8.3	100.0	100.0	100.0	100.0	100.0

Source: Central Bank of Sri Lanka (Annual Report, 2004-2012)

But a reduction in contribution to the GDP from the Western Province can be seen in the latter half of the 2000s while contributions from other provinces noticeably increased. Southern and North Western Provinces show a significant increase in provincial GDP growth rates and contribution to the total GDP of the country while war affected Northern and Eastern provinces also show positive trends in both GDP growth and contribution to the total GDP. A higher level of human development is achieved during the recent years, but there were wide regional disparities in achievements (World Bank, 2007; Kumara and Gunewardena, 2010). According to the Human Development Report, 2010, the human development index of Sri Lanka is 0.66 and ranked as 91, Life expectancy at birth is 74.4 years and adult literacy rate is 91 per cent, primary enrolment is 99.7 per cent while secondary enrolment is 87 per cent, infant mortality is 13 and child mortality is 14 for 1000 live births, gender inequality index of Sri Lanka is 0.85.

From the perspective of monetary poverty, the unevenness of growth has also brought disappointing results in terms of poverty reduction. Although there was a marginal decline in poverty between 1996 and 2007 in both urban and rural areas, the estate areas experienced an increase in poverty. Moreover, poverty levels of the poorest provinces i.e. Uva and Sabaragamuwa (and districts) exceeded the poverty levels of 1996. However, a significant rate of reduction of poverty can be observed between the latest surveys (Household Income and Expenditure Surveys 2006/07 and 2009/10) at the national and regional levels (Table 1.3). This reduction of monetary poverty at the national level can be attributed mostly to the higher reduction of poverty in rural and estate areas. Interestingly, estate area recorded more than 60 per cent (more than 20 percentage points) reduction of monetary poverty headcount ratio between the two survey periods. Poverty gap index and squared poverty gap index that estimate the intensity and severity of poverty also show a similar trend of the headcount index.

Table 1.3: Incidence (HCI), depth (PGI) and severity (SPGI) of poverty by area

Area	HCI (%)				PGI (%)				SPGI (%)			
	1996	2002	2007	2010	1996	2002	2007	2010	1996	2002	2007	2010
Urban	14.0	7.9	6.7	5.3	2.9	1.7	1.3	1.2	0.9	0.5	0.4	0.4
Rural	30.9	24.7	15.7	9.4	7.2	5.6	3.2	1.8	2.5	1.8	1.0	0.5
Estate	38.4	30.0	32.0	11.4	7.9	6.0	6.2	2.1	2.5	1.8	1.8	0.6
Sri Lanka	28.8	22.7	15.2	8.9	6.6	5.1	3.1	1.7	2.2	1.6	0.9	0.5

Source: Department of Census and Statistics (2011, 2009, 2003), estimates based on HIES 2009/10, 2006/07, 2002 and 1995/96. Note; HCI: Headcount Index, PGI: Poverty Gap Index. SPGI: Squared Poverty Gap Index

Growth of household consumption expenditure has also been uneven across households by 50 per cent for the top quintile and only two and six per cent for the bottom quintiles, respectively (World Bank, 2007). The increasing Gini coefficient, measured using household consumption expenditure, shows that the sharpest increase in inequality in Sri Lanka has been recorded during the period from 1996 to 2007 (Table 1.4). Nevertheless, a decrease in inequality can be seen in the latest survey.

Table 1.4: Gini coefficient 1996-2010

Area	1996	2002	2007	2010
Urban	0.38	0.42	0.43	0.41
Rural	0.33	0.39	0.38	0.37
Estate	0.20	0.29	0.26	0.30
Sri Lanka	0.35	0.40	0.40	0.38

Source: Department of Census & Statistics based on HIES 1995/96, 2002, 2006/07 and 2009/10.

Estate areas

During early 1920s, the British established tea plantations in Sri Lanka as in several of their tropical colonies, such as tea in India, sugarcane in the Caribbean, cocoa in Africa and oil palm in Malaysia (Shunsuke, 2012, ILO, 1966). Common characteristics of these plantations are the resident labour, mono cultivation and geographical concentration to certain areas. Due to the shortage of labour for plantations, the colonial government imported labour from famine stricken South India (de Silva, 1981). The

imported workers (who spoke Tamil language and hereafter called estate Tamils¹) were employed mostly at tea plantations, and their welfare and social activities were looked after by the respective planters (Samarasinghe, 1993). The imported workers were confined to the employed plantation, and they were not allowed to move outside the estate. Education, health and basic social services were provided at the plantation where they worked, and the services were minimal in both quality and quantity.

As immigrants, they were not having the Sri Lankan citizenship for more than a century, and most of the development programmes avoided them (Jayawardena, 1984). By 1920, the plantation management was obliged to provide primary education for children of estate workers, though the implementation was not a reality. A minimum wage was guaranteed in 1927 by including estate workers under the minimum wage ordinance (Jayawardena 1972). However, the amount paid to them was much less than what others received in the country. India took some interest of the estate workers after the independence of Sri Lanka which is demonstrated by several estate workers related agreements between the two countries (Nehru-Kotalawala pact of 1954; Sirima-Shastri Pact of 1964; Sirima-Gandhi pact of 1974). This led to the granting of Sri Lankan citizenship to some of the Tamil estate workers. Finally, Sri Lanka granted citizenship to all Indian origin estate workers in 2003 (Government of Sri Lanka act no 5 of 1986; 39 of 1988; 35 of 2003).

The fighting between the Sri Lankan government army and separatist Tamil Tigers (LTTE), which lasted for three decades from the 1980s, further limited the mobility of estate Tamils. They speak the language (Tamil) that is spoken in the areas where there was intense fighting and some of them did not have national identity cards (since they were not considered as Sri Lankan citizens). These made it difficult for them

¹ Tamil people in Sri Lanka are divided into two categories: Sri Lankan Tamils and Estate (Indian) Tamils. Estate Tamils are the imported plantation workers from India and their descendants. Sri Lankan Tamils are the people descended in Sri Lanka from their historical ancestors especially from North and Eastern Provinces of Sri Lanka.

to move into other areas of the country because of the fear of being suspected as a terrorist. The fighting ended in early 2009, allowing for greater movement of estate workers.

Obtaining citizenship and providing the basic services (health and education) by the government have improved the welfare of the estate workers to some extent (PHDT, 2007-2013). Moreover, the ending of the civil war provided them more opportunities (travelling without problems) for domestic and international migration. However, due to the holistic approach of the plantation management, estate workers have been isolated geographically, socially, economically and politically from the rest of the country for more than a century (Shunsuke, 2012) and their welfare levels were significantly lower than the national averages.

1.2 Research objectives and questions

As discussed previously, Sri Lanka records an impressive rate of poverty reduction in recent years (using monetary poverty estimates). The national poverty level in 2010 is almost half of the national poverty level in 2007. The rate of reduction of monetary poverty levels in the estate areas is far more impressive than the national figures which show more than 60 per cent reduction of poverty headcount ratios. These figures raise the question, “Did Sri Lanka achieve such a huge reduction of poverty, and if so, what contributed to it?”

The above estimates of poverty are based on the monetary poverty approach to measuring poverty which solely defines poverty using a predetermined poverty line and monetary value of income or expenditure. If a household (or individual) achieves the predetermined monetary value, that household is defined as not poor. Measuring poverty by considering only the monetary achievements of households may not generate the real picture of poverty. Therefore in estimating poverty levels, both monetary and non-monetary aspects of welfare should be considered (Sen, 1999).

Most poverty researchers at present agree that poverty is a multidimensional phenomenon. However, a standard way of measuring multidimensional poverty is not yet established, and several estimation methods are currently being discussed (Duclos et al., 2006). Alkire and Foster (2009, 2011) have made a significant contribution in developing an internationally comparable Multidimensional Poverty Index (MPI). But this internationally comparable MPI does not represent realities of individual countries. The method is also criticized for the arbitrary selection of dimensions and weights. Once the dimensions and indicators are chosen, it is important to see the levels of poverty among households who are deprived of these indicators and see which indicator contributes mostly to the multidimensional poverty in Sri Lanka.

Another way of answering the above question is re-estimating poverty levels using an alternative data source. It can show whether Sri Lanka has achieved such a huge reduction in poverty in recent years. Poverty estimates of the previous section are based on the Household Income and Expenditure Survey data (HIES). HIES is conducted every five years (every three years after HIES 2007) as a national sample survey by the Department of Census and Statistics of Sri Lanka with about 20,000 households as the sample size. Collecting data and re-estimating poverty levels using new data provides recent estimates of poverty and possible comparison between the estimates using two data sources. In addition to this, by visiting poor areas and listening to the poor themselves and analysing their perceptions can complement the statistically estimated poverty levels.

If the reduction of poverty levels of the alternative estimation method and alternative data sources are similar to the official estimates, then it is important to analyse how Sri Lanka achieved such an impressive reduction of poverty. The reduction can be due to the improvements in households' characteristics such as education, health or availability of assets or it can be due to favourable market conditions. Understanding the causes behind this reduction will help Sri Lanka to further reduce its poverty levels as

well as for other developing countries to replicate them in their policy development for poverty reduction.

Therefore, the objectives of this study are:

1. To estimate multidimensional poverty levels in Sri Lanka by redefining the Multidimensional Poverty Index (MPI) so that it is relevant to Sri Lankan socio-economic conditions.
 - a. To identify the important dimensions of poverty.
 - b. To select the relevant indicators for each dimension.
 - c. To estimate multidimensional poverty trends and issues in Sri Lanka.
2. To analyse recent poverty trends in estate areas of Sri Lanka.
 - a. To estimate poverty in estate areas using the author's survey data.
 - b. To infer the recent changes in poverty among households deprived of different indicators of multidimensional poverty index in estate areas.
 - c. To analyse the perceptions of the poor persons in estate areas.
3. To identify the sources of reduction of poverty in Sri Lanka
 - a. To estimate the effect of changes in the distribution of household characteristics and returns to these characteristics on the recent reduction of poverty in Sri Lanka.
 - b. To analyse the recent changes in socio-economic conditions and their relationship with reduction of poverty.
 - c. To find out what determined poverty at micro level (household level) and their effects on reducing poverty.

The first objective of this study is to estimate multidimensional poverty levels for Sri Lanka using the recently developed Alkire– Foster method (AF method) of measuring

multidimensional poverty. The study aims to overcome the constraints of the AF method in identifying the poor in a particular country context by selecting the weights and dimensions relevant for a specific country. For this purpose, polychoric principal component analysis will be utilized. Multidimensional poverty trends, issues of Sri Lanka are analysed using the proposed method.

The second objective is to estimate recent poverty levels for the estate areas of Sri Lanka using data collected by the author and compare them with the estimates made using HIES data. If there are substantial differences between the two estimates, then it could be an indication that there are errors in poverty levels estimated using HIES data. However, the poverty estimates of the author's survey and HIES are not strictly comparable due to the differences in survey period and survey methodology. HIES 2010 was conducted between July 2009 and June 2010 while the author's survey was conducted in September and October 2013. Even though the two questionnaires are similar, there are some differences in data collection method employed by the two surveys, for example, HIES used a one week household roster while the author's survey used only a questionnaire. Therefore, a qualitative analysis of the perception of the poor people in estate areas will also be conducted to achieve the second objective. Data of the household questionnaire from the author's survey, individual interviews of estate workers, focus group interviews and key informants will be utilized in achieving this objective.

The third research objective of this study is set to identify the causes of the recent reduction of poverty in Sri Lanka. Since it is an impressive rate of reduction of poverty, it is important to understand how Sri Lanka achieved such a reduction in poverty. In achieving this objective, first the reduction of poverty is decomposed into two segments i.e. a portion due to the differences in the distribution of the household characteristics and another portion due to the differences in the distribution of returns to these characteristic between 2007 and 2010. The changes in macroeconomic conditions that could lead to

differences in returns to characteristics are examined in general while the socio-economic factors that contributed to the reduction of poverty at the household level is examined in detail.

The research questions, in line with the above objectives, are:

1. How can a multidimensional poverty measure that can be applied to a specific country i.e. Sri Lanka be developed?
 - a. Which dimensions and indicators are important and should be included?
 - b. How are different dimensions and indicators weighted?
 - c. What are the multidimensional poverty trends and issues in Sri Lanka?
2. What are the recent poverty trends in estate areas of Sri Lanka?
 - a. What are the recent poverty levels in estate areas in Sri Lanka?
 - b. Are there differences of multidimensional and one-dimensional poverty levels of households deprived of different aspects of multidimensional poverty?
 - c. How do poor people themselves see poverty and recent changes in their welfare levels?
3. What caused the huge reduction of poverty in Sri Lanka?
 - a. What is the relationship between the changes in macroeconomic variables and recent reductions of poverty in Sri Lanka?
 - b. What contributed to the reduction of poverty? Is it the improvements of the household characteristics or the improvements of the returns to these characteristics?
 - c. What determined poverty at the household level in Sri Lanka?

1.3 Limitations

As many other multidimensional poverty studies (Alkire and Santos, 2010), this study is also limited by the availability of data. The study used the household income and expenditure survey of Sri Lanka as the main data source. This survey provides information on some important aspects of multidimensional poverty such as health, education, and access to household utilities and government services, yet information on vulnerability, political participation and empowerment are not available. Moreover, some detailed information on health such as maternal mortality, child mortality and nutrition are also not available. Therefore, the selection of dimensions and allocating of weights can be made further relevant if more data were available in these attributes. Furthermore, availability of data for the war affected areas was limited to one survey or to a smaller sample size. Therefore, a detailed analysis of multidimensional poverty trends could not be carried out for these areas, though the multidimensional poverty trends could be significantly different in these areas.

Estate areas of Sri Lanka are mainly comprised of tea, rubber and coconut plantations.² However, the author conducted his survey only at tea plantations of Nuwara Eliya and Badulla districts. Nuwara Eliya district has only tea plantations while Badulla district has a few rubber estates, however, data from these rubber estates also were not collected. This is mainly due to the convenience of survey administration with limited time and resources. Nuwara Eliya and Badulla districts account for around 60 per cent of the estate population in Sri Lanka, and the remaining is distributed among several other districts.³ Therefore rubber and coconut plantations as well as samples from other districts should also be included in the survey in order to generalize the results of this study to estate areas of Sri Lanka.

² See annex 1 for extent of land of estate areas of Sri Lanka

³ See annex 2 for population distribution of Sri Lanka by area

1.4 Organization

The remainder of the study is organized as follows. Chapter 2 provides the theoretical background and a review of the literature relevant to this study. Chapter 3 discusses the methodology and data used. The first part of Chapter 4 identifies the dimensions of poverty and weights using a principal component analysis and the second part estimates and discusses the trends and issues of multidimensional poverty in Sri Lanka. Chapter 5 analyses poverty among plantation workers of the country using data gathered by the author. Chapter 6 identifies the possible sources of the recent reduction of poverty of Sri Lanka. The final chapter concludes the study.

Chapter 2

Theoretical background and literature review

The first subsection of this chapter discusses the major approaches to measuring poverty while the different weighting methods applied in multidimensional poverty analysis is discussed in the second subsection. The third subsection discusses the literature related to analysing determinants of poverty and literature related to decomposition of reduction of poverty discussed at the last subsection.

2.1 Major approaches to measuring poverty

Poverty can generally be defined as a visible lack of “wellbeing” (World Bank, 2000). Therefore it is required to define wellbeing before poverty analysis. The level or the gravity of estimated poverty figures can vary according to the approach taken by the researcher in defining wellbeing, hence poverty. Measuring poverty can be categorized into four major approaches (Laderchi et al. 2010). The monetary approach defines poverty as the command over commodities, while the capability approach defines it with the capability to function properly in the society. Social exclusion defines poverty as the full or partial exclusion of individuals from full participation in the society and in the final approach poor people themselves define poverty (the participatory approach).

(a) *Monetary approach*

The monetary approach to measuring poverty dominated poverty analysis from the beginning of poverty research (Gunewardena, 2005). The methodology is based on utility, thus is known as the welfarist approach (Haughton & Khandker 2009). The monetary approach identifies poor with a shortfall in income or consumption. Therefore, the methodology is looking at whether a person or a household has or does not have the minimum necessities considering the household size and demographic composition (Ravallion, 1994). Initially, the “poverty line” which is defined as the minimum monetary requirement to satisfy basic needs (nutritional requirements based on minimum calorie intake) differentiated the poor from the non-poor. However, allowances were made for non-food expenditure such as expenditures on education, fuel, entertainment in the poverty line later (cost of basic needs method). Adult equivalence, returns to scale, and temporal and spatial price indicators were introduced in improving the poverty line (Deaton, 1997; Haughton & Khandker, 2009). The Foster-Greer-Thorbecke index (FGT) is the dominant measurement technique which estimates the incidence, depth and severity of poverty.

The monetary approach is based on the estimation of income or consumption at market prices, which requires identifying the relevant markets and imputation of monetary values for those not identified (Grosh and Glewwe, 2000). The imputation of these monetary values involves strong assumptions that make the monetary approach weaker in understanding poverty. Furthermore, the literature questions the ability of uniform money matrices in explaining the heterogeneity across individuals and their situations (Laderchi et al., 2010). The monetary approach identifies the poor by referring to an arbitrary cut-off point, namely the poverty line. Irrespective of the estimation method (cost of basic needs or food intake method), it is required to set a particular income or consumption level that differentiate the poor from the non-poor. Even though the monetary approach uses a specific poverty line, the nutritional requirements of a person depends on different biological requirements, activities, gender and age of

individuals (Sukhatme, 1982, 1989; Dasgupta, 1993; Payne 1993). Furthermore, different tastes, food availability and prices also influence the amount of money required for a particular level of nutrition. Moreover, poverty lines are often defined for households whereas the resource distribution within the family affects the nutritional level of each individual (Laderchi et al., 2010). These limitations show that it is difficult to define a unique cut-off point (poverty line) for all individuals and groups.

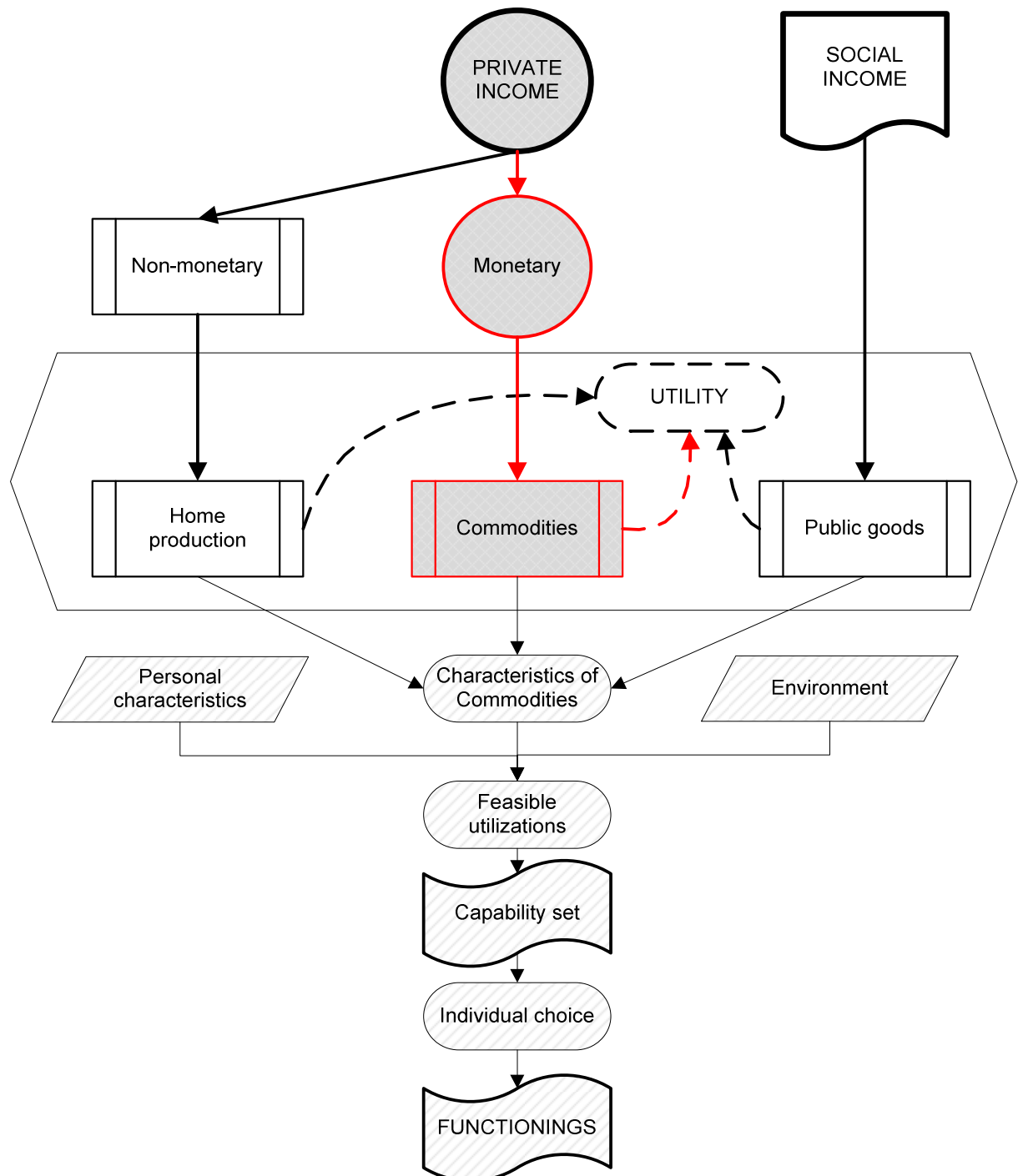
Having a particular income or consumption level also does not guarantee that the welfare of a particular household is above the defined poverty line. For example, if most of the household expenditure is spent on alcohol consumption or goods and services are not available in the market i.e. rationing. Furthermore, as most of the economic activities of developing countries are carried out outside of the market, numeric measures of welfare such as income or expenditure are not available or reliable. In this situation it is worth finding several proxies for income or consumption which are easy to observe (Kolenikov and Angeles, 2009).

(b) *Capability approach*

A significant change in understanding and measuring poverty was due to the pioneering work of Sen (1976, 1985, 1997, and 1999) on the capability approach to poverty. The capability approach argues that the development should not be measured by utility or its proxies - income or expenditure - but by the ability of people to behave decently in the society (“a valued life”). Capability approach defines poverty as the failure to achieve basic “capabilities” and capabilities are defined as “the ability to satisfy certain crucially important functionings [achievements] up to [a] certain minimally adequate level” (Sen, 1993, p. 41). In other words, the capability approach explains that people may be poor if they do not possess capabilities to function properly in the society thus lacking income, education, freedom, voice, social participation, and health may drag people into poverty (Sen, 1999). Therefore, it shifts away from monetary income (or

expenditure) as the sole indicator of measuring wellbeing and also focuses on the non-monetary indicators of wellbeing (see Figure 2.1).

Figure 2.1: Capability approach



Source: Adapted from Laderchi et al. (2010)

The capability approach considers monetary income as a way of improving wellbeing but not as the outcome expected in human life (Laderchi et al., 2010). However, the ability of individuals to transfer monetary income into wellbeing also depends on their personal characteristics and environment. Therefore, some people need more resources to achieve the same outcome as some other people (Laderchi et al., 2010).

However, as shown by Figure 2.1, monetary income also plays a significant role in determining the welfare level. People can acquire commodities using monetary income and the characteristics of these commodities, commodities produced at home, and public goods determine the use of these commodities and the available capability set to the person depending on the personal and environmental characteristics. The Functionings (achievements) of the person is determined by the individual choice of the person within the given capability set. Therefore, the capability approach broadens the measure of wellbeing incorporating both monetary and non-monetary aspects of welfare. However, Sen does not provide what capabilities should be included in the welfare measure though some researchers attempt to draw a universal list (Laderchi et al., 2010; Alkire, 2002; Nussbaum, 2000; Qizilbash, 1998; Desai, 1995).

The first and best known measure of the multidimensional approach to poverty is the United Nations' Human Development Index (HDI) which was introduced at the beginning of the 1990s and included three dimensions of poverty - Health, Education and Income (UNDP, 1990). Since then, many different indicators of multidimensional poverty were developed⁴ and the most recent is the MPI by Alkire and Santos (2010). Other than developing univariate multidimensional indicators there were some different approaches to measuring poverty such as the dominance approach and the fuzzy set approach (Duclos et al., 2006; Martinetti, 2006). Incorporating multidimensionality into the capability approach was further improved by Foster and Sen (1997), and Martinetti (2000). The development of the Human Poverty Index (HPI) by the UNDP was one more step in the

⁴ WIDER conference on Inequality, Poverty and Human Development

operationalization of the capability approach. One of the greatest contributions to the multidimensional poverty concept was the development of the Millennium Development Goals (MDGs) of UNDP that the world is trying to reach by 2015.

Compared to the monetary approach, the capability approach sees poverty as a broader concept that measures the lives people live and freedoms that they enjoy. It identifies broader causes of poverty and provides a bigger space for policy development for poverty reduction (Laderchi et al., 2010). It includes personal and environmental (contextual) characters that matter in deciding people's welfare into the poverty measurement. However, the problem with most of the approaches in measuring multidimensional poverty is aggregation of different dimensions into one index (this will be discussed in detail in the methodology section). As explained in the methodology part of this study, Alkire and Foster (2009, 2011) have elaborated a robust methodology of aggregation. The MPI that used the AF aggregation method replaced the Human Poverty Index (HPI) in the Human Development Report from 2010.

(c) Social exclusion approach

In addressing the weaknesses of monetary and capability approaches, social exclusion and participatory approaches were developed (Laderchi et al., 2010). The Social exclusion approach defines poverty as exclusion from the normal activities of society. Formally a person is poor if he is a resident in the society, but for the reasons beyond his control cannot participate in the normal activities of that society and he would like to do so (Laderchi et al., 2010). Though there are several other ways of defining poverty in social exclusion (Atkinson, 1998; Room, 1999; Micklewright, 2002), basic roots are grounded in the work of Townsend, who defined social exclusion as the exclusion from ordinary living patterns, customs and activities (Townsend, 1979). Social exclusion accepts the multidimensionality of poverty and focuses on the dynamics of poverty, as "some disadvantages lead [to] some exclusion, which in turn leads to more

disadvantages and more exclusion and ends up with persistent multiple (deprivation) disadvantages” (Eurostat Taskforce, 1998). Social exclusion is a group based approach and belongs to the relative poverty measurements as it is defined according to the normal activities.

However, the literature on the application of the social exclusion approach in the developing country context is limited. Finding the appropriate benchmarks for defining exclusion is a difficult task in developing countries. Most of the poor in developing countries are employed in the informal sector, and they mostly do not possess the social insurance coverage. Therefore, lack of inclusion in the formal sector or the social insurance does not mean that they are excluded from normal relationships (Laderchi et al., 2010). Moreover, the social agreements within the society, i.e. caste system further complicate it.

(d) *Participatory approach*

The participatory approach allows people themselves to define poverty (Chambers, 1994, 1997) and thereby it tries to resolve the criticism of externally defining poverty levelled against monetary and capability approaches. Most poverty definitions and assessments are done by external people and the poor themselves hardly have any chance to explain what matters for them. Participatory Rural Appraisal (PRA) led the way for the development of the participatory approach which is defined as “a growing family of approaches and methods to enable local people to share, enhance and analyse their knowledge of life and conditions, to plan and to act” (Chambers, 1994). The approach was popularized when major international development organizations i.e. the World Bank and IMF insisted that borrowing countries should have a PRA as a way of empowering the poor. The World Bank itself published several country reports, a global report and methodological reports in 1999 listening to poor people. Even though the approach claims that it allows for the poor to participate in defining poverty, interpretation of the research

outcome is always done by an outside researcher as it is happening in other approaches (Booth et al., 1998 as cited in Laderchi et al. 2010). Therefore, total participation of poor people in measuring poverty is not guaranteed in this approach either. Policy oriented conclusions of PRAs are mostly drawn by the external researchers. The participatory approach is best suited for analysing poverty in a homogenous society. When a society is heterogeneous, it is difficult to draw a common conclusion. Furthermore, it creates the problem of “whose voices are [to be] heard” (Laderchi et al. 2010). Some people may not speak on their own due to the existing social relations. Some may fear powerful individuals and groups when raising their actual voice. Da Cunha and Pena (1997) conclude that the participatory approach could reinforce the existing social relations. Time and financial resources required by the approach are relatively higher compared to the other approaches. Therefore, most of the participatory poverty assessments include only a few representative samples. Hence, the approach may not reveal the real situation of the society. Furthermore, it is argued that the poor themselves may not be able to express their situation well due to their limited information and social conditions. This argument is originally put forward by Sen (1985) against the monetary approach (“valuation neglect”). These difficulties and weaknesses have made the participatory approach less popular among poverty researchers.

2.2 Approaches to allocate weights

Allocating weights for different dimensions or indicators is inevitable in developing a multidimensional poverty measure that aims at aggregating several deprivations into one index. The weighting method is important for the interpretation of the index. Weights determine the possible trade-off between two variables. Weights also reflect the value judgements of how good life should be. If higher weights are allocated for a variable, it shows that the variable is more important in human life and vice versa. However, allocating weights for different dimensions has been an important issue in

multidimensional research. Weighting schemes can be broadly categorized into three main groups such as (1) Data driven, (2) Normative, (3) Hybrid (Decancq and Lugo, 2013).

(a) *Data driven approach*

The data driven approach allocates weight for each dimension by analysing the actual distribution of data. Value judgments are not involved in this weighting method. The trade-off between variables is determined by their statistical relationships. Therefore, the data driven method does not expect to define how good life should be and accepts the relationship determined by data.

Three approaches of weight allocation are found within the data driven method such as Frequency based, statistical and most favourable weight. The frequency based method allocates weight for a dimension based on the distribution of that dimension (Decancq and Lugo, 2013). For example, for the dimensions less frequently lack by poor will get higher weights and vice versa. The advantage of this approach is that the dimensions that a minority of the population are poor of will have greater significance. However, Brandolini (2007) argues that the frequency weights are not stable, and the definition of a good life depends only on the relative deprivation of different dimensions. The second approach to the data driven method is statistical weights. According to this approach, weights are allocated according to the correlation among different dimensions. The most popular way of allocating weights in the statistical method is by weights generated through principal component analysis (Klasen, 2000; Noorbakhsh, 1998) or factor analysis. The justification for this weight allocation is that a dimension can have a trade-off between more than one variable and PCA will take it into account. However, sometimes it is difficult to interpret the components generated by the PCA. Moreover, PCA allocates less weight for less correlated dimensions, but in reality there could be less correlation of important dimensions (Decancq and Lugo 2013). Furthermore, the weight

allocated by PCA is also not stable over time, and it is less transparent (de Kruijk and Rutten, 2007). The most favourable weighting method allocates weights such that everyone feels that their perceptions are considered in defining wellbeing. If the same weights are allocated for everyone, they may feel that their wellbeing is defined with others perceptions (Decancq and Lugo, 2013). Therefore, the most favourable weighting method allocates weights based on the performance of individuals and the highest weight is allocated to the dimensions in which individuals perform best. But the weaknesses of this method also lie in its individual specific approach. As everyone will have their own weighting schemes, comparison of wellbeing across individuals is not reliable. Moreover, there is no guarantee that the most favourable method will allocate weights so that trade-off among variables is correctly reflected. Though the highest weight is given to the dimension that individuals perform best, the best performance may be due to the easiness of achieving it. Therefore, the highest weight may not be allocated to the most important dimension.

(b) Normative approach

In contrast to the data driven weighting method, the normative weighting method depends totally on value judgements and actual distribution of data is not considered. Though normative weighing is not theoretically well justified it is the most popular weighting method in multidimensional poverty analysis (Decancq and Lugo, 2013). This is partly due to the easiness of calculation and interpretation. There are three major approaches to normative weight allocation, such as equal or arbitrary weights, expert opinion weights, and price based weights.

The most commonly applied weighting method in multidimensional poverty analysis is the arbitrary equal weights.⁵ The equal weights are popular among poverty

⁵ Decancq and Lugo (2013) provide a comprehensive list of literature that applies different weighting methods.

researchers due to the simplicity and arguments of equal importance of all dimensions (Decancq and Lugo 2013). The Human Development Index applies equal weights to all three dimensions. But the allocation of equal weights may not represent the actual trade-off among dimensions (Ravallion, 1997). Arbitrary weights can also be allocated in an unequal way. If the researcher feels that some dimensions are more important, those dimensions can have more weights. But the problem with allocating different weights is that there is no theoretical background to decide the weights for different dimensions. Fleurbaey (2009) argues that ethical preferences of the observer can be utilized in allocating weights for different dimensions, but there is no economic or philosophical theory that gives clues about how to incorporate those preferences in weighting. However, equal weights may not reflect the real trade-off among dimensions thus the substitutability of two dimensions is interpreted incorrectly. Therefore, allocating arbitrary equal weights is criticized severely by some poverty researchers (Ravallion, 1997, 2010, 2011; Chowdhury and Squire, 2006).

To overcome the arbitrariness of the researcher, opinions of a group of experts can be considered in weight allocation. This approach is known as expert opinion weights. The justification of consultation of a group of experts is that it may provide guidelines for weights based on the actual importance of dimensions because expert opinions represent the agreement of the scientific community in the relevant field (Mascherini and Hoskins, 2008). The main concern with expert opinions is the selection of experts. Selection of experts can be biased and due to this fact, the agreed weights can also be biased. On the other hand, even if the experts' opinions are not be biased; it may not represent the real preferences of the concerned population (Decancq and Lugo, 2013). The last approach of nominal weights allocation is price based weights. This approach is the least popular weighting approach in multidimensional poverty analysis. The method suggests that the marginal rate of substitution of different dimensions should be calculated, and these calculations can be used in determining the possible weights.

(c) *Hybrid approach*

The hybrid weighting method aims to overcome the weaknesses of the data driven method and the normative method, and also to use the advantages of both methods. The hybrid method utilizes value judgements as well as actual distribution of data in determining the weights. Though not popular, there are two major approaches of allocating hybrid weights such as stated preference and hedonic weights. Stated preference weights incorporate the opinion of the individuals or their representatives in allocating weights. Therefore, this method is data driven as well as involving value judgements. This method may represent the actual preferences of individuals as well as real trade-off among dimensions. However, the method is less popular due to data limitations. Almost none of the household surveys include a question on the individual preferences over different dimensions. Once more data are available, this method can be the most suitable way of allocating weights in multidimensional poverty analysis (Decancq and Lugo 2013). The hedonic weighting method is expected to retrieve the implicit valuation of wellbeing of individuals from their self-reported happiness or satisfaction. Therefore, it proposes that weights can be generated from a regression of life satisfaction on a set of different dimensions (Decancq and Lugo, 2013; Nardo et al. 2008). The most general problem with the hedonic approach is finding a dependent variable i.e. life satisfaction. On the other hand, the included dimensions could be highly correlated which leads to imprecise estimations of coefficients. Furthermore, the researcher has to decide which variables to be included as dimensions of wellbeing and which as exogenous control variables. This depends on the value judgement of the researcher creating the same problems encountered in normative weighting schemes.

As all the weighting methods have their own advantages and disadvantages, it is difficult to say which method is most suitable for allocating weights in multidimensional poverty analysis. The best way to decide weights is to try all possible weighting methods and check the sensitivity of the proposed measure and use the robust weighting method.

Decancq and Lugo (2013) conclude their comprehensive analysis of different weights on multidimensional poverty:

As long as there is no widely accepted theoretical framework on how to set these trade-offs, the researcher has no choice than to rely on her common sense and to be very cautious in interpreting the obtained orderings of the achievement vectors. In all cases, robustness tests and a sensitivity analysis should be called upon to determine whether results are solely driven by the specific value of weights selected (Decancq and Lugo, 2013, p. 30).

2.3 Decomposition of poverty reduction

Sri Lanka records an impressive level of reduction of poverty in recent years. Then the question raised along with that is how Sri Lanka achieved such a reduction in poverty. Is it due to the changes in general socio-economic conditions of the country? Is it due to the demographic changes such as reduced household size? Is it due to the increased education level? Or is it due to the increased employment or due to the increased labour income? Similar questions have constantly been raised in development literature (Azevedo et al., 2013) and understanding the forces behind the reduction of poverty has long been an interest among poverty researchers (Ferreira, 2010). Poverty decomposition analysis as a way of understanding the sources of reduction of poverty mainly focus on decomposing the effect of changes of economic growth and changes in redistribution on reduction of poverty (Kakwani, 2000; Datt and Ravallion 1992). The effects of structural changes on reduction of poverty were also examined in understanding the sources of reduction of poverty (Grootaert, 1995, Huppi and Ravallion 1991). Recent studies focus on decomposing reduction of poverty due to the observable changes in the distribution of household characteristics and unobservable returns to these characteristics (Azevedo et al. 2013).

Initial analyses of decomposition of reduction in poverty are based on the Datt and Ravallion method of decomposing poverty, which estimates the relative contribution of growth and inequality between two periods of time using the poverty line and Lorenz

curves. Subsequent decomposition techniques also mostly bear the roots of the Datt and Ravallion decomposition method. Following Datt and Ravallion (1992), Kakwani (1997) proposes an axiomatic approach to decomposing poverty. Kakwani (1997) eliminates the residual term which was a limitation of the Datt and Ravallion approach and completely explains the difference into growth and redistribution effects. Shorrocks (2013) proposes a Shapley value based decomposition method which is a generalization of Kakwani's axiomatic approach (see Baye (2006) for a detailed discussion on these three approaches). Ferreira (2010), in his excellent review of literature on the relationship between economic growth, inequality and poverty, concludes that "poverty generally declines as economies grow" and "the growth elasticity of poverty reduction falls with inequality" (pp. 8-9).

Moving from macro to meso, some literature analysed the sectoral level changes and their effects on reduction of poverty. Ravallion and Chen (2007) found that the agricultural sector growth is related with higher reduction of poverty. Growth in the services sector found to be highly related with the reduction of poverty in some other studies (Ravallion and Datt, 2002; Ferreira, 2010). Similar analyses have been carried out to understand the regional level changes in aggregate variables and their effects on reducing poverty and have found that sources of reduction of poverty can be different depending on the area (Ferreira, 2010).

Due to the significant improvements in availability of household survey data, detailed analysis of sources of poverty reduction at the micro level (household level) is becoming popular (Azevedo et al., 2013). These analyses do not depend on the aggregate variables and use the total distribution of the household income or household consumption expenditure distribution (Ferreira, 2010). These studies mainly bear the root of the Ravallion and Chen's (2003) Growth Incidence Curve (GIC) analysis. According to Ferreira (2010), if the interest is to estimate the contribution of a particular change such as increased education or decreased household size on poverty or growth, GIC can be decomposed into the particular change and to the residual as follows:

$$y(p) = \frac{y^s(p) - y_{t-1}(p)}{y_{t-1}(p)} + \frac{y_t(p) - y^s(p)}{y_{t-1}(p)}, \quad (2.1)$$

where $y^s(p)$ is the counterfactual distribution, which would be obtained by the exclusive application of the event to $y_{t-1}(p)$, ceteris paribus. The first component of the right hand side of equation 2.1 is the counterfactual GIC of the interested change, and the second component is the residual.

Based on equation 2.1 (even though they specifically do not use the same notation), several decomposition analyses are found in the empirical literature that led for significant development of the decomposition techniques. Among them, some seminal contributions are from Juhn et al. (1993), Dinardo et al. (1996), Bourguignon et al. (2008), Machado and Mata (2005) and Fortin et al. (2011). All these estimation techniques bear the roots of the Blinder-Oaxaca decomposition technique which decomposes the changes in wage income due to the changes in earning characteristics, returns to these characteristics and to residual. Ferreira (2010) provides a detailed discussion on the development and application of these techniques in analysing changes in poverty and economic growth.

Nguyen (2006), De Silva 2013, Kumara (in print) recently applied the MM decomposition techniques in decomposing household consumption expenditure into two components i.e. a component due to the changes in household characteristics and a component due to the returns to these characteristics with an inequality focus. This study applies MM and FLF⁶ in identifying the sources of the recent reduction of poverty in Sri Lanka.

⁶ The estimation procedures of these two techniques will be discussed in detail in the methodological section of this study

2.4 Determinants of poverty

Poverty profiles are useful in understanding the extent and characteristics of the poor, yet poverty profiles fail to identify the determinants of poverty, which is required for making policies for poverty reduction, due to the bivariate nature of information (Haughton and Khandker 2009; Simler et al., 2004). Bivariate relationships indicated by poverty profiles are misleading due to their unconditional nature (Datt and Jolliffe, 2005). Due to the complex nature of poverty, the effect of a variable on poverty is conditional on many other variables (Coulombe and Makay, 1996). Therefore a multivariate analysis is necessary for understanding the determinants of poverty. Glewwe (1991) proposed that regressing household consumption expenditure as a proxy of utility on several household and community characteristics⁷ could identify the possible determinants of poverty. Following his theoretical presentation, a vast body of literature on the determinant of poverty was developed for different countries and contexts (Khudri and Chowdhury, 2013; Achia et al., 2010; Datt and Jolliffe, 2005; Simler et al., 2004; Mukherjee and Benson, 2003; Grootaert, 1997; Coulombe and Makay, 1996). Based on Glewwe's theoretical presentation, two major estimation approaches of determinants of poverty can be identified (Haughton and Khandker 2009) which estimate determinants of household consumption expenditure (a proxy for social welfare) and determinants of poverty (Datt and Jolliffe, 2005).

Indirectly analysing determinants of poverty uses household income or household consumption expenditure as a proxy of utility and regresses it on several household and community characteristics. Household consumption expenditure is preferred to household income as household consumption expenditure is more accurately estimated than the income (Coulombe and Makay, 1996), household consumption expenditure is a direct measure of welfare and is smooth over the life cycle (Duclos and Araar, 2006; Deaton,

⁷ Glewwe (1991) included household composition variables, regional dummies, physical assets owned by the households, human capital and community characteristics as independent variables in his model.

1997), and income is highly subject to underreporting due to the seasonal and unrecorded income sources of developing countries (Heltberg, 2003) and consumption captures the attained welfare while income captures the potential welfare (Atkinson, 1991).

Instead of analysing determinants of poverty indirectly by analysing the determinants of household consumption expenditure, determinants of poverty can be directly analysed by using a binary variable for poverty status (1 for poor and 0 otherwise) as the dependent variable (Khudri and Chowdhury, 2013; Achia et.al, 2010; De Silva, 2008; Bogale et al., 2005; Geda et al., 2005; Minot and Baulch, 2005; Grootaert, 1997; Coulombe and Makay, 1996; Rodriguez and Smith, 1994). The pioneering work of Diamond et al. (1990) suggests that the multinomial logit model can be applied to estimate the probability of belonging to a certain income group conditional on several household characteristics and personal characteristics.⁸ They divide the total sample into five income classes and employ multinomial logit estimation⁹ for generating the probability of being selected for these income classes. When the dependent variable is a binary variable i.e. poor and non-poor, this method automatically becomes a binary logit model (Grootaert, 1997).

OLS assumes continuous distribution of the dependent variable, hence OLS cannot be employed with the direct method due to the fact that the dependent variable is binary, and either logit or probit estimation provides a neat solution (Rodriguez and Smith, 1994). Analysing determinants of household consumption expenditure assumes the effect of determinants of household consumption expenditure (hence poverty) is the same along the distribution of consumption, which is not realistic. This problem can be solved by analysing the determinants of poverty directly using logit or probit models (Rodriguez and Smith, 1994). However, the employment of logit and probit models in estimating determinants of poverty is criticized for treating all the people above the poverty line

⁸ They include demographic characteristics, human capital related variables and labour force participation as dependent variables in their model

⁹ However, either logit or probit estimation can be employed in this kind of research (Grootaert, 1997)

(rich) the same and all the people below the poverty line (poor) the same, and due to the arbitrariness of the poverty line (Datt and Jolliffe, 2005; Simler et al., 2004), and the level regressions can be estimated consistently under weaker assumptions (Ravallion, 1996).

Nevertheless, Grootaert (1997) argues that level regression imposes assumption of constant parameters over the distribution of independent variables, thus the impact of education, health, assets and other household characteristics on welfare is the same. Therefore, there is no difference in the effect of these variables on the welfare of poor and rich people. But in reality, returns to these characteristics differ between rich and poor (Grootaert, 1997). Hence the use of logit and probit analysis in analysing determinants of poverty will generate better results than level regressions by estimating the real effect of independent variables on welfare.

Estimation of determinants of poverty using the direct method is a two-step process: first, a household is defined as poor or not poor using a measure of welfare; second the defined binary variable is regressed on several regional, community, household and individual level variables as do with the household consumption expenditure based approach. The most used approach of defining household as poor and non-poor is the monetary approach to poverty (Jan et al. 2008; Bogale et al., 2005; Muller, 2003). But Most of the poverty researchers now agree that poverty is a multidimensional phenomenon (Duclos et al., 2006, Bourguignon and Chakravarty, 2003). However, only few studies define households as poor and non-poor according to the multidimensional approach (Khudri and Chowdhury, 2013; Achia et al., 2010, Mok et al., 2007) mostly due to the non-availability of a standard technique to estimate multidimensional poverty.

Chapter 3

Methodology and data

This study applies both monetary and multidimensional approaches to measuring poverty in analysing poverty in Sri Lanka. In estimating monetary poverty, the standard Foster Greer Thorbecke (1984) (FGT) indexes, namely poverty headcount, poverty gap and squared poverty gap indexes are estimated. Multidimensional counterparts of the FGT poverty measures (multidimensional poverty incidence, intensity and acute multidimensional poverty indexes) are estimated using the standard Alkire and Foster (2009, 2011) (AF) approach to multidimensional poverty. Polychoric Principal Component Analysis (PPCA) is applied in developing alternative weights and dimensions for the Alkire-Foster estimation method of multidimensional poverty. Decomposition of reduction of poverty is achieved by using Machado and Mata, and Fortin, Lemieux and Firpo decompositions techniques. Determinants of poverty are analysed using quantile, logit and probit regression techniques. Household Income and Expenditure Survey (HIES) 2006/07 and 2009/10 of Sri Lanka are the main data source of this study. HIES is a national sample survey of nearly 20,000 households. Household data gathered by the author is also used in analysing poverty in estate areas which is around 300 households. The following subsections will discuss how these methods and techniques are applied in this study and the data sources of the study.

3.1 Foster Greer Thorbecke measures of one-dimensional poverty

Following the notation of Foster et al. (1984, pp. 761-763), estimating one dimensional poverty can be defined as follows:

Let $y = (y_1, y_2, \dots, y_n)$ be a vector of household income in increasing order and suppose that $z > 0$ is the predetermined poverty line. Where $g_i = z - y_i$ is the income shortfall of the i^{th} household, $q = q(y; z)$ is the number of poor households (whose income falls below the poverty line z) and $n = n(y)$ is the total number of households. Poverty measure P can be defined as

$$P(y; z) = \frac{1}{nz^2} \sum_{i=1}^q g_i^2. \quad (3.1)$$

In line with Sen (1976), Foster et al. (1984) also measure poverty by taking the normalized weighted sum of the income shortfall of the poor. However, in the Foster et al. (1984), deprivation depends on the distance between the actual income of the poor household and the poverty line. The FGT method satisfies the two poverty axioms proposed by Sen (1976, 1979), namely monotonicity and transfer axioms.¹⁰

Introducing the poverty aversion parameter (α) to equation (3.1), Foster et al. (1984) develop the FGT class of poverty measures, which is denoted by

$$P_\alpha(y; z) = \frac{1}{n} \sum_{i=1}^q \left(\frac{g_i}{z} \right)^\alpha, \quad (3.2)$$

where $\alpha \geq 0$, α is called the poverty aversion parameter because larger values of α gives greater emphasis to the poorest of the poor. By setting $\alpha = 0, 1$ and 2 , the standard FGT poverty measures can be generated. When $\alpha = 0$, it generates the poverty headcount index which measures the incidence of poverty, when $\alpha = 1$, it generates the poverty gap index

¹⁰ Monotonicity axiom: given other things, a reduction in the income of poor household must increase the poverty measure. Transfer axiom; given other things, a pure transfer of income from a poor household to any other household that is richer must increase the poverty measure.

which measures the depth of poverty and when $\alpha = 2$, it generates the squared poverty gap index which measures the severity of poverty.

The above poverty measures are estimated on the basis of sample estimations, hence checking the statistical validity of observed estimates should improve the validity of results. Kakwani (1993) proposes a way of testing the statistical significance of observed poverty estimates of a sample and comparison between poverty figures estimated using two independent samples. Following Kakwani (1993, p. 634) the testing of the hypothesis of individual statistical significance and comparison of poverty figures estimated using two independent samples can be defined as follows.

Suppose that P_α is a FGT class poverty measure and n is the sample size, then $\sqrt{n}(\hat{P}_\alpha - P_\alpha)$ is asymptotically normally distributed with zero mean and variance $\sigma^2(P_\alpha)$. If $\hat{\sigma}^2(P_\alpha)$ is a consistent estimator of $\sigma^2(P_\alpha)$, then $\hat{\sigma}^2(\hat{P}_\alpha)/\sqrt{n}$ is called the standard error of $\hat{P}_\alpha$ which is denoted by $SE(\hat{P}_\alpha)$, hence

$$t = \frac{(\hat{P}_\alpha - P_\alpha)}{SE(\hat{P}_\alpha)}. \quad (3.3)$$

Further, suppose that $\hat{P}_{\alpha 1}$ and $\hat{P}_{\alpha 2}$ are estimates of poverty measure P_α computed using two independent samples of n_1 and n_2 respectively and let $\hat{\sigma}_1^2$ and $\hat{\sigma}_2^2$ be the sample estimators of the variances of the asymptotic distributions of $\sqrt{n_1}\hat{P}_{\alpha 1}$ and $\sqrt{n_2}\hat{P}_{\alpha 2}$ respectively, then the standard error of $(\hat{P}_{\alpha 1} - \hat{P}_{\alpha 2})$ will be

$$SE(\hat{P}_{\alpha 1} - \hat{P}_{\alpha 2}) = \sqrt{\frac{\hat{\sigma}_1^2}{n_1} + \frac{\hat{\sigma}_2^2}{n_2}}. \quad (3.4)$$

And the test statistic will be,

$$\eta = \frac{\hat{P}_{\alpha 1} - \hat{P}_{\alpha 2}}{SE(\hat{P}_{\alpha 1} - \hat{P}_{\alpha 2})}. \quad (3.5)$$

Then, η can be used to test the null hypothesis that the observed poverty differences are statistically significant.

3.2 Alkire-Foster measures of multidimensional poverty

Following the UNDP (2010), multidimensional poverty headcount can be estimated as follows:

$$MHI = \frac{q}{n}, \quad (3.6)$$

where q is the number of people who are multidimensionally poor and n is the total population. ID shows the proportion of weighted indicators (d), in which on average, poor people are found to be lack and can be calculated as follows:

$$ID = \frac{\sum_{i=1}^d c_i}{qd}, \quad (3.7)$$

where c is the total number of weighted deprivations experience by the poor and d is the number of indicators applied (10 in this study). It should be noted that weighted deprivations are summed and divided by the total number of indicators only for the poor households.

Alkire and Foster (2009, 2011) and subsequently Alkire and Santos (2010) elaborate the calculation procedure of the MPI as follows: Let $y = [y_{ij}]$ denote a matrix of achievements where i = person, j = dimension. Each row vector gives an individual i^{th} achievement in different dimensions, while each column vector gives distribution of j^{th}

dimension across different individuals. The MPI calculation procedure allows the assigning of different weights to different dimensions, and therefore the weighting vector is defined as $w = w_j$. The sum of weights is equal to the total number of dimensions (d) given as $\sum_{j=1}^d w_j = d$. Applying the dual cut-off procedure to identify the poor, the MPI uses a ‘within dimension cut-off’ and an ‘across dimension cut-off’. The households that are found to be deprived of any dimension are identified in the first step. In the procedure, let $z_j > 0$ be the poverty line (deprivation cut-off or first cut-off) in dimension j . Then $g^0 = [g_{ij}^0]$ denotes a matrix of deprivations, which is defined by $g_{ij}^0 = w_j$ when $y_{ij} < z_j$. From matrix g^0 , $c_i = \sum_{j=1}^d g_{ij}^0$, and a column vector is constructed, which represents the sum of weighted deprivations suffered by person i . After that, applying the second cut-off (k), multidimensional poor are identified.

Alkire and Santos (2010, p.10) explains the identification procedure more formally as follows: let $\rho: R_+^d \times R_+^d \rightarrow \{0,1\}$, ρ_k be the identification function that maps from person i 's achievement vector $y_i \in R_+^d$ and cut-off vector z in R_+^d to an indicator variable. $\rho_k = 1$ when $c_i \geq k$ and $\rho_k = 0$ when $c_i < k$, which means that a person to be considered as multidimensionally poor, his or her weighted deprivation should be greater than k . Then, censored matrix $g^0(k)$ is constructed from g^0 by replacing its i^{th} row with a vector of zeros, whenever $\rho_k = 0$ this matrix contains weighted derivations of all persons who have been identified as poor and excludes deprivations of non-poor. The MPI is simply the mean of the matrix $g^0(k)$, that is $MPI = \mu(g^0(k))$ where μ denotes the arithmetic mean. In essence, the MPI is the weighted sum of the deprivations experienced by the poor, divided by the total population, multiplied by the total number of deprivations considered. In other words, MPI is the multiplication of multidimensional poverty headcount (MPH) and average deprivation share (ID) among the poor.

Following Alkire and Santos (2010), this study uses ‘health’, ‘education’ and ‘living standards’ as the dimensions of the MPI when the standard AF method is applied. Alkire and Santos (2010) have chosen three dimensions based on participatory exercises,

enduring consensus, relevant theories and data availability. These three dimensions are similar to the three dimensions of the Human Development Index. The dimensions, indicators and their cut-off points of the standard AF method are shown in Table 3.1.

Table 3.1: Dimensions, Indicators, Cut-offs and Relevance to MDGs

Dimension	Indicator	Cut-off (poor if.....)	Related to
Education	Child enrolment	School aged child is not attending school (grade 1 to 8)	MDG 2
	Primary Schooling	No one has completed at least grade 5	MDG 2
Health	Chronically ill	Household member is chronically ill	MDG 6
	Hospitalized	Household member was hospitalized within the last six months	MDG 6
Standard of living	Electricity	Household has no access to electricity	
	Sanitation	Sanitation facility of the household is not improved or shared with others	MDG 7
	Water	Household has no access to clean water (as defined by the MDG) or walks more than 30 min. to get clean water	MDG 7
	Floor	Household has mud or cow dung floor	
	Cooking fuel	Household uses firewood, sawdust or paddy husk as cooking fuel	MDG 7
	Assets	Household does not own at least two of the following, radio, TV, telephone, bicycle or motorcycle or tractor	

Source: adapted from Alkire and Santos (2010)

The three dimensions are estimated on the basis of ten indicators, two each to calculate the health and education dimensions, and the remaining six to calculate the living standards dimension. This study applies ‘years of schooling’ and ‘child enrolment’ as the indicators for the education dimension, and access to ‘cleaner cooking fuel’, ‘sanitation’, ‘water’, and ‘electricity’, ‘type of house floor’, and ‘assets availability’ as the indicators for the ‘living standards’ dimension.

In the health dimension, whether the household has a chronically ill member and whether someone from the household was hospitalized during the last six months are used

as the two proxies for ‘nutrition’ and ‘child mortality’ indicators. The significance of good health for wellbeing of the people is emphasized by the three MDG goals, namely Goals 4, 5, and 6. Those who are ill or disabled may not be fully economically active, limiting their earning capacity (Andren, 2001; Bloom et al., 2004) and ability to make economic decisions. Furthermore, they tend to have less education, and they have to bear the cost of treatments for their lifetime, thus trapping them in poverty (van Agt et al., 2000; Oxford Health Alliance, 2005). Being sick may affect a person’s working life, social life, lifestyles as well as emotional aspects (Vingard et al., 2004; Hansen, 2000). Although these two proxies may not fully capture the health deprivations of the household, these two variables are the best available proxies in the HIES 2006/07, and 2009/10.

Whether someone in the household has ‘at least five years of school education’, and ‘all children of school age are attending school’ are the indicators used to calculate the education dimension. School education can be a proxy for the knowledge and understanding of the household. A higher education (literacy, numeracy and understanding) boosts the functioning of the household (UNESCO, 2002, 2003; Wedgwood, 2007; Boissiere et al., 1985). The importance of education in poverty reduction is also highlighted by the MDG goal 2 on education. If a child is not attending school, all the members of the household are considered as deprived of the indicator. A school aged child is defined as a child who is between age 5 and age 12 (grade 1 to grade 8 in Sri Lanka).

Access to ‘clean drinking water’, ‘improved sanitation’, ‘clean cooking fuel’, and ‘electricity’ and ‘type of flooring material’, and ‘assets ownership’ are the six indicators applied for the ‘living standards’ dimension. Even though these are means, they are directly connected to the functionings of the households. Access to clean drinking water, sanitation, clean cooking fuel, and better flooring material are related to better health. Clean cooking fuel prevents respiratory diseases, which is a cause for preventable death

and better environment at home. Electricity provides a safer means of lighting, makes households independent and mobile at night, and gives access to safer food through refrigeration. Moreover, the application of these indicators to measure living standards is also well justified by MDG 7.

A household is identified as poor with regard to 'access to clean water' if they drink water from a river, tank, and stream or from an unprotected well or if they have to walk for more than 30 minutes to get clean water. If a household shares the toilet or if they use a pit type toilet or if they do not have toilet facilities, the particular household is identified as poor in relation to 'access to improved sanitation'. If a household uses firewood, sawdust or paddy husks, as the major source of cooking fuel, that household is identified as poor with respect to 'access to clean cooking fuel'. A household is considered as poor in terms of 'access to electricity' if they do not have electricity at home. If the type of flooring material is mud or cow dung, that household is identified as poor with regard to 'improved flooring'. Finally a household is defined as poor in relation to 'assets' if the household does not own at least two of the following: radio, television, telephone, bicycle, motorcycle, or tractor.

Relative weights assigned to the indicators are chosen on the basis of value judgments and could "represent the enduring importance of a capability relative to the other capabilities or the priority of expanding one capability relative to the others in the next phase" (Alkire and Santos, 2010, p.18). Choosing weights could be done through the participatory approach, survey questions, or public debate. However, there should be a consensus among relevant communities (Sen, 1996; Alkire and Santos, 2010). The MPI assigns equal weights to all the dimensions, thus $1/3$ for each. The indicators for the health and education dimensions have the same weights ($1/6$) and the indicators for the living standards dimension have $1/18$.

The poverty cut-off suggested by Alkire and Santos (2010), which is 30 per cent ($k = 3$) of the total value of weighted indicators, is applied in this study. This is an

intermediate criterion, which aims at overcoming the problems of the union and intersection criteria. A household is multidimensionally poor if the total value of weighted deprivations sums up to 30 per cent. The indicators for the health and education dimensions are weighted at $1/6$ of 10, thus 1.67 for each, and the indicators for the living standards dimension are weighted at $1/18$ of 10, thus 0.55 for each. Therefore, if a household is found to be deprived of any two indicators associated with the 'health' or 'education' dimensions, or all the six indicators for the 'living standards' dimension, the household is identified as multidimensionally poor. Furthermore, a household is also identified as multidimensionally poor if a household is found to be deprived of a combination of one 'health' or 'education' indicator and three 'living standards' indicators.

3.3 An alternative approach to select dimensions and to allocate weights

This study also introduces an alternative approach to allocate weights and to select dimensions. First it uses the Polychoric Principal Component Analysis (PPCA) to find the important dimensions of multidimensional poverty. Secondly, it incorporates the selected dimensions into the MPI using the Alkire and Foster Aggregation method. In applying the Alkire and Foster aggregation method, two different weighting methods are examined, namely arbitrary equal weights and data driven statistical weights.

(a) Selection of dimensions

The main difficulty found in operationalizing the capability approach is how to select the set of dimensions (components) that best describe the situation of the poor and leads to better policy making for alleviating poverty (Alkire, 2007). Sen himself did not list the possible candidates for the dimensions though he emphasized a few areas like health and education. Nussbaum (2000) attempted to make a general list of dimensions that should be used in multidimensional poverty measurements and similar attempts were

made by Alkire (2002), Desai (1995) and Qizilbash (1998). All of these lists indicate similar essential capabilities which include health, nutrition and education (Laderchi et al. 2010).

Alkire (2002) argues that keeping the list of possible dimensions open was a deliberate act by Sen to provide room for the researcher to decide what is important in a particular country's context. This argument claims that having a universal list of essential dimensions is not only a difficult task but also misguided, because different circumstances exist in different socio-economic backgrounds. Moreover, as Ravallion (2010) argued, there can be no practical application of the proposed index for policy development if it does not describe the local realities. Therefore, this study proposes a kind of Principal Component Analysis (PCA) to select the suitable dimensions for a specific country. Therefore, the relevant dimensions are selected based on a data driven method and local realities are considered in determining the dimensions.

Principal Component Analysis is a standard multivariate technique of dimensional reduction developed in the beginning of the 20th century (Kolenikov and Angeles, 2009; Pearson, 1901; Hotelling, 1933). The PCA reduces the dimensionality of a data set while extracting the important information and generating a new set of orthogonal variables. These new variables are called principal components and they display the pattern of similarity of the observations.

The central idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of a large number of interrelated variables, while retaining as much as possible of the variation present in the data set. This is achieved by transforming to a new set of variables, the principal components (PCs), which are uncorrelated, and which are ordered so that the first few retain most of the variation present in all of the original variables (Jolliffe, 2002, p. 1).

As explained by Jolliffe (2002, pp 1-6), if $\mathbf{x}$ is a vector of p random variables and the structure of the covariances or correlations between the p variables are of interest, it would not be easy to look at all the variances and correlations unless the p is small or the

structure is simple. An alternative way is to look for a few variables that preserve most of the information of $\mathbf{x}$. In the process, the first step is to look for a linear function $\alpha'_1 \mathbf{x}$ of the elements of $\mathbf{x}$ having the maximum variance, where α_1 is a vector of p constants.

$$\alpha'_1 \mathbf{x} = \alpha_{11}x_1 + \alpha_{12}x_2 + \cdots + \alpha_{1p}x_p = \sum_{j=1}^p \alpha_{1j}x_j. \quad (3.8)$$

Next, define a linear function $\alpha'_2 \mathbf{x}$, uncorrelated with $\alpha'_1 \mathbf{x}$ having maximum variance and so on. So that at the k^{th} stage a linear function $\alpha'_k \mathbf{x}$ is found and it has the maximum variance subject to being uncorrelated with $\alpha'_1 \mathbf{x}$, $\alpha'_2 \mathbf{x}$, ..., $\alpha'_{k-1} \mathbf{x}$. The k^{th} derived variable, $\alpha'_k \mathbf{x}$ is the k^{th} PC. Up to p PCs could be found, but it is hoped, in general, that most of the variation in $\mathbf{x}$ will be accounted for by m PCs, where $m \ll p$.

The classical PCA was developed for the analysis of quantitative data and assumed that input variables are multivariate normal (Qian et al, 1994; Kolenikov and Angeles, 2009). But most of the data required for the analysis of multidimensional poverty are discrete in nature. Discrete data do not hold the multivariate normality assumption. Therefore, classical PCA cannot be applied to the categorical data. Application of discrete data for factor analysis generates wrong conclusions and biased estimates for the factor loadings (Olsson, 1979). Other than not holding the assumption of multivariate normality, discrete data tend to have high skewness and kurtosis (Kolenikov and Angeles, 2009). The major concerns regarding the use of discrete data in multivariate analysis are discussed by Bollen and Barb, 1981; Johnson and Creech, 1983; Babakus et al., 1987; Dolan, 1994; Di Stefano, 2002).

To overcome the problems related to using discrete data for PCA, Filmer and Pritchett (2001) proposed to have dummy variables for each category of the discrete variable (this is known as the Filmer – Pritchett procedure). The use of dummies for PCA is motivated by the use of individual dummies for categorical variables in the regression

analysis. The method produced several studies using discrete variables for PCA in assessing the socio-economic status including some publications from the World Bank i.e. Gwatkin et al., 2003a, 2003b (Kolenikov and Angeles, 2009). However, according to Kolenikov and Angeles (2009) use of dummies in PCA can generate spurious correlations. The categorical dummies produced for the same variable are negatively correlated. Then PCA needs to take into account both the (usually) positive correlations among observed variables and negative correlations among the dummies for the same variable. Therefore PCA may not be able to generate correct results due to the fact that greater variability observed could be from the spurious correlations. On the other hand, the Filmer–Pritchett procedure loses all the ordinal information of a discrete variable i.e. primary education, secondary education, tertiary education etc. Availability of ordering information makes PCA efficient (see Kolenikov and Angeles, 2009 for a detailed analysis on weakness of using dummies in PCA).

Overcoming the above problems, Kolenikov and Angeles (2009) introduce the Polychoric Principal Component Analysis (PPCA) for analysing the discrete variables. They propose to create polychoric correlation matrixes for discrete variables and then to use these matrixes for the PCA. Maximum likelihood estimation is applied for generating the polychoric correlation matrix.

The estimation method of the polychoric correlation matrix is explained in Kolenikov and Angeles (2009, pp. 135-137) as follows, suppose ordinal variables y_1 and y_2 are obtained by categorizing y_1^* and y_2^* with distribution

$$\begin{pmatrix} y_1^* \\ y_2^* \end{pmatrix} \sim N \left(0, \begin{pmatrix} 1 & \rho \\ \rho & 1 \end{pmatrix} \right), -1 \leq \rho \leq 1. \quad (3.9)$$

The categorizing thresholds for the two variables are given by $\alpha_{1,0} = -\infty < \alpha_{1,1} < \dots < \alpha_{1,d_1-1} < \alpha_{1,d_1} = \infty$, $\alpha_{2,0} = -\infty < \alpha_{2,1} < \dots < \alpha_{2,d_2-1} < \alpha_{2,d_2} = \infty$, so

that $y_i = k$ when $\alpha_{i,k-1} < y_i^* \leq \alpha_{i,k}$, $i = 1, 2$. Assuming that observations are i.i.d., the likelihood can be written as

$$L(\rho\alpha) = \prod_{i=1}^N \prod_{m=1}^{d_1} \prod_{l=1}^{d_2} \pi(m, l; \rho, \alpha)^{I(x_{i,1}=m, x_{i,2}=l)}$$

$$= \prod_{i=1}^N [\pi(y_{i,1}, y_{i,2}, \rho, \alpha)], \quad (3.10)$$

$$\ln L = \sum_{i=1}^N \ln \pi(y_{i,1}, y_{i,2}; \rho, \alpha). \quad (3.11)$$

Maximizing over ρ and α , obtains the polychoric correlation of y_1 and y_2 . Since the estimation is a maximum likelihood, “it is consistent, asymptotically normal, and asymptotically efficient, as the regularity conditions for those properties can be verified to hold” (Kolenikov and Angeles, 2009, p. 137).

As explained above, when there are two discrete variables, the polychoric correlation matrix is generated while the polyserial correlation matrix is generated between discrete and continuous variables. When two continuous variables are available, the usual Pearson’s correlation matrix is generated. When relevant correlation matrixes are generated, the usual PCA is applied to a combination of these matrixes.

Once the PPCA is performed, the number of dimensions is determined according to the standard way of component selection in a PCA which is known as Kaiser’s rule (Jolliffe, 2002). The components that have eigenvalues of more than one are selected as the number of dimensions relevant to the context studied. When the relevant dimensions are determined, then these dimensions are named based on the variables included in the particular dimensions. The selection of variables for a particular dimension is determined according to the contribution of each variable to the component. In other words, the squared component loadings are ranked from highest to lowest and then the first few

variables with higher values are selected as the variables for the given dimension. The procedure is well explained in the empirical application of Chapter 4.

(b) Allocation of weights

Allocating weights for different dimensions is necessary for the Alkire-Foster aggregation method. This study applies two weighting methods in aggregating the different dimensions into one index, namely normative equal weights (weighting method proposed by the AF method) and data driven weights generated by principal component analysis. Alkire and Foster (2009, 2011) and subsequently Alkire and Santos (2010) originally applied arbitrary equal weights for all the dimensions. As they had three dimensions, they allocated 1/3 for each dimension and after that the weight of a dimension was equally distributed among the indicators of that dimension. Therefore, if the weighting vector is defined as $w = w_j$, the sum of weights is equal to the total number of dimensions (d) given as $\sum_{j=1}^d w_j = d$. This weight is used in counting the number of deprivations faced by the poor.

Generating weights by using Principal Component Analysis (PCA) is one of the most common data driven weighting methods in multidimensional poverty analysis. The eigenvalue of a component is equal to the squared component loadings of this component. Therefore, the contribution of a specific variable to the component is the squared component loading of the specific variable which can be denoted as follows,

$$ctr_{i,l} = f_{i,l}^2, \quad (3.12)$$

where i = variable, l = component. The value of contribution is between 0 and 1 and the sum of total contribution is equal to 1. Component loadings of the selected first 6 components of this study are given in Table 3.2.

Table 3.2: Component loadings of the selected components using HIES 2007 and 2010 data

Variable*	Component 1	Component 2	Component 3	Component 4	Component 5	Component 6
the	0.34224	0.13966	0.16462	0.01899	0.10474	0.02084
thw	0.19607	0.28491	0.11356	0.04391	0.09741	0.21646
thr	0.14192	0.36952	0.26818	0.00395	0.10693	0.12152
sdw	0.01235	0.27842	0.36796	0.07327	0.35139	0.25494
ddw	0.06925	0.02021	0.01153	0.01912	0.22476	0.79134
toa	0.22498	0.38867	0.02613	0.04165	0.18182	0.00845
tot	0.16982	0.25925	0.06572	0.01376	0.18014	0.10248
msl	0.26263	0.23372	0.07451	0.03185	0.09270	0.01003
msf	0.29844	0.27995	0.00027	0.11384	0.08219	0.00282
dds	0.22364	0.18767	0.34662	0.08635	0.02581	0.10926
lps	0.09038	0.11271	0.19939	0.02561	0.04877	0.21944
dmf	0.16757	0.19283	0.33840	0.01308	0.08314	0.15263
dpo	0.22124	0.18407	0.33282	0.04582	0.00422	0.00171
dba	0.01020	0.25506	0.31650	0.03419	0.03454	0.03708
apg	0.33188	0.08501	0.12477	0.10462	0.00930	0.09731
apl	0.30702	0.17493	0.18299	0.11245	0.01040	0.06262
apw	0.23681	0.29069	0.32778	0.09587	0.21473	0.01764
hos	0.25902	0.01275	0.14367	0.69472	0.00577	0.00770
dis	0.17586	0.00025	0.12197	0.22169	0.70081	0.32867
chi	0.16100	0.00768	0.05123	0.62885	0.34823	0.16978
hef	0.24271	0.15985	0.00713	0.06591	0.10183	0.00735
rep	0.05647	0.03800	0.24890	0.01202	0.18161	0.02488

Source: Author's estimations using HIES 2007 and 2010 data, Note:* see table 4.1 for variable names

The squared component loadings of each variable of the first component is considered as the relevant weights of indicators in this study. A higher value of a component loading denotes that the variable contributes more to that component. Thus that variable is important in that component. Therefore, the squared component loading

value of a variable (indicator) can be used as the weight of that variable to the component (dimension). As explained in the previous paragraph, the weight to a dimension will be equal to the summation of the weights of all the variables of that dimension. This weighting method leads to different weights for different dimensions and is a data driven (based on the actual distribution of data) approach.

3.4 Decomposition of reduction of poverty

To identify the sources of reduction of poverty, this study employs a conventional decomposition method (Blinder – Oaxaca, OB) and its conditional quantile regression extension (Machado and Mata, MM) and unconditional quantile regression extension (Fortin, Lemieux, and Firpo, FLF). This section first explains the decomposition as it applies to average change in household consumption expenditure between the two survey periods, and second describes the two methods of quantile regression, and its application to the decomposition of change in household consumption expenditure.

The seminal work of Blinder (1973) and Oaxaca (1973) decompose the conditional mean wage distribution into differences in observable characteristics (covariate effect) and differences in returns to these characteristics (returns effect, including the differences in unobservable characteristics). The Blinder-Oaxaca decomposition technique has led to a vast literature on decomposition studies (Fortin et al., 2011).¹¹ The covariate effect is also termed as “explained component” due to the fact that counterfactual decomposition identifies this segment by the average changes of explanatory variables. The other component is termed as “unexplained component” due to the fact that the counterfactual decomposition explains it with the differences in estimated coefficients. The Blinder–Oaxaca decomposition technique further estimates the contribution from each covariate to the explained and unexplained components.

¹¹ Fortin et al., (2011) provides an extensive discussion on the development of decomposition analysis.

Following Blinder (1973) and Oaxaca (1973), the estimated change in household consumption expenditure between 2007 and 2010 can be decomposed as follows:

$$\ln y^{*2010} - \ln y^{*2007} = X^{*2007}(\beta^{2010} - \beta^{2007}) + (X^{*2010} - X^{*2007})\beta^{2010}, \quad (3.13)$$

where $\ln y$ is a measure of household welfare (household consumption expenditure in this study); X is a vector of regional, community, household and individual level characteristics for the i^{th} household, and β is a vector of coefficients. The asterisks denote mean or average. The first term on the right side is the component of change due to differences in coefficients $(\beta^{2010} - \beta^{2007})$, evaluated at the same set of average household characteristics X^{*2007} in this case the 2007. The second term is the change attributed to differences in average household characteristics $(X^{*2010} - X^{*2007})$ weighted by the 2010 returns structure.¹²

If there were no differences in returns to household characteristics between two survey periods, $\beta^{2010} = \beta^{2007}$ i.e. characteristics in two surveys periods gain similar returns, the first term will be zero, and the change between two surveys will be completely explained by differences in household characteristics in the two survey periods, $X^{*2010} - X^{*2007}$.

The Blinder-Oaxaca decomposition method is based on Ordinary Least Squares (OLS) regression. OLS assumes that the effect of the regressors does not differ along the conditional distribution of the dependent variable (household consumption expenditure in this study). For example, OLS assumes that the effect of schooling on household welfare is the same for the lower quantiles as well as for the upper quantiles. But the effect of education on household consumption expenditure can vary along the distribution of

¹² The decomposition may also be expressed in terms of average 2010 characteristics X^{*2010} and 2007 returns structure β^{2007} .

household welfare. Quantile regressions generate different models for different percentiles of the distribution of welfare and it provides a parsimonious way of describing the total distribution of welfare (Martins and Pereira 2004). The θ^{th} quantile of y_i conditional on $\mathbf{X}_i$ is given by

$$Q_{\theta}(y_i|\mathbf{X}_i) = \mathbf{X}_i\beta_{\theta}, \theta \in (0, 1), \quad (3.14)$$

where $i = 1, \dots, I$, the coefficient β_{θ} is the slope of the quantile line giving the effects of changes in X on the θ^{th} conditional quantile of y . As shown by Koenker and Basset (1978), the quantile regression estimator of β_{θ} solves the following minimization problem.

$$\beta_{\theta} = \arg \min \left[\sum_{i: y_i \geq X_i\beta} \theta |y_i - X_i\beta| + \sum_{i: y_i < X_i\beta} 1 - \theta |y_i - X_i\beta| \right]. \quad (3.15)$$

Analogous to the Blinder-Oaxaca decomposition in equation 3.13, Machado and Mata (2005) combine QR with a bootstrap approach and derive the following decomposition.

$$\begin{aligned} Q_{\theta}(y^{2010}) - Q_{\theta}(y^{2007}) &= [Q_{\theta}(X_i^{2007}\beta^{2010}) - Q_{\theta}(X_i^{2007}\beta^{2007})] + \\ &[Q_{\theta}(X_i^{2010}\beta^{2010}) - Q_{\theta}(X_i^{2007}\beta^{2010})] + \text{residual}. \end{aligned} \quad (3.16)$$

The first term on the right hand side is the change in household consumption expenditure due to the differences in coefficients (returns effect), and the second term is the change in household consumption expenditure due to the differences in characteristics (covariate effect) of the θ^{th} quantile between the two survey years. The residual term comprises the simulation errors and sampling errors and will disappear with more simulations and more observations. It is assumed that the model is correctly specified (Melly, 2005). The interpretation of the results of Machado and Mata (2005)

decomposition is similar to the Blinder-Oaxaca (1978) decomposition. The Machado and Mata (2005) decomposition is conducted at each percentile of the welfare distribution; hence, it shows the relative importance of covariates and coefficients in explaining the change along the distribution welfare.

Even though the Machado and Mata (2005) decomposition technique allows for the decomposition of the changes along the distribution of the welfare measure using quantile regression analysis, this technique fails to identify individual contribution of covariates to the explained and unexplained components of the change (as in the Blinder–Oaxaca mean decomposition).

Firpo et al. (2009) provide a new approach estimating quantile regression which is termed as “unconditional quantile regression analysis”. The conventional quantile regression analysis proposed by Koenker and Bassett (1978) will be termed as “conditional quantile regression analysis” hereafter to differentiate it with the unconditional regression analysis of Firpo et al. (2009).

Using the unconditional regression analysis, Fortin et al. (2011) propose a quantile regression decomposition technique (hereafter unconditional quantile regression decomposition) that allows for the decomposition of changes of outcome variable along the entire distribution of outcome variable which is also capable of identifying individual contribution of covariates to the explained and unexplained components as the Blinder-Oaxaca decomposition technique. Therefore this technique has an advantage compared to the other decomposition techniques such as DiNardo et al., (1996), Machado and Mata, (2005). Galego and Pereira (2013), Sakellariou, (2012), Chi et al. (2011) are some of the recent applications of unconditional quantile regression decomposition analysis. The unconditional quantile regression is based on the recentered influence function (RIF) of the dependent variable.

Following the notation of Galego and Pereira (2013), the decomposition procedure of unconditional quantile regression can be explained as follows. First derive

the RIF of the dependent variable (household consumption expenditure per capita, in this study). The RIF for the τ^{th} quantile is given by the following expression:

$$RIF(Y, q_\tau) = q_\tau + \frac{\tau - I(Y \leq q_\tau)}{f_Y(q_\tau)}, \quad (3.17)$$

where $f_Y(q_\tau)$ is the marginal density of Y at the point q_τ estimated by kernel methods; q_τ is the sample quantile; $I(Y \leq q_\tau)$ is an indicator function indicating whether the value of the outcome variable (household consumption expenditure in this study) is below q_τ . Firpo et al. (2009) demonstrate that the RIF provides a linear approximation to a non-linear functional ($v(Y)$) (e.g. median) of the Y distribution and thus allow computing partial effects for single covariates. They also show that the RIF quantile regression may be implemented by using a linear regression model (estimated by OLS) of the new dependent transformed variable on the covariates (X). In this study, considering two periods (2007 and 2010), RIF regressions for household consumption expenditure in both periods are estimated:

$$E[RIF(Y_{i \in g}; q_\tau) | X_{i \in g}] = X_{i,g} \beta_{\tau,g} \quad g = 2007, 2010. \quad (3.18)$$

Coefficients $\beta_{\tau,g}$ represent the approximate marginal effects of the explanatory variables on the quantile q_τ for households in periods $g = 2007$ and 2010 . In order to decompose the difference in household consumption expenditure between the two periods into the covariate effect and returns effect, it is also necessary to estimate the counterfactual household consumption expenditure distribution, that is, the distribution that we obtain combining the returns of period 2007 with the distribution of characteristics of period 2010. In the classical Blinder and Oaxaca decomposition this is estimated by $\bar{X}_{2010} \hat{\beta}_{2007}$ (where $\bar{X}_{2010}$ represents the covariates mean for period 2010).

According to Fortin et al. (2011), after estimating the RIF regressions for households in 2007 and 2010 and for the counterfactual household consumption expenditure distribution, decomposition of change in household consumption expenditure (similar to the Blinder and Oaxaca decomposition) for any unconditional quantile τ , can be achieved as follows:

$$\hat{\Delta}_O^\tau = \bar{X}_{2010}(\hat{\beta}_{\tau,2010} - \hat{\beta}_{\tau,2007}) + \hat{\beta}_{\tau,2010}(\bar{X}_{2010} - \bar{X}_{2007}). \quad (3.19)$$

$$\hat{\Delta}_O^\tau = \hat{\Delta}_S^\tau + \hat{\Delta}_X^\tau. \quad (3.20)$$

$\hat{\Delta}_S^\tau$ is the returns effect (change due to the differences in coefficients) and $\hat{\Delta}_X^\tau$ is the covariate effect (change due to the differences in covariates). Covariate effect can be further decomposed in terms of the sum of the contribution of each covariate as follows:

$$(\hat{\Delta}_X^\tau) = \sum_{k=1}^k (\bar{X}_{2010,k} - \bar{X}_{2007,k}) \hat{\beta}_{\tau,2007,k}. \quad (3.21)$$

This provides the detailed elements of the covariate effect in the same way as in the Blinder–Oaxaca mean decomposition. Similarly, the detailed elements of the returns effects can be computed, but as in the case of the mean, these will also be subject to the problem of the omitted group (Fortin et al., 2011). In order to test whether the effects of covariates are significant for the different elements of both the covariate effect and the returns effect, standard errors can be estimated by bootstrapping. Bootstrap standard errors of this study are computed considering 200 replications.

3.5 Determinants of poverty

After decomposing the overall change in household consumption expenditure into coefficients and covariates effects, it is important to see how household coefficients changed during the two periods. This will lead the way to identify which covariates were

important in reducing poverty in Sri Lanka. To achieve this objective, this section analyses the determinants of poverty in Sri Lanka during 2007 and 2010.

In analysing determinants of poverty this study applies two specifications for the dependent variable, first by defining the dependent variable according to the monetary approach and secondly by the multidimensional approach to poverty. The econometric estimation procedure of the monetary approach can be explained as follows. Let c_j be the household consumption expenditure per capita, x_j be a set of household and community characteristics and η_j be a random error term, then the simplest relationship can be given as:

$$\ln c_j = \beta' x_j + \eta_j. \quad (3.22)$$

Equation (3.22) is estimated using Ordinary Least Squares (OLS), Instrumental Variables (IV) or Quantile Regression (QR). Although the most direct methods of analysing determinants of poverty use OLS as the estimation technique, use of OLS is criticized mainly due to the assumption that the impact of determinants of poverty on household consumption expenditure is the same along the entire distribution of consumption (Grootaert, 1997). Due to this assumption, the model does not differentiate the poor from non-poor and puts them together in the analysis. But the actual effect of poverty determinants on household consumption expenditure could be different for poor people from non-poor (Grootaert, 1997). Two possible solutions are provided for this problem. The consumption expenditure based method of analysing determinants of poverty can be econometrically estimated using quantile regression techniques (Muller, 2003) or the determinants of poverty can be econometrically estimated using the direct approach which uses the binary dependent variable of poor or non-poor instead of consumption.¹³

¹³ The direct method of analysing poverty will be discussed in detail in the next section.

OLS regression assumes that the effect of the regressors does not vary along the conditional distribution of the dependent variable. For example, the effect of schooling on household welfare is assumed to be the same at the bottom of welfare distribution as it is at the top. If, however, these effects vary along the distribution of household welfare, quantile regressions, which yield models for different percentiles of the distribution, provide a solution by describing the whole distribution (Koenker, 2005; Martins and Pereira 2004; Muller, 2003). Some examples of application of the quantile regression approach in analysing determinants of poverty are found in De Silva (2013, 2008), and Muller (2003).

The econometric estimation of determinants of poverty using the direct approach (applying logit regression) can be defined as follows. Dependent variable of the direct approach is a binary variable which is equal to one when the achieved welfare level is below the poverty line and zero otherwise. Let P_j denote the probability of j^{th} household being defined as poor and probability distribution is defined as:

$$P_j(X) = \frac{e^{\alpha + \beta X}}{1 + e^{\alpha + \beta X}}, \quad (3.23)$$

where, X is a vector of possible determinants of poverty, α is a scalar and β is a row vector. The logit function to be estimated is given as:

$$\ln\left(\frac{P_j}{1-P_j}\right) = \alpha + \sum_i \beta_i + X_{ij}. \quad (3.24)$$

$\ln\left(\frac{P_j}{1-P_j}\right)$ provides the log likelihood a household fall below the poverty line, conditional on the poverty determinants (X s). Equation (3.24) can be estimated using the maximum likelihood method which does not require normality and homoscedasticity

assumptions (Mok et al., 2007) that are violated by the dichotomous dependent variable. The independent variables included in this specification are also the same as the independent variables of the consumption expenditure based specification (Khudri and Chowdhury, 2013; De Silva, 2008; Minot and Baulch, 2005; Grootaert, 1997; Coulombe and Makay, 1996; Rodriguez and Smith, 1994).

Regressors included in the both approaches are the standard dependent variables in this type of analysis (Datt and Jolliffe, 2005; Haughton and Khandker, 2009). Selecting the independent variables of a poverty determinant model needs to be done carefully as the independent variables should be exogenous of the current consumption expenditure (Haughton and Khandker, 2009; Mukherjee and Benson, 2003). Only exogenous variables should be included as the independent variables in a model of poverty determinants (Mukherjee and Benson, 2003). Three broader types of independent variables are mainly employed in analysing determinants of poverty in the literature (Haughton and Khandker, 2009) such as regional characteristics, community characteristics, and household and individual characteristics.

Regional level characteristics included in analysing determinants of poverty at the national level in this study are the variables for area (urban, rural or estate) of living and the province. Variables at community level includes distance to bus stop, access to electricity, access to piped water, distance to a financial institution, distance to primary school, distance to a health facility and distance to village officers' office. Household and individual level variables include household size (linear and squared), number of dependent members in the family, age of the household head (linear and squared), sex of the household head, ethnicity of the household head, employment status of the household head, education level of the household head, availability of a secondary job, availability of land, availability of household appliances, receiving remittances, has a chronically ill or disabled member, ownership of a house and sanitary facilities.

Due to the structural differences between the national sample and the estate areas, two regional level variables (area and province), ethnicity of the household head, availability of land and a house are excluded from the estate level specification, while living in a line house is introduced as a new variable. Estate areas in Sri Lanka are limited to some parts of a few provinces, especially towards the central hills. The estate workers are mainly Indian Tamils (at present they are called estate Tamils) and other ethnic groups rarely engage in providing labour for plantations (even though it is very rare, there are some instances that Sinhalese and Muslim ethnic workers also employed in estate areas due to marriages between these two ethnic groups). Therefore, these variables cannot be included in the estate level regressions. The estate workers traditionally do not own a house or land as housing facilities are provided by the respective plantation management. However, some ongoing programmes initiated recently provide a small area of land (around 5 perch) and the house for estate workers where the estate worker will have the sole ownership. The estate workers have been living in a housing type called line housing. The line housing system is built by the British and adjoins more than 10 rooms together and each household is given one room. Presently some changes to their housing conditions are taking place. Government and non-government organizations as well as plantation management provide individual houses for some of the estate workers (size of the house is increased and individual houses are provided). Therefore some households live in separate houses while others continue to live in line houses. Therefore this study includes living in a line house as an independent variable in estate areas.

Endogeneity of independent variables is a higher concern in poverty regressions. Regional and community characteristics, and the household head's age and sex are endogenous in the long run. Nevertheless, according to the Coulombe and Makay (1996), other than those endogenous variables, the all the variables employed in this study can be considered exogenous at least in the short run. Most of the previous studies employed the above set of variables as the independent variables in their econometric specifications

(see Haughton and Khandker, 2009 for a detailed discussion of the independent variables of poverty regression).

3.6 Data

This study applies Household Income and Expenditure Survey (HIES) data as the main data source. The author conducted primary data collection in estate areas of two districts of Sri Lanka and these data are also applied in analysing recent poverty changes. This subsection first discusses the HIES data and next the author's survey data in detail.

3.6.1 Household Income and Expenditure Survey data

Household Income and Expenditure Survey (HIES) 2006/07 and 2009/10 of Sri Lanka are the main data source of this study. The HIES is a national survey conducted once every five years (presently once every three years), starting from 1980/81 by the Department of Census and Statistics (DCS) of Sri Lanka under the Ministry of Finance and Planning.

The sample size of the HIES 2006/07 was 21,790 households and 19,958 households in 2009/10. The HIES is conducted for 12 months to account for seasonal variations. The two stage random sampling method is applied for the sample design. Urban, rural and estate areas are the domains of stratification (Department of Census and Statistics, 2009). The sample frame is generated from the list of households prepared for the population census of 2001. 2500 primary sampling units (PSUs) were first selected proportionate to the distribution of number of housing units and the standard deviation of the household expenditure in the previous HIES. Allocation of the samples among different areas (urban, rural and estate) were made according to the square root of the sizes of the selection domains (different areas). Each primary sampling unit was allocated with 10 housing units. The number of households within a primary sampling unit can be higher than 10 households, due to the fact that some housing units had more than one

household. However, the final sample sizes of both surveys were less than the targeted sample of 25000 households. Table 3.3 shows the sample distribution of HIES 2009/10 across districts and areas.

Table 3.3: Sample allocation of HIES 2009/10 over districts and areas

District	Housing units	%	District	Housing units	%
Colombo	3000	12.70	Batocilola	930	3.94
Gampaha	2030	8.59	Ampara	900	3.81
Kalutara	1663	7.04	Trincomalie	640	2.71
Kandy	1214	5.14	Kurunegala	1220	5.16
Matale	630	2.67	Puttalam	867	3.67
Nuwara Eliya	809	3.42	Anuradhapura	834	3.53
Galle	1622	6.86	Polonnaruwa	600	2.54
Matara	1368	5.79	Badulla	806	3.41
Hambantota	921	3.90	Moneragala	600	2.54
Jafna	750	3.17	Ratnapura	950	4.02
Vavuniya	444	1.88	Kegalle	833	3.53
Area	Housing units	%	Area	Housing units	%
Urban	6549	27.71	Estate	2026	8.57
Rural	15056	63.71	Sri Lanka	23631	100.00

Source: HIES 2009/10, Department of Census and Statistics of Sri Lanka Note: sample sizes are only for 22 districts. Some parts of the North and Eastern Provinces were excluded from the survey due to tension in the area.

The HIES micro data are widely used by poverty researchers, especially for the estimations of monetary poverty in Sri Lanka, and no major problems or inaccuracies have been reported (World Bank, 2005; World Bank, 2007). The survey gathers a wide range of socio-economic information at individual and household levels, such as information on households' demography, schooling, health, expenditure, income, debts, housing, access to facilities, and assets availability.

Table 3.4 shows the summary of the variables employed in the multidimensional poverty analysis using HIES data. Majority of households (43 per cent) of Sri Lanka have

junior secondary level of education while the next highest is the ordinary level followed by advanced level¹⁴.

Table 3.4: Data Summaries (%)

Indicator	2007				2010			
	Urban %	Rural %	Estate %	National %	Urban %	Rural %	Estate %	National %
Highest education level of the family								
No schooling	0.39	0.89	4.82	1.13	0.23	0.77	3.05	0.82
Some primary	3.71	4.32	22.65	7.07	3.96	5.32	21.39	6.36
Some junior secondary	35.67	44.20	57.73	43.33	35.09	44.55	58.01	43.44
Ordinary Level (O/L)	26.85	24.27	8.42	23.44	25.49	24.33	10.26	23.42
Advanced Level (A/L)	25.17	19.91	5.46	19.88	25.98	19.49	5.71	20.0
Graduate	8.22	4.86	0.93	5.35	8.43	5.55	1.5	5.95
Lighting source								
Kerosene	6.11	19.07	42.80	18.03	4.80	13.78	27.59	12.61
Electricity	93.63	78.60	55.87	80.25	95.18	84.11	71.43	85.93
Solar power	0.17	2.25	1.28	3.04	0.02	2.11	0.98	1.46
Drinking water								
Protected well	18.90	55.04	20.79	42.09	16.53	53.16	29.23	41.4
Unprotected well	0.63	6.46	7.43	5.09	0.70	3.96	5.65	3.24
Tube well	3.52	4.36	2.15	3.95	3.17	3.80	1.96	3.47
Pipe born	77.20	26.82	26.71	39.40	78.15	36.83	57.02	49.51
Stream/river/tank	0.60	5.03	38.10	6.99	0.21	0.84	3.34	0.89
Other	2.12	2.29	4.82	2.48	1.23	1.41	2.82	11.49
Toilet availability/type								
No toilet	4.04	3.63	8.19	4.16	1.16	2.81	4.32	2.51
Shared with others	9.67	6.09	23.87	8.63	10.91	6.54	22.41	9.07
Exclusively for family	86.29	90.28	67.94	87.71	87.94	90.65	73.27	88.42
Water sealed	95.70	93.53	95.70	95.70	97.68	96.22	94.32	96.45
Pit type	4.16	6.33	4.30	5.60	2.25	3.74	5.38	3.48
Floor type								
Cement	84.78	80.79	76.54	81.51	82.00	80.21	82.03	80.84
Terrazzo/tiles	12.09	5.63	0.52	6.77	15.19	7.85	0.80	9.18
Mud	1.53	11.21	22.18	9.81	1.56	8.79	16.30	7.53
Type of cooking fuel								
Firewood	44.77	84.57	96.97	75.78	48.23	85.66	96.83	76.75
Gas	43.15	13.07	1.63	19.52	40.24	12.06	1.79	18.61
Kerosene	10.89	1.48	0.17	3.71	10.13	1.18	0.29	3.47
Electricity	0.30	0.12	0.52	0.20	0.38	0.20	0.63	0.29
Sawdust/paddy husk	0.19	0.26	0.00	0.22	0.32	0.19	0.46	0.21
Assets ownership								
Radio	79.41	79.33	71.72	78.64	73.25	74.60	68.15	73.68
Television	81.11	75.14	60.00	75.23	84.41	78.31	66.01	78.85
Land phone	42.46	29.14	9.06	30.60	49.31	45.47	33.81	45.47
Mobile phone	44.18	28.24	12.60	30.77	71.83	58.70	38.71	60.43
Bicycle	43.51	46.57	13.24	42.71	42.22	45.01	12.56	41.45
Motorcycle	18.80	21.22	5.28	19.13	23.90	26.74	7.09	24.28
Health status								
Disabled	4.88	7.24	4.94	6.43	5.10	6.15	6.28	5.88
Hospitalized	0.47	0.71	0.64	0.65	0.44	0.49	0.46	0.47

Source: Author's compilation using HIES 2006/07 and 2009/10

¹⁴ See annex 3 for data summaries for Nuwaraeliya and Badulla districts

Less than one per cent of the total households report that none of the family members had gone to school in the recent survey at the national level. The distribution of educational achievements by area is the same as the distribution of national level, but the estate areas report that primary education is the second highest level of education, and more than three per cent had never attended school in both surveys. Access to electricity has improved from 80 per cent to 85 per cent within the two survey periods, which is significantly high in the urban areas. However, 43 per cent of the households in the estate areas do not have access to electricity in 2006/07 which has significantly decreased by 2009/10 (28 per cent).

Over 14 per cent of the total households have no access to clean drinking water in both survey years. Drinking water from streams, rivers or tanks was over 38 per cent in the estate areas in the first survey, which has also drastically reduced to 3.34 in the second survey. Over 75 per cent of the urban households have access to pipe born water while more than half of the rural households use water from protected wells. Less than three per cent of the total households do not have access to improved sanitary facilities in Sri Lanka. Similarly, the population without toilets is high in the estate areas though the rate reduced from 8 per cent to 4 per cent between the two survey periods. The type of toilets that households use is almost the same in all the areas while the usage of water sealed toilets is around 95 per cent of the total toilets availability.

More than one fourth of the households in Sri Lanka use firewood as the main source of cooking fuel while it is as high as 97 per cent in the estate areas. Usage of gas as a source of cooking fuel is 40 per cent in the urban areas, while it is significantly lower in the other areas. The use of cleaner cooking fuel slightly deteriorated between the two survey periods, and it is the only variable that worsened during the study period. Increased LPG gas price can be the main reason for this deterioration. Less than 8 per cent of the households still live on mud or other types of inferior floorings in Sri Lanka. Nevertheless, the usage of mud as a flooring material is more than 16 per cent in the

estate areas in the recent survey. Irrespective of the areas, around 75 per cent of the households have radios and televisions although the availability is relatively less in the estate areas.

The availability of telephones is more than 30 per cent in Sri Lanka while the availability is significantly high in the urban areas and notably low in the estate areas. Interestingly, the use of land phones and mobile phones increased by 50 per cent and 100 per cent respectively during the study period. The improvement is significantly high in the estate areas. The ownership of bicycles and motorcycles has the same trend as other assets. Around six per cent of the households in Sri Lanka have at least one household member who is disabled. Less than one per cent of the households in all the areas report that at least one member of the family was hospitalized within the previous six months.

Table 3.5 provides the summary statistics of the variables used in the regressions using HIES data.¹⁵

Log household consumption expenditure per capita of the estate areas is considerably lesser than the log household consumption expenditure per capita of the national level for both survey years. Nevertheless, the increase in household consumption expenditure per capita is higher in the estate areas between 2007 and 2010 therefore the difference in household consumption expenditure per capita between the urban and rural areas decreased in the recent surveys.

Access to household utilities as well as proximity to public services and markets improved in the latest survey for both samples. However, access to household utilities is significantly lower in the estate areas and the distance to public services and markets are longer for the estate areas. Household size and the number of dependents of the family are also decreased in national as well as in estate areas in the latest survey. Sex and age of the household head are stable between the two survey years.

¹⁵ See annex 4 for the summary statistics of the same variables at estate areas of Badulla and Nuwaraeliya districts.

Table 3.5: Summary statistics of the variables used for the regressions

Variable	HIES 2007				HIES 2010			
	National		Estate		National		Estate	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
LHCEPC*	8.31	0.57	7.96	0.46	8.71	0.54	8.43	0.46
Area: Urban is the reference								
Rural	0.66	0.47	-	-	0.65	0.48	-	-
Estate	0.09	0.29	-	-	0.09	0.28	-	-
Province: Western is the reference								
Central	0.13	0.33	-	-	0.11	0.31	-	-
Southern	0.19	0.40	-	-	0.18	0.38	-	-
Eastern	0.08	0.27	-	-	0.11	0.31	-	-
North Western	0.10	0.30	-	-	0.09	0.29	-	-
North Central	0.07	0.25	-	-	0.06	0.24	-	-
Uva	0.07	0.25	-	-	0.06	0.24	-	-
Sabaragamuwa	0.09	0.28	-	-	0.08	0.27	-	-
Distance to bus stop	0.46	1.00	0.94	1.31	0.50	1.18	1.00	1.40
Access to electricity	0.82	0.39	0.57	0.50	0.87	0.33	0.72	0.45
Access to clean water	0.85	0.35	0.50	0.50	0.88	0.32	0.58	0.49
Distance to a bank	3.28	4.53	5.68	5.40	3.43	4.48	6.18	5.52
Distance to primary school	0.94	1.61	1.46	1.72	0.90	1.46	1.44	1.76
Distance to a health facility	1.29	2.14	2.32	2.87	2.81	2.99	4.09	4.35
Distance to GN office	0.67	1.28	1.89	2.22	0.66	1.37	1.80	1.86
Household size	4.14	1.71	4.16	1.86	4.05	1.69	4.10	1.79
Household size squared	20.07	17.52	20.73	18.77	19.28	16.86	20.01	17.31
Number of dependents	1.35	1.18	1.44	1.32	1.27	1.15	1.30	1.27
Head's Age	50.48	13.86	48.73	13.65	50.77	14.06	49.51	13.48

Head's age squared	2740.17	1469.44	2561.07	1361.16	2775.12	1493.25	2632.80	1355.89
Male head	0.76	0.43	0.78	0.42	0.76	0.43	0.76	0.43
Head's ethnicity: Sinhala is the reference								
Tamil	0.15	0.36	-	-	0.19	0.39	-	-
Muslim	0.10	0.29	-	-	0.11	0.31	-	-
Head's employment: Public is the reference								
Private	0.33	0.47	0.57	0.49	0.31	0.46	0.52	0.50
Employer	0.02	0.15	0.00	0.05	0.02	0.14	0.00	0.05
Self employed	0.25	0.43	0.05	0.23	0.25	0.43	0.07	0.25
Family worker	0.00	0.06	0.00	0.05	0.00	0.06	0.00	0.04
Secondary jobs	0.25	0.43	0.55	0.50	0.22	0.41	0.52	0.50
Agricultural land	0.26	0.44	-	-	0.13	0.33	-	-
Household appliances	1.58	0.49	1.88	0.32	1.48	0.50	1.76	0.42
Remittances	0.13	0.33	0.11	0.31	0.14	0.35	0.14	0.35
Chronically ill or disabled	0.31	0.46	0.26	0.44	0.30	0.46	0.25	0.43
Head's education: No education is the reference								
Some primary	0.28	0.45	0.49	0.50	0.26	0.44	0.49	0.50
Some junior secondary	0.41	0.49	0.25	0.43	0.44	0.50	0.29	0.45
O/L passed	0.15	0.36	0.04	0.19	0.14	0.35	0.03	0.17
A/L passed	0.08	0.26	0.02	0.14	0.08	0.27	0.02	0.15
Tertiary	0.02	0.15	0.01	0.08	0.02	0.15	0.01	0.09
House owner	0.83	0.38	0.25	-	-	0.37	-	-
Sanitary facilities	0.87	0.33	0.68	0.47	0.88	0.32	0.73	0.44
Line house	-	-	0.68	0.47	-	-	0.62	0.49
Observations	18544		1722		19958		1736	

Source: Authors compilation using HIES 2006/07 and HIES 2009/10 data, * Logarithm of Household Consumption Expenditure Per Capita

Percentage of Tamil households in the latest survey increased substantially due to the enhanced mobility of Tamil people after ending of civil war. Education levels increased between the two survey years irrespective of the sample concerned. However, education levels of the estate areas are significantly lower than the education levels of the national average. Employment in the private sector is considerably high in the estate areas due to the fact the most of the plantations are currently owned by the private sector. Self-employment among the household heads is relatively high in the estate areas while almost half of the household heads in the estate areas engage in secondary job while only one quarter of the total population in Sri Lanka engaged in the secondary jobs.

3.6.2 Author's survey data

The author conducted a household survey in Badulla and Nuwara Eliya districts¹⁶ of Sri Lanka¹⁷ in September and October 2013 using a household questionnaire.¹⁸ The survey gathered information on household demographic characteristics, education, income, consumption, assets, housing conditions, access to utilities and perceptions of the poor people. Focus group interviews with selected households and interviews with key informants such as divisional secretariat, village officers (*Grama Niladaries*), religious leaders and social activists were also conducted before the household survey.

The total sample size of the survey was 300 households. However, only 276 households provided complete information. Therefore the sample size of the author's survey is limited to 276 households. Nuwara Eliya and Badulla districts were selected for the author's survey as these two districts account for more than 60 per cent of the total estate population¹⁹ and higher poverty levels recorded from these two districts.

¹⁶ See annex 5 for a map of Badulla and Nuwaraeliya districts

¹⁷ See annex 6 for a map of Sri Lanka

¹⁸ See annex 7 for author's survey questionnaire

¹⁹ See annex 1 and 2 for land and population distribution of estate areas

Each district is allocated a sample of 150 households and the sample of the district was distributed among the households in the following manner. First, 15 tea estates from each district (out of 161 in Badulla, 195 in Nuwaraeliya) are selected so that the selected estates represent all the areas of the district.²⁰ Then, one village officer's division (*Grama Niladari division*) is selected from each selected estate. 10 households were selected from each village officer's division using the sequence of the household list of the village officer. Households that are unable to contact was replaced with the next closest household.

²⁰ The list of villages selected for the author's survey is not publicly available due to the confidentiality of data, but can be obtained from the author on request.

Chapter 4

Multidimensional poverty trends and issues of Sri Lanka

The recent reduction of poverty levels in Sri Lanka may be questioned with the measurement method employed, namely the monetary approach to measuring poverty. The level of total income or the consumption expenditure may not reveal the real welfare of a household (Chakravarty, 2006). For instance, even when a household is above the income threshold, its level of welfare can significantly be affected if it has a chronically ill person. Moreover, a higher level of household consumption expenditure may not guarantee a higher level of welfare for a household, for example if a bigger share of expenditure is allocated for alcohol (a reality in many developing countries), the real welfare of the household can be significantly reduced. Therefore, poverty needs to be analysed with the real achievements (what Amartya Sen termed as functionings in his capability approach to poverty). Measuring poverty in a multidimensional way, according to the capability approach, provides a good solution for this problem. Furthermore, although Sri Lanka has ample research on poverty profiles, using monetary poverty measures, there is no research that develops a multidimensional poverty profile. Therefore, knowledge on multidimensional poverty trends, issues and policy options are limited.

Almost all the poverty researchers at present agree that poverty is a multidimensional phenomenon and needs to be measured in a multidimensional way, however, there is no agreement among poverty researchers how to measure it (Duclos et al., 2006). Alkire and Foster (2009, 2011) introduced a new method of aggregation (AF

method) and Alkire and Santos (2010) improved it further. However the method is criticized mostly for arbitrary selection of dimensions and weights (Ravallion, 2010, 2011). In line with the capability approach, this chapter first proposes a new approach of selecting dimensions for the AF method that could be used in measuring multidimensional poverty in a specific country or region. Additionally, the chapter tests the sensitivity of the AF method to two alternative weighting schemes namely arbitrary equal weights and statistically determined different weights. Finally, the chapter estimates multidimensional poverty levels among the households which fall below the cut-off point of each indicator (deprived of each indicator) of the multidimensional poverty index. This study applies Polychoric Principal Component Analysis (PPCA) to select the important dimensions and weights in the Sri Lankan context and incorporates those dimensions and weights into the AF aggregation method. An empirical analysis is carried out for Sri Lanka using the dimensions and weights selected by the Polychoric Principal Component Analysis.

4.1 Selection of dimensions and indicators

The arbitrary selection of dimensions and allocating equal weights to all the dimensions are questioned by the opponents of the AF method (Ravallion, 2010). The dimensions that are important in analysing poverty greatly depend on the cultural and social background of the country (Sen, 2000), and the process of setting up the dimensions is not easy.

There is no escape from the problem of evaluation in selecting a class of functionings in the description and appraisal of capabilities, and this selection problem is, in fact, one part of the general task of the choice of weights in making normative evaluation... The need for selection and discrimination is neither an embarrassment, nor a unique difficulty, for conceptualizing functionings and capabilities (Sen 2008, p. 58).

However, the selection of dimensions, which depends heavily on value judgements, needs to be by a logical process. Furthermore, Ravallion (2010) argues that

the value of any composite index does not have policy relevance if that index does not fit with the local realities and if it is unable to indicate the constraints to the development of a particular country. Therefore, the socio-cultural background of the country needs to be analysed before choosing the dimensions or indicators.

In this section a Polychoric Principal Component Analysis (PCPA) on the selected variables from Household Income Expenditure Survey data is performed to choose the relevant dimensions and indicators for each dimension. As shown by Table 4.1, 22 variables at the household level are included in the Polychoric Principal Component Analysis. The analysis generated 22 components and the eigenvalues of the first 6 components were greater than one.

Table 4.1: Variables included in the PPCA

Variable	Description	Variable	Description
the	Total household equipment	dmf	Distance to medical facility
thw	Type of housing wall	dpo	Distance to post office
thr	Type of housing roof	dba	Distance to bank
sdw	Source of drinking water	apg	Access to power grid
ddw	Distance to drinking water	apl	Access to phone line
toa	Toilet availability	apw	Access to piped water line
tot	Type of toilet	hos	Hospitalized
msl	Main source of lighting	dis	Disable
msf	Main source of cooking fuel	chi	Chronically ill
rep	RHCEPC*	hef	Highest education in family
dds	Distance to Divisional Secretariat office	lps	Lack of primary schooling

Source: Author's labelling, * Real Household Consumption Expenditure Per Capita

Therefore, these 6 components are chosen as possible candidates for dimensions in developing the Sri Lankan multidimensional poverty measure. The first 6 components explain 58 per cent of the total variation of the data set (see annex 8). Once the components are chosen, the relevant component loadings of each component are ranked from the highest to the lowest (see annex 9).

The first five variables of each component are selected as suitable candidates of the indicators for the multidimensional poverty measure. The selected variables of each component are allocated among components such that the variables with higher component loadings were allocated for the particular dimension and also the dimensions are practically defined. Each component is defined as a dimension, and named examining the variables included in each component.

Table 4.2 shows the possible dimensions and indicators of the Sri Lankan multidimensional poverty measure generated by the Polychoric Principal Component Analysis. Sri Lankan multidimensional poverty measure has six dimensions and 18 indicators. The dimension *economic wealth* has five indicators, *education* has one indicator and the other four dimensions have three indicators each. Even though the indicators are expected to be distributed evenly among the six dimensions, the above allocation is made due to the practical difficulties in defining dimensions.

Table 4.2: Dimensions and indicators selected by the Polychoric Principal Component Analysis

Dimension	Indicator(s)
Economic wealth	1. Household equipment 2. Access to national power grid 3. Access to telephone line 4. Use of cleaner cooking fuel 5. Main lighting source
Housing condition	1. Type of housing roof 2. Type of housing walls 3. Availability of toilet at home
Access to public services	1. Distance to post office 2. Distance to public health facility 3. Distance to divisional secretariat office
Health	1. Household member was hospitalised 2. Household member is disabled 3. Household member is chronically ill
Access to clean water	1. Main source of drinking water 2. Distance to source of drinking water 3. Access to piped water line
Primary education	1. Everyone in family completed primary education

Source: Author's classification using PPCA based on HIES 2006/7 and 2009/10 data

Using the above procedure, this research selected the possible dimensions of poverty for the multidimensional poverty measure of Sri Lanka without arbitrarily selecting the dimensions and their indicators. Therefore, these dimensions and indicators are suitable for analysing multidimensional poverty of the particular country (Sri Lanka in this case). These dimensions and indicators are used in estimating the Sri Lankan multidimensional poverty levels using the Alkire and Foster aggregation method.

4.2 Allocation of weights

Decancq and Lugo (2013) suggest that the best way to decide on allocating weight is to test all the possible ways of weighting and check the sensitivity of the measure to different weighting methods. This section applies two types of weighting systems (data driven and normative) to the Sri Lankan data to identify the most suitable weighting scheme. Though it is preferable to have a hybrid weighting method for the comparison, it is not applied due to data limitations.

Following Alkire and Foster (2009, 2011) and Alkire and Santos (2010) this section first applies the same weights for all dimensions. Table 4.3 shows the weight allocations for different dimensions and indicators based on the arbitrary equal weights which are applied by Alkire and Santos (2010).

According to the equal weight allocation, each dimension gets around 16.67 per cent of the total weight of the multidimensional poverty index. The weight of a particular dimension (16.67) is again divided equally among the indicators of that dimension. Therefore, the indicators of “economic wealth” dimension is allocated 3.33 per cent of the total weight of multidimensional poverty index, while indicators of “housing conditions”, “access to public services”, “health”, “access to clean water” dimensions have 5.5 per cent allocation out of the total weight. Since, there is only one indicator for “primary education” dimension, that indicator is allocated the total weight of the dimension (16.67).

Table 4.3: Allocation of equal weights

Dimension	Weight %	Indicators	Weight %
Economic wealth	16.67	1. Household equipment	3.33
		2. Access to national power grid	3.33
		3. Access to telephone line	3.33
		4. Use of cleaner cooking fuel	3.33
		5. Main lighting source	3.33
Housing condition	16.67	1. Type of housing roof	5.55
		2. Type of housing walls	5.55
		3. Availability of toilet at home	5.55
Access to public services	16.67	1. Distance to post office	5.55
		2. Distance to public health facility	5.55
		3. Distance to divisional secretariat office	5.55
Health	16.67	1. Household member was hospitalised	5.55
		2. Household member is disabled	5.55
		3. Household member is chronically ill	5.55
Access to clean water	16.67	1. Main source of drinking water	5.55
		2. Distance to source of drinking water	5.55
		3. Access to a piped water line	5.55
Primary education	16.67	1. Everyone in family completed primary education	16.67

Source: Author's calculations

As discussed in the literature review, arbitrary equal weight allocation is the most popular way of allocating weight in the multidimensional poverty literature. However, allocation of equal weights has been criticized due to non-availability of theoretical justification and misinterpreting the actual trade-off among dimensions. Therefore, this study also applies an alternative weighting method generated by the Polychoric Principal Component Analysis.

Table 4.4 shows the weights for each dimension and indicator generated for Sri Lankan data by the Polychoric Principal Component Analysis. The weights allocated for indicators and dimensions by the Polychoric Principal Component Analysis are significantly different from that of the equal weight. Weight of the *economic wealth* dimension significantly increased while weights of the access to clean water and primary education dimensions significantly decreased. At the indicator level, household

equipment and access to the national power grid receive the highest weights while water related indicators receive the least weights.

Table 4.4: Weight allocation by the PPCA

Dimension	Weight %	Indicators	Weight %
Economic wealth	49.97	1. Household equipment	12.20
		2. Access to national power grid	11.48
		3. Access to telephone line	9.82
		4. Use of cleaner cooking fuel	9.28
		5. Main lighting source	7.19
Housing condition	11.38	1. Type of housing roof	2.10
		2. Type of housing walls	4.01
		3. Availability of toilet at home	5.27
Access to public services	13.24	1. Distance to post office	5.21
		2. Distance to public health facility	2.93
		3. Distance to divisional secretariat office	5.10
Health	12.91	1. Household member was hospitalised	6.99
		2. Household member is disabled	3.22
		3. Household member is chronically ill	2.70
Access to clean water	6.36	1. Main source of drinking water	0.02
		2. Distance to source of drinking water	0.50
		3. Access to piped water line	5.84
Primary education	6.14	1. Everyone in family completed primary education	6.14

Source: Author's calculations using PPCA based on HIES 2006/7 and 2009/10 data

Allocation of half of the total weights to the *economic wealth* dimension is statistically justified as most of the variation in the data is explained by the first component of the Polychoric Principal Component Analysis. According to the theory of the Principal Component Analysis, the first component explains most variation in the data while the rest of the dimensions explain the remaining variation in descending order. Therefore, the first component of a Principal Component Analysis receives the highest weight while the second component receives the highest weight out of the remaining weight.

The highest weight for the *economic wealth* dimension can also be justified with poverty literature. The *economic wealth* dimension represents the monetary aspect of wealth. Nonmonetary wellbeing measures highly correlate with monetary wellbeing, i.e.

income per capita (Hicks and Streeten, 1979; Larson and Wilford, 1979; McGillivray, 1991; McGillivray and White, 1993; Noorbakhsh, 1998; Cahill, 2005), thus most of the variation in noneconomic wellbeing can be explained by the variation in monetary wealth. However, monetary wealth alone may not explain the nature of poverty, but it is a significant variable that correlate poverty. Allocation of less weight for *health* and *primary education* can be justified with universal free health and education in Sri Lanka. Though education is strongly correlated with poverty, there is not much variance of education level in Sri Lankan data due to universal free provisioning of education from kindergarten to university. Irrespective of the poverty conditions, everyone is provided free education up to university level. Furthermore, irrespective to the poverty conditions, health facilities in Sri Lanka are also totally free from outpatient consultations to hospitalization. Consequently, irrespective of the poverty conditions, everyone has access to health and education. However, quality of education and health may differ from place to place (between urban and rural areas) yet, the quality of education and health is not captured by the data used in this study. Therefore, the indicators of health and education dimensions receive lesser weights in the Sri Lankan context.

In contrast, the proportion of the population which does not have access to electricity, better housing conditions, access to public services is high, especially in rural and estate areas. Therefore, weights allocated for these dimensions or indicators are considerably high. This suggests that allocation of weights by the PPCA reflects the local country context. But allocating more than 50 per cent of the total weights to one dimension creates doubts about the suitability of this method for allocation of weights.

The second, third, and fourth columns of Table 4.5 show the multidimensional poverty levels for Sri Lanka calculated using equal weights for all dimensions and the last three columns show the multidimensional poverty levels calculated using Polychoric Principal Component Analysis generated statistical weights. The estimates shows that

poverty figures estimated using Alkire Foster multidimensional poverty estimation technique are highly sensitive to the changes in weight allocation.

Table 4.5: Poverty comparisons with different weighting methods

Area	Multidimensional Poverty					
	Equal weights			PPCA weights		
	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (Value)
Urban	1.51	36.8	0.005	9.56	38.5	0.037
Rural	9.52	36.8	0.035	39.67	44.5	0.117
Estate	23.01	36.7	0.084	70.96	46.3	0.117
Sri Lanka	8.59	36.7	0.031	35.08	44.5	0.156

Source: Author's calculations using HIES 2006/07 data,

The analysis shows that multidimensional poverty levels are significantly high with Polychoric Principal Component Analysis weights compared to the equal weights, especially in the rural and estate areas. Furthermore, it suggests that there is a significant difference between the multidimensional poverty levels in different areas. Multidimensional poverty in urban areas seems to be much lower compared to the national poverty levels, while it is high in estate areas. Multidimensional poverty in rural areas is on par with the national multidimensional poverty levels.

This issue of inequality could also be identified with the differences in monetary poverty estimates and regional contributions to GDP. But the difference in multidimensional poverty levels is considerably higher than the monetary poverty estimates. This warrants a deeper analysis of multidimensional poverty trends and issues in Sri Lanka at regional and district levels to generate better policies for efficient poverty reduction.

4.3 Multidimensional poverty trends and issues

This section will use the multidimensional poverty levels estimated using the Polychoric Principal Component Analysis generated statistical weights to discuss the

multidimensional poverty trends and issues in Sri Lanka. Multidimensional Poverty Headcount index (MPH), which shows the proportion of multidimensional poor households (incidence); intensity of deprivations (ID), which shows the average proportion of deprivations experienced by poor people (intensity); and multidimensional poverty index (MPI), which shows the proportion of multidimensional poor households adjusted by intensity of deprivation (acute multidimensional poverty) are estimated in identifying the poverty trends and issues.

Table 4.6 shows that Multidimensional poverty in Sri Lanka decreased significantly from 2006/07 to 2009/10 irrespective of the area concerned. The national multidimensional poverty headcount decreased by 25 per cent between the two survey periods. This decrease is mostly due to the decrease of poverty levels in the estate and rural areas. Urban areas record an eight per cent of reduction in multidimensional poverty; however the multidimensional poverty headcount of urban areas is significantly lower than the other areas. The reduction of multidimensional poverty in rural and estate areas is on par with the reduction of monetary poverty levels in these areas.

Table 4.6: Multidimensional poverty trends at national level

Area	2007			2010			Percentage Change		
	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (%)
Estate	70.96	46.3	0.329	51.10	43.3	0.222	-28.0	-6.3	-32.5
Rural	39.67	44.5	0.177	30.14	43.1	0.130	-24.0	-3.1	-26.6
Urban	9.56	38.5	0.037	8.74	38.6	0.034	-8.6	0.3	-8.1
Sri Lanka	35.08	44.5	0.156	26.33	42.7	0.113	-24.9	-4.0	-27.6

Source: Author's estimates based on HIES 2009/10, 2006/07, data. Note; MPH: multidimensional poverty headcount, ID: intensity of deprivations, MPI: multidimensional poverty index

On average, one quarter of the total population of Sri Lanka is still multidimensional poor though the country records a significant reduction in multidimensional poverty in recent years. Regional variation in multidimensional poverty estimates is significantly high compared to monetary poverty estimates. Multidimensional

poverty incidence in the estate areas is always higher than in the other areas. More than 50 per cent of the households in estate areas are multidimensionally poor while more than 30 per cent of the households are multidimensionally poor in rural areas in the latest survey. In contrast, multidimensional poverty levels in the urban areas are lower than in the other areas. The recent survey shows that multidimensional poverty incidence of the urban areas is around eight per cent. Estimated multidimensional poverty levels for the previous survey is always higher than the latest survey where the incidence of multidimensional poverty is 9 per cent, 39 per cent and 70 per cent in the urban, rural and estate areas respectively. The same pattern of unequal distribution of poverty incidence can be identified with the monetary poverty figures.

On average Sri Lankan poor people lack around 44 per cent of the total deprivations considered (18 indicators in this study). A significant difference of intensity of deprivation cannot be identified between estate and rural areas, however the intensity of deprivations in the urban areas are always lower than in the other areas. The reduction of average proportion of deprivations faced by poor people in Sri Lanka is not much higher between the two survey years. Moreover, intensity of deprivation in the urban areas marginally increased in the latest survey. This suggests that even though multidimensional poverty levels in Sri Lanka decreased considerably, the conditions of the remaining poor people have not improved and have even worsened in the urban areas.

The multidimensional poverty index, which measures the acute multidimensional poverty (using both incidence and intensity) also substantially decreased during the two survey periods. This is mostly due to the higher reduction in multidimensional poverty incidence. The pattern of distribution of multidimensional poverty index among different areas follows the same pattern observed in the multidimensional poverty incidence. Multidimensional poverty indexes of the estate and the rural areas are always significantly higher than the urban areas. This suggests that acute multidimensional poverty in estate and rural areas are high and needs more emphasis in policy development.

Table 4.7 depicts that at the provincial level, the highest level of multidimensional poverty headcount is recorded from Northern Province as expected, due to the negative effect of civil war. However a comparison between two periods is not possible in this province due to data limitations. No survey was conducted in the Northern Province before HIES 2009/10 due to the tension prevailed in the area. Northern Province is the worst affected province from the three decades of armed fighting in the country. Much of the socioeconomic infrastructure of the area is damaged or non-existent. This may have contributed to the higher multidimensional poverty incidence in the area.

Table 4.7: Multidimensional poverty trends at provincial level

Province	2007			2010			Percentage Change		
	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (%)
Northern	n.a.	n.a.	n.a.	50.53	45.8	0.231	n.a.	n.a.	n.a.
Sabaragamuwa	50.28	45.6	0.229	39.91	44.3	0.177	-20.6	-2.9	-22.7
Uva	49.38	45.8	0.226	39.36	43.1	0.170	-20.3	-5.9	-24.8
North Western	46.93	46.8	0.220	38.14	43.1	0.164	-18.7	-7.9	-25.5
North Central	47.49	45.6	0.217	33.74	42.8	0.144	-29.0	-6.1	-33.6
Central	44.15	44.8	0.198	31.46	45.7	0.144	-28.7	2.0	-27.3
Eastern	41.46	45.4	0.188	28.92	40.8	0.118	-30.2	-10.1	-37.2
Southern	30.47	42.7	0.130	19.58	40.6	0.080	-35.7	-4.9	-38.5
Western	16.87	40.7	0.069	11.89	39.9	0.047	-29.5	-2.0	-31.9
Sri Lanka	35.08	44.5	0.156	26.33	42.7	0.113	-24.9	-4.0	-27.6

Source: Author's estimates based on HIES 2009/10, 2006/07, data, n.a.: no sufficient data. Note; MPH: multidimensional poverty headcount, ID: intensity of deprivations, MPI: multidimensional poverty index

However, contradictory to the multidimensional poverty levels of the Northern Province, the war affected Eastern Province performs well in reducing multidimensional poverty. The province records more than 30 per cent reduction of multidimensional poverty incidence between the two survey periods. This is mainly due to the higher level of multidimensional poverty reduction in Ampara district. Table 4.8 shows that there is a higher reduction of poverty in the Ampara district between 2007 and 2010.

Table 4.8: Multidimensional poverty trends at district level

District	2007			2010			Percentage Change		
	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (Value)	MPH (%)	ID (%)	MPI (%)
Jaffna	n.a.	n.a.	n.a.	57.66	45.8	0.264	n.a.	n.a.	n.a.
Vovuniya	n.a.	n.a.	n.a.	43.29	45.8	0.178	n.a.	n.a.	n.a.
Trincomalie	n.a.	n.a.	n.a.	29.03	43.7	0.127	n.a.	n.a.	n.a.
Monaragala	62.60	48.4	0.303	42.57	43.1	0.183	-32.0	-11.0	-39.6
Ratnapura	53.60	47.4	0.254	43.38	44.0	0.191	-19.1	-7.2	-24.8
Anuradapura	52.25	46.4	0.242	40.11	43.6	0.175	-23.2	-6.0	-27.7
Nuwaraeliya	53.11	45.2	0.240	25.24	40.0	0.101	-52.5	-11.5	-57.9
Kurunegala	51.28	45.0	0.231	42.48	43.0	0.183	-17.2	-4.4	-20.8
Matale	47.63	45.3	0.216	33.16	40.1	0.133	-30.4	-11.5	-38.4
Puttalam	40.66	50.1	0.204	36.41	46.4	0.169	-10.5	-7.4	-17.2
Ampara	43.73	45.2	0.198	24.64	43.0	0.106	-43.7	-4.9	-46.5
Kegalle	44.99	43.0	0.193	31.98	41.5	0.133	-28.9	-3.5	-31.1
Polonnaruwa	40.56	44.1	0.179	38.29	42.4	0.162	-5.6	-3.9	-9.5
Baticoloa	38.82	45.7	0.177	39.97	48.4	0.194	3.0	5.9	9.6
Badulla	40.29	43.0	0.173	27.90	42.6	0.119	-30.8	-0.9	-31.2
Kandy	36.70	44.0	0.162	28.70	41.8	0.120	-21.8	-5.0	-25.9
Hambantota	35.12	43.7	0.153	19.70	41.4	0.082	-43.9	-5.3	-46.4
Galle	30.06	42.2	0.127	21.92	41.9	0.092	-27.1	-0.7	-27.6
Kalutara	28.40	43.5	0.124	20.13	41.3	0.083	-29.1	-5.1	-33.1
Matara	27.94	42.3	0.118	16.68	38.0	0.063	-40.3	-10.2	-46.6
Gampaha	16.42	38.1	0.063	11.55	39.8	0.046	-29.7	4.5	-27.0
Colombo	10.62	39.4	0.042	7.38	37.7	0.028	-30.5	-4.3	-33.3
Sri Lanka	35.08	44.5	0.156	26.33	42.7	0.113	-24.9	-4.0	-27.6

Source: Author's estimates based on HIES 2009/10, 2006/07, data, n.a.: no sufficient data. Note; MPH: multidimensional poverty headcount, ID: intensity of deprivations, MPI: multidimensional poverty index

This district was free from armed fighting earlier than the other districts affected by war. National and international reconstruction programmes were carried out in this district earlier than the other districts. The higher reduction of poverty suggests that the district is reaping the peace dividends generated by the end of the conflict. On the other hand, the other district of the province (Baticoloa, this is the only district with comparable data available that was involved in war) is the only district that records an increase in multidimensional poverty levels between the two survey periods. This suggests that districts that were affected by war and recently became free from armed fighting such as Jafna, Vovuniya, Trincomalie, Mullative, are also still to overcome the negative effects

from war. However, there is no comparable data for these districts to analyse the multidimensional poverty trends.

Western Province, as in the monetary poverty levels, records the lowest multidimensional poverty incidence and the province also shows a greater reduction of multidimensional poverty levels. Colombo, the commercial capital, records the lowest multidimensional poverty incidence among other districts followed by Gampaha (both are in Western Province). The multidimensional poverty levels also confirm the monetary poverty trends shown by these districts. Southern Province shows the highest reduction of multidimensional poverty incidence which is over 35 per cent. This reduction is mostly due to the reduction of poverty in Hambantota (44 per cent) and Matara (40 per cent) districts. Hambantota records the second highest multidimensional poverty reduction while Matara also records a higher reduction. This reduction of multidimensional poverty in Southern Province and especially Hambantota district can be explained by the recent development of the area. A new international airport (the second international airport of the country), a new international sea port, a highway network, a new railway network and other economic infrastructures were developed recently in the area.

The substantial reduction of monetary poverty in the estate area, recorded recently, is also reflected in the multidimensional poverty incidence. Nuwaraeliya district of Central Province records the highest reduction in multidimensional poverty incidence which is more than 50 per cent between the two survey periods. The higher reduction of poverty in Nuwaraeliya district is mainly due to the higher reduction of estate poverty. More than half of the total population of the district is comprised by estate workers while national composition is about five per cent. The higher reduction of estate poverty is due to the recent emphasis by the government and non-government organizations on the reduction of estate poverty. Traditionally estate areas recorded the highest monetary poverty and multidimensional poverty (Kumara, 2011). But as shown in Chapter 1, monetary poverty levels also decreased considerably in the area in recent years and the

reduction rates are higher than the national averages. The same trend is identified in this study using the multidimensional approach to poverty. This higher reduction of poverty in the estate areas will be discussed in details in the following chapters.

Intensity of derivations is notably high in Puttalam district for both the survey periods which is around 50 per cent of the total deprivations while Colombo and Gampaha record the lowest all the time. The intensity of deprivations of all the other districts is almost the same varying around 45 per cent. The reduction of intensity of deprivations between two periods is high in Nuwaraeliya, Matale, Monaragala, and Matara districts where a higher proportion of the estate population is concentrated. The other districts record a similar level of reduction in intensity of deprivations. However, as explained previously, intensity of deprivation is increased in the Batticaloa district possibly due to the negative effect of civil war. Furthermore, intensity of deprivation in Gampaha district also increased though the poverty incidence decreased. This suggests that the remaining poor in the district face increased deprivations though the proportion of poor decreased.

On par with reduction of multidimensional poverty incidence and intensity of deprivations, Nuwaraeliya district records the highest reduction in acute multidimensional poverty (58 per cent) measured by the multidimensional poverty index. This shows that there is a greater reduction in multidimensional poverty in the district mainly due to the reduction in estate poverty. Ampara and Hambantota districts also record a considerable reduction in acute multidimensional poverty due to the reasons discussed previously. Acute multidimensional poverty in the Batticaloa district increased between the two survey periods and this is obvious as both the multidimensional poverty incidence and intensity of deprivations increased during the study period. This further emphasizes that the war affected areas are yet to overcome the negative effects of three decades of war. The rest of the districts record the reduction of intensity of deprivations that is similar to the national averages.

4.4 The analysis of multidimensional poverty for each indicator of three dimensions of the multidimensional poverty index

This subsection will analyse multidimensional poverty for each indicator of multidimensional poverty index, namely households deprived of primary education, child enrolment, chronically ill or disabled, hospitalized, access to electricity, sanitary facilities, drinking water, housing floor, cooking fuel, and assets availability indicators. First, the households that are deprived of each indicator are identified by examining their achievement of each indicator. If the particular household is below the predetermined poverty cut-off point of the concerned indicator, then that household is identified as deprived of that indicator. For example, if there is a chronically ill or disabled member in the family, that household is identified as deprived of the chronically ill or disabled indicator of the health dimension. Following the above, the multidimensional poverty among these households is estimated using Alkire and Foster multidimensional poverty estimation technique. The selection of dimensions and allocation of weights is done by using the polychoric principal component analysis which generates different weights for different dimensions. Monetary poverty counterparts of each sample are also estimated and are shown in Annex 12.

Table 4.9 shows that multidimensional poverty among the households where none of the household members has completed primary education (up to grade five) is significantly high compared to the households with at least primary education. Around 12 per cent of the households deprived of primary education indicator are multidimensionally poor at national level in 2007 while it decreased to seven per cent in 2010. The estate areas recorded the highest multidimensional poverty level, which is almost 18 per cent of the total households in 2007 and it decreased to 12 per cent in 2010. Multidimensional poverty headcount among the households deprived of primary education indicator in the urban areas is the least, which is four per cent and two per cent in 2007 and 2010 respectively.

Table 4.9: Analysis of multidimensional poverty for *primary education* indicator (in Education Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of primary education	Urban	4.74	40	0.02	2.67	35	0.01
	Rural	10.33	37	0.04	6.48	37	0.02
	Estate	17.97	45	0.08	12.24	40	0.05
	Sri Lanka	12.05	41	0.05	7.57	38	0.03
Households not deprived of primary education	Urban	1.42	41	0.01	0.85	37	0.00
	Rural	2.77	36	0.01	2.12	36	0.01
	Estate	10.89	42	0.05	5.42	37	0.02
	Sri Lanka	3.01	38	0.01	2.00	36	0.01

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

Table 4.10 depicts that, irrespective of achievement of primary education as well as the initial level of multidimensional poverty, a considerable reduction of multidimensional poverty can be observed in all the areas between 2007 and 2010. Multidimensional poverty at national level decreases by 37 per cent and 33 per cent among the households deprived and not deprived of primary education indicator respectively. This shows that the welfare among less educated households improved relatively than the other households. Nevertheless, reduction of multidimensional poverty among the households not deprived of primary education indicator is higher in the estate areas while it is higher among the households deprived of primary education indicator in the urban areas. Reduction of acute multidimensional poverty (measured by multidimensional poverty index) also follows the same trend of multidimensional poverty incidence mainly due to the effect of the reduction of multidimensional poverty headcount. Importantly, a considerable reduction of the intensity of multidimensional poverty cannot be observed among the households deprived and not deprived of primary education indicator which suggests that the living conditions of the remaining poor people has not change between 2007 and 2010.

Table 4.10: Percentage point difference and percentage change of multidimensional poverty estimates for *primary education* indicator (in Education Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of primary education	Urban	-2.07	43.67	-0.04	10.94	-0.01	49.83
	Rural	-3.85	37.27	0.00	0.23	-0.01	37.12
	Estate	-5.73	31.89	-0.05	12.11	-0.03	40.13
	Sri Lanka	-4.48	37.18	-0.03	6.82	-0.02	41.46
Households not deprived of primary education	Urban	-0.57	40.14	-0.04	8.99	-0.00	45.52
	Rural	-0.65	23.47	-0.00	0.10	-0.00	23.54
	Estate	-5.47	50.23	-0.05	12.70	-0.03	56.55
	Sri Lanka	-1.01	33.55	-0.02	5.02	-0.00	36.89

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

Even though the multidimensional poverty difference between the households deprived and not deprived of primary education indicator is negligible, multidimensional poverty difference between the households deprived and not deprived of child enrolment (a school aged child is not attending school) indicator is considerably high (see Table 4.11). Multidimensional poverty among the households deprived of child enrolment indicator is 45 per cent and 37 per cent in 2007 and 2010 respectively, but the multidimensional poverty among the households not deprived of child enrolment indicator (where all the school aged children are attending school) is ten and eight per cent in 2007 and 2010 respectively. The same difference can be observed in the other areas where the difference is substantially high in the urban and rural areas.

This suggests that even though the education from kindergarten to university in Sri Lanka is universally free, more children of the poor households are not attending schools, compared to their richer counterparts.

Table 4.11: Analysis of multidimensional poverty for *child enrolment* indicator (in Education Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of child enrolment	Urban	28.57	43	0.12	n.a.	n.a.	n.a.
	Rural	23.53	51	0.12	12.90	49	0.06
	Estate	60.26	53	0.32	75.00	46	0.34
	Sri Lanka	45.36	51	0.23	37.29	46	0.17
Households not deprived of child enrolment	Urban	5.03	44	0.02	5.01	44	0.02
	Rural	9.08	46	0.04	7.97	46	0.04
	Estate	32.30	49	0.16	27.57	49	0.13
	Sri Lanka	10.14	47	0.05	8.87	46	0.04

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

This can be due to two major reasons that influence school enrolment negatively. One reason is the other expenses involved with school attendance such as transportation and school stationaries. The other reason is the opportunity cost involved with school attendance (Jensen and Nielsen, 1997). Children of the poor families look after their younger siblings and also provide labour for family earnings such as working in the paddy fields and helping to run family businesses. Hence, there is a high tendency for poor families to keep their kids away from school. This can be clearly identified with the higher multidimensional poverty levels among the households deprived of child enrolment indicator in the estate areas. Multidimensional poverty among the households deprived of child enrolment indicator is 60 and 75 per cent in estate areas in 2007 and 2010 respectively. But the multidimensional poverty among the households, who ensures that all school aged kids attend school, is less than half of the multidimensional poverty levels of the households deprived of this indicator (32 and 27 per cent in 2007 and 2010 respectively). A similar trend can be identified in urban and rural areas even though the multidimensional poverty incidence is relatively low as compared to the estate areas. This clearly shows the higher tendency of less school enrolment by children of the poor

households. Insufficient data was a problem in estimating multidimensional poverty among the households deprived of child enrolment indicator in the urban areas in 2010.

Table 4.12 shows that similar to the reduction of multidimensional poverty among the households deprived of primary education indicator, multidimensional poverty among households deprived of child enrolment indicator also significantly decreased in all the samples other than in the estate areas.

Table 4.12: Percentage point difference and percentage change of multidimensional poverty estimates for *child enrolment* indicator (in Education Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of child enrolment	Urban	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Rural	-10.63	45.18	-0.02	4.11	-0.06	47.43
	Estate	14.74	24.46	-0.07	12.57	0.03	8.81
	Sri Lanka	-8.07	17.79	-0.05	9.54	-0.06	25.64
Households not deprived of child enrolment	Urban	-0.02	0.40	-0.00	-0.18	-0.00	0.22
	Rural	-1.11	12.22	-0.01	1.55	-0.01	13.59
	Estate	-4.73	14.64	-0.01	1.24	-0.03	15.70
	Sri Lanka	-1.27	12.52	-0.01	1.89	-0.01	14.18

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

However, a notable difference in the reduction of poverty between two of the indicators of the education dimension is that there is an increase in multidimensional poverty between 2007 and 2010 among the households deprived of child enrolment indicator. While multidimensional poverty decreased in all the other areas, it increased by 24 per cent (by 14 percentage points) in the estate areas. This suggests that even though the multidimensional poverty decreased between two survey periods, multidimensional poverty among some groups increased during the same period. Multidimensional poverty headcount among the households deprived of child enrolment indicator decreased by 45

per cent in the rural areas while it decreased by 17 per cent in the total sample (Sri Lanka as a whole). However, there was no significant difference in the reduction of multidimensional poverty among the households not deprived of child enrolment indicator among different areas. This was around 13 per cent for all the areas. However, due to the unavailability of sufficient data, reduction of multidimensional poverty in urban areas is not estimated or not reliable.

Against the expected results, multidimensional poverty among the households with chronically ill or disabled members is less which is around five per cent for all the areas other than the estate areas (see Table 4.13).

Table 4.13: Analysis of multidimensional poverty for *chronically ill/disabled* indicator (in Health Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households with ill or disabled member	Urban	2.02	44	0.01	1.24	39	0.00
	Rural	3.53	36	0.01	2.35	37	0.01
	Estate	25.34	44	0.11	13.93	37	0.05
	Sri Lanka	4.80	40	0.02	2.88	37	0.01
Households without ill or disabled member	Urban	1.11	36	0.00	0.73	36	0.00
	Rural	3.46	37	0.01	2.44	37	0.01
	Estate	17.34	37	0.06	12.79	38	0.05
	Sri Lanka	4.28	37	0.02	2.97	37	0.01

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

This result holds for both surveys. However the multidimensional poverty among households with chronically ill or disabled members as well as among the other households is significantly higher than the national averages. Multidimensional poverty among the households with ill or disabled member is 25 and 14 per cent in 2007 and 2010 respectively, while it is 17 and 13 per cent among the households without ill or disabled members during the same period. The intensity of deprivation which measures the

average number of deprivations encountered by poor households is always high in the urban areas. This suggests that even though the incidence of multidimensional poverty is less in the urban areas, living conditions of the poor people in urban areas are worse than the other areas. Nevertheless, with a smaller value of MPI, it confirms that acute multidimensional poverty among the households with ill or disabled member in the urban areas is lesser than the other areas. Also acute multidimensional poverty in rural areas is high compared to other areas as in the aggregated sample.

Table 4.14 shows that though the incidence of multidimensional poverty is significantly low among the households with chronically ill or disabled members, the reduction of multidimensional poverty among these households are significantly high during the study period. The reduction of multidimensional poverty among households with chronically ill or disabled members is significantly higher than the households without chronically ill or disabled members. This is the opposite of the expected result for this variable. Multidimensional poverty headcount among the households with chronically ill or disabled members decreased by 40 per cent at national level between 2007 and 2010. The highest reduction of multidimensional poverty headcount is recorded in the estate areas which account for more than 45 per cent reduction (more than 11 percentage points) between 2007 and 2010. The reduction of multidimensional poverty headcount among the households with chronically ill or disabled members records more than 33 per cent reduction in the rural areas. The estimates show that reduction of multidimensional poverty among the households without chronically ill or disabled members is always lesser than the reduction of households with chronically ill or disabled members during the study period at national level as well as in different areas. The higher reduction of multidimensional poverty headcount among chronically ill or disabled members is mainly due to the interventions of governmental and non-governmental organizations in improving the living conditions among these households.

Table 4.14: Percentage point difference and percentage change of multidimensional poverty estimates for *chronically ill/disabled* indicator (in Health Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households with ill/disabled member	Urban	0.78	38.61	0.05	10.64	0.00	45.14
	Rural	1.18	33.43	-0.01	-3.10	0.00	31.36
	Estate	11.41	45.03	0.07	16.81	0.06	54.27
	Sri Lanka	1.92	40.00	0.03	7.05	0.01	44.23
Households without ill/disabled member	Urban	0.38	34.23	-0.01	-1.56	0.00	33.21
	Rural	1.02	29.48	0.00	0.22	0.00	29.63
	Estate	4.55	26.24	0.00	-0.75	0.02	25.69
	Sri Lanka	1.31	30.61	0.00	-0.28	0.00	30.41

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

Nevertheless, such a significant reduction cannot be observed with the intensity of deprivations between the two survey years. A minor reduction of the intensity of deprivations among the households with chronically ill or disabled members can be seen in all the areas other than rural areas. The intensity of deprivations in the rural areas marginally increased between the two surveys. This suggests that even though the level of multidimensional poverty among the households with chronically ill or disabled members have considerably decreased, the living conditions of the remaining multidimensionally poor did not change or worsened during the study period. This also suggests that further reduction of multidimensional poverty among the households with chronically ill or disabled members needs more time and more resources. The reduction of acute multidimensional poverty (measured by MPI) among the households with chronically ill or disabled members shows a similar pattern of the multidimensional poverty incident mainly due to effect of the considerable reduction of multidimensional poverty headcount.

Table 4.15 shows the multidimensional poverty among the households with hospitalized member (s) in the family. Contrary to the multidimensional poverty among the households with chronically ill or disabled members, multidimensional poverty among the households with hospitalized member is significantly high at national level as well as in all the other areas.

Table 4.15: Analysis of multidimensional poverty for *hospitalized* indicator (in Health Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households with hospitalized member	Urban	62.50	48	0.30	65.22	40	0.26
	Rural	20.69	42	0.09	34.92	43	0.15
	Estate	74.07	63	0.47	37.50	41	0.15
	Sri Lanka	39.73	51	0.20	42.55	42	0.18
Households without hospitalized member	Urban	32.38	38	0.12	32.29	38	0.12
	Rural	33.91	42	0.14	31.57	42	0.13
	Estate	37.58	48	0.18	34.49	46	0.16
	Sri Lanka	33.87	42	0.14	32.01	41	0.13

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

The highest multidimensional poverty among the households with hospitalized members is recorded in the estate areas which is nearly 75 per cent. This is due to the fact that estate workers do not normally get hospitalized other than for a very serious illness. There are two reasons that may influence on their decision not to be hospitalized. That is, if they are hospitalized, they will not get their wages for the hospitalized period as the estate workers are daily paid workers. On the other hand, the hospitals available at plantations do not provide hospitalization facilities. Therefore, for hospitalization they have to go to a hospital located in the nearest cities. These two reasons prevent the estate workers from being hospitalized. If the estate workers are hospitalized, it gives the signal that they are seriously ill and the whole family is affected by the hospitalization of the

household member. This further increases the poverty situation in the family. However, multidimensional poverty among the households with hospitalized members in the urban areas also records more than 62 per cent of multidimensional poverty incidence. The least multidimensional poverty headcount among the households with hospitalized member is reported in the rural areas which accounts for more than 20 per cent while at national level it recorded nearly as 40 per cent. Nevertheless, multidimensional poverty among the households without hospitalized member in the family is always around 30 per cent irrespective of the area of living which is significantly lesser than their counterparts with hospitalized members. This also suggests that multidimensional poverty among the households with poor health conditions is high. Furthermore, Annex 12 shows that monetary poverty among the households with hospitalized members is always lesser than the multidimensional poverty. This confirms that even though the monetary poverty levels are low among the households with poor health conditions, multidimensional poverty levels are significantly high.

Contrarily to the expected sign of the reduction of multidimensional poverty headcount, table 4.16 shows that multidimensional poverty significantly increased among the households with hospitalized members between 2007 and 2010 in all the areas other than the estate areas. Multidimensional poverty among the households with hospitalized member increases by more than 60 per cent in the rural areas, while it is around five per cent in the urban areas between the two surveys. However, reduction of multidimensional poverty headcount among the households with hospitalized member is more than 50 per cent in rural and estate areas. Reduction of multidimensional poverty among the households without hospitalized member does not show a significant difference between the two surveys. This indicates that households with poor health conditions are not only multidimensionally poor, but also their conditions are getting worse in recent times.

Table 4.16: Percentage point difference and percentage change of multidimensional poverty estimates for *hospitalized* indicator (in Health Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households with hospitalized member	Urban	-2.72	-4.35	0.07	15.01	0.03	11.31
	Rural	-14.23	-68.78	-0.01	-2.27	-0.06	-72.61
	Estate	36.57	49.37	0.22	35.39	0.31	67.29
	Sri Lanka	-2.82	-7.10	0.09	18.27	0.03	12.47
Households without hospitalized member	Urban	0.09	0.28	0.00	-0.33	0.00	-0.05
	Rural	2.34	6.90	0.00	0.98	0.01	7.81
	Estate	3.09	8.22	0.02	3.79	0.02	11.70
	Sri Lanka	1.86	5.49	0.01	1.33	0.01	6.75

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

Table 4.17 shows that multidimensional poverty among the households deprived of access to electricity indicator is significantly higher than the households not deprived of access to electricity indicator. Multidimensional poverty headcount among the households deprived of access to electricity indicator in 2007 is around 32 percent in national level while it is around 25, 30, and 45 per cent in urban, rural and estate areas respectively in the same survey. The estimates of multidimensional poverty headcount in 2010 survey also follows a similar trend in 2007. But multidimensional poverty headcount among the households not deprived of electricity indicator is less than 10 per cent in all the areas other than estate areas. However, multidimensional poverty among the households not deprived of access to electricity indicator in estate areas is more than 30 per cent in 2007, which is significantly higher than the national averages. Nevertheless, it is significantly lesser than the multidimensional poverty levels among the households deprived of access to electricity indicator. This higher level of multidimensional poverty among the households not deprived of access to electricity indicator is due to the higher average multidimensional poverty levels in the estate areas.

Table 4.17: Analysis of multidimensional poverty for *electricity* indicator (in Living Standards Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of access to electricity	Urban	24.74	35	0.09	18.11	36	0.06
	Rural	29.31	36	0.11	25.35	35	0.09
	Estate	45.26	40	0.18	44.89	38	0.17
	Sri Lanka	32.42	37	0.12	28.33	36	0.10
Households not deprived of access to electricity	Urban	4.39	35	0.02	5.20	33	0.02
	Rural	8.15	33	0.03	9.83	33	0.03
	Estate	30.59	37	0.11	24.58	36	0.09
	Sri Lanka	8.53	35	0.03	9.56	34	0.03

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

Even though there is no considerable difference in the intensity of deprivation between the households deprived and not deprived of access to electricity indicator, the intensity of deprivation of multidimensional poverty among the poor households in estate areas is relatively high in both surveys. This shows that gravity of the multidimensional poverty in estate areas is much higher than the other areas. The multidimensional poverty index which measures the acute multidimensional poverty follows the same trend as the multidimensional poverty headcount. Acute multidimensional poverty is much higher among the households deprived of access to electricity indicator in estate areas as compared to the other areas.

An interesting finding of the analysis of multidimensional poverty among the households with and without access to electricity is that multidimensional poverty among the households deprived of access to electricity decreased between the two survey years (Table 4.18), yet multidimensional poverty among households with access to electricity increased between the two survey years.

Table 4.18: Percentage point difference and percentage change of multidimensional poverty estimates for *electricity* indicator (in Living Standards Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of access to electricity	Urban	6.63	26.80	-0.01	-2.27	0.02	25.13
	Rural	3.96	13.51	0.01	2.55	0.02	15.72
	Estate	0.37	0.82	0.02	4.68	0.01	5.46
	Sri Lanka	4.09	12.62	0.01	3.00	0.02	15.24
Households not deprived of access to electricity	Urban	-0.81	-18.45	0.01	3.68	0.00	-14.09
	Rural	-1.68	-20.61	0.00	1.24	-0.01	-19.12
	Estate	6.01	19.65	0.01	3.72	0.03	22.64
	Sri Lanka	-1.03	-12.08	0.01	2.59	0.00	-9.18

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

Multidimensional poverty headcount of households without access to electricity decreased by 26, 13 and 12 per cent in urban, rural and estate areas respectively. Nevertheless, multidimensional poverty headcount among the households without access to electricity in estate areas decreased only by less than one per cent. Contrary to that, multidimensional poverty headcount among the households with access to electricity increased by 18, 20 and 12 per cent in urban, rural and estate areas respectively. However, multidimensional poverty headcount among the households with access to electricity in estate areas decreased significantly (by 20 per cent) between the two surveys. This pattern of reduction of the multidimensional poverty reveals the recent development pattern of the country. Access to electricity in Sri Lanka is nearly 90 per cent at present, therefore, the households without access to electricity belong to the ultra-poor or households located in remote rural area. Therefore, the reduction of poverty among this segment of population suggests that recent development of the country has especially benefitted the rural remote poor households. Nevertheless, the minor reduction of multidimensional poverty among households without access to electricity in estate areas and the significant

reduction of multidimensional poverty among the households with access to electricity indicate that reduction of poverty in estate areas is still limited to the moderate poor households. This suggests that reduction of multidimensional poverty in estate areas of Sri Lanka needs further emphasis.

Even though the number of households without access to sanitary facilities in Sri Lanka is less than four per cent, regional variations are significantly high. Moreover, as in access to electricity, households without access to sanitary facilities also belong to the ultra-poor segment among the poor. Table 4.19 shows the multidimensional poverty levels among the households with and without access to sanitary facilities in 2007 and 2010. The estimates show that for multidimensional poverty incidence (MPH), the intensity of deprivation (ID) and acute multidimensional poverty (MPI) among the households without access to sanitary facilities is higher than the households with access to sanitary facilities.

Table 4.19: Analysis of multidimensional poverty for *sanitary facilities* indicator (in Living Standards Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of access to sanitary facilities	Urban	12.60	35	0.04	10.66	35	0.04
	Rural	30.30	37	0.11	24.77	36	0.09
	Estate	47.64	40	0.19	42.89	38	0.17
	Sri Lanka	29.60	38	0.11	24.51	37	0.09
Households not deprived of access to sanitary facilities	Urban	3.35	35	0.01	4.29	33	0.01
	Rural	16.63	35	0.06	10.98	34	0.04
	Estate	32.91	38	0.13	23.82	36	0.09
	Sri Lanka	11.12	36	0.04	10.15	34	0.03

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

Multidimensional poverty headcount among households without access to sanitary facilities in estate areas are much higher than the other areas. More than 47 per cent of the

households without access to sanitary facilities in estate areas are multidimensionally poor in 2007 whereas, it is 12 and 30 per cent in urban and rural areas respectively. The estimates of the 2010 survey also follow a similar trend. Showing the general trend of poverty, multidimensional poverty headcount among the households with access to sanitary facilities in estate areas is also significantly higher than the other areas. Multidimensional poverty headcount among the households with access to sanitary facilities is three, 16 and 32 per cent in 2007 in urban, rural and estate areas respectively. The intensity of deprivation which shows the average number of deprivations encountered by the poor is also high among the households without access to sanitary facilities in almost all the areas and in the two surveys. Following the same trend, acute multidimensional poverty (measured by MPI) also shows the same trend. This indicates that, not only the probability of being multidimensionally poor is high among the households without access to sanitary facilities but also their average number of deprivations is also higher than their counterparts with access to sanitary facilities.

Since the larger proportion of the households without access to sanitary facilities belongs to the poorest of the poor, there is no significant reduction of multidimensional poverty among households without access to sanitary facilities between the two surveys. Table 4.20 shows that multidimensional poverty headcount decreased by 17 per cent in national level between 2007 and 2010. The reduction of multidimensional poverty among the households without access to sanitary facilities at urban, rural and estate areas is 15, 18 and 10 per cent respectively. While rural and estate areas shows a significant reduction of multidimensional poverty headcount among households with access to sanitary facilities, estimates also show that multidimensional poverty among households with access to sanitary facilities increased in urban areas between the two surveys. This is an interesting finding which says that even though a higher level of reduction of poverty in Sri Lanka can be observed in recent times, the same trend cannot be observed from the poorest of the poor in urban areas. However, the intensity of deprivation decreased in all

areas and both the samples and the reduction of the intensity of deprivation is higher among the households with access to sanitary facilities.

Table 4.20: Percentage point difference and percentage change of multidimensional poverty estimates for *sanitary facilities* indicator (in Living Standards Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of sanitary facilities	Urban	1.94	15.40	0.00	0.27	0.01	15.62
	Rural	5.53	18.25	0.01	3.67	0.02	21.25
	Estate	4.75	9.97	0.01	3.74	0.03	13.34
	Sri Lanka	5.09	17.20	0.01	3.51	0.02	20.10
Households not deprived of sanitary facilities	Urban	-0.94	-28.06	0.02	6.45	0.00	-19.80
	Rural	5.65	33.97	0.01	3.44	0.02	36.25
	Estate	9.09	27.62	0.02	5.59	0.04	31.67
	Sri Lanka	0.97	8.72	0.02	4.53	0.01	12.86

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

Decrease in acute multidimensional poverty among households with access to sanitary facilities is higher than the reduction among the households without access to sanitary facilities. This indicates that living condition of remaining poor is improving in recent years, while the improvement is higher among the households with access to sanitary facilities. Following the same trend of multidimensional poverty headcount, multidimensional poverty index also decreased between the two surveys other than in the urban areas. The reduction of multidimensional poverty index is also high among the households with access to sanitary facilities. This suggests that even though the recent development programmes improved the living conditions among the poor people, the poorest of the poor are not benefitting at the same rate.

Table 4.21 shows the multidimensional poverty estimates of the households deprived and not deprived of access to clean drinking water indicator. As in the

households deprived of access to improved sanitary facilities indicator, multidimensional poverty among the households deprived of access to clean drinking water indicator is high in the estate areas.

Table 4.21: Analysis of multidimensional poverty for *drinking water* indicator (in Living Standards Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of access to clean water	Urban	14.76	36	0.05	5.20	34	0.02
	Rural	16.41	36	0.06	14.44	35	0.05
	Estate	29.17	37	0.11	30.06	38	0.11
	Sri Lanka	23.08	36	0.08	20.43	37	0.08
Households not deprived of access to clean water	Urban	37.48	40	0.15	6.24	34	0.02
	Rural	31.94	39	0.13	12.07	35	0.04
	Estate	25.84	39	0.10	24.64	38	0.09
	Sri Lanka	12.40	37	0.05	11.18	35	0.04

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

Multidimensional poverty headcount among the households deprived of access to clean drinking water indicator is around 23 per cent at national level in 2007. But the multidimensional poverty headcount among the households deprived of access to clean water indicator is around 14 per cent in urban areas in the same year. And also multidimensional poverty headcount among the households deprived of access to clean drinking water indicator is around 16 percent and nearly 30 per cent in the same survey year in rural and estate areas respectively. Multidimensional poverty headcount among the households deprived of access to clean drinking water indicator in 2010 follows the same trend of 2007 with slight decrease (other than estate areas) in multidimensional poverty headcount in the later survey. The intensity of deprivation which measures the gravity of multidimensional poverty is almost same for all the areas in 2007 however; it slightly decreased in the latest survey for the urban and rural areas. Acute

multidimensional poverty among the households deprived of access to clean drinking water indicator also follows the same trend of multidimensional poverty headcount and the intensity of deprivation.

Contrary to the expected results, multidimensional poverty among the households with access to clean drinking water is higher than the multidimensional poverty among their counterparts without access to clean drinking water. This result is true for urban and rural areas in 2007 and urban areas in 2010. Multidimensional poverty headcount among the households with access to clean drinking water in urban areas is 37 per cent in 2007 while it is around 32 per cent in rural areas. Nevertheless, multidimensional poverty headcount among the households with access to clean drinking water in estate areas is around 25 per cent in 2007 which is less than the multidimensional poverty headcount among the households without access to clean drinking water in estate areas in the same year. The intensity of deprivation and multidimensional poverty index among the households not deprived of access to clean drinking water indicator also follows the same trend of multidimensional poverty headcount in 2007. Nevertheless, multidimensional poverty estimations among the households not deprived of access to clean drinking water indicator is high only in the urban areas in 2010 as compared to their counterparts without access to clean drinking water. This result suggests that contradictory to the general belief, provision of access to clean drinking water is high for the poorer households in Sri Lanka though it is not true in the estate areas. This can be due to the targeted interventions of governmental and nongovernmental organizations in providing access to clean drinking water for poor people in Sri Lanka.

Irrespective of the conditions of access to clean drinking water, multidimensional poverty relatively decreased between 2007 and 2010 other than in the estate areas in 2007. Table 4.22 shows that multidimensional poverty among the households deprived of access to clean drinking water indicator decreased by 11 percent in national level while it decreased by more than 64 per cent in urban areas.

Table 4.22: Percentage point difference and percentage change of multidimensional poverty estimates for *drinking water* indicator (in Living Standards Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of access to clean water	Urban	9.56	64.77	0.02	6.72	0.04	67.14
	Rural	1.97	12.00	0.00	0.35	0.01	12.31
	Estate	-0.89	-3.05	-0.02	-4.61	-0.01	-7.80
	Sri Lanka	2.65	11.48	-0.01	-1.95	0.01	9.76
Households not deprived of access to clean water	Urban	31.24	83.35	0.06	15.57	0.13	85.94
	Rural	19.87	62.21	0.05	11.45	0.08	66.54
	Estate	1.20	4.64	0.01	2.82	0.01	7.33
	Sri Lanka	1.22	9.84	0.02	4.14	0.01	13.57

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

Furthermore, multidimensional poverty headcount among the households deprived of access to clean drinking water indicator decreased by 12 per cent in the rural areas. Contradictory to these results, multidimensional poverty among the households deprived of access to clean drinking water indicator increased by three per cent in the estate areas. Even though multidimensional poverty headcount among the households deprived of access to clean drinking water indicator decreased between 2007 and 2010, the intensity of deprivation of multidimensional poverty increased by four per cent during the same period. This suggests that even though the prevalence of multidimensional poverty among households deprived of access to clean water indicator decreased, the severity of multidimensional poverty among the remaining poor further increased between 2007 and 2010. This implies that, more funds and emphasis is needed for further reduction of multidimensional poverty among this group. But, a minor decrease in the intensity of deprivations can be observed in urban and rural areas. Acute multidimensional poverty decreased almost in all areas other than estate areas which, shows a seven per cent increase in acute multidimensional poverty among the households deprived of access to

clean drinking water indicator between 2007 and 2010. Nevertheless, acute multidimensional poverty decreased by more than 60 per cent in urban areas among the households deprived of access to clean drinking water indicator due to the effect of a considerably decreased multidimensional poverty headcount.

Multidimensional poverty among the households not deprived of access to clean drinking water indicator decreased in all the areas where urban and rural areas showed considerably higher rates. Multidimensional poverty headcount among the households with access to clean drinking water decreased between 2007 and 2010 by 83 per cent and 62 per cent in urban and rural areas respectively. However, estate areas and Sri Lanka as a whole showed only less than 10 per cent decrease during the same period. Yet, the reduction of multidimensional poverty headcount among the households with access to clean drinking water is significantly higher than the households deprived of access to clean drinking water indicator. The intensity of deprivation and multidimensional poverty index also decreased in all the areas between 2007 and 2010 among the households with access to clean drinking water. This indicates that even though the prevalence and severity of poverty among the households with access to clean drinking water is high, a considerable reduction of multidimensional poverty can be observed in recent years.

Table 4.23 shows that housing floor conditions are highly correlate with multidimensional poverty levels. Households with improved housing floor report lesser multidimensional poverty levels while households deprived of improved housing floor indicator record higher multidimensional poverty levels. Multidimensional poverty headcount among the households deprived of improved housing floor indicator is around 35 per cent at national level in 2007 while it is more than 50 per cent in estate areas in the same year. Multidimensional poverty headcount among households deprived of improved housing floor indicator is 22 per cent and 31 per cent in urban and rural areas respectively. These multidimensional poverty headcounts are considerably higher than the multidimensional poverty headcounts of households deprived of other indicators of the

living standard dimension, suggesting that, if housing floor is mud or cow dung, then there is a higher probability to be multidimensionally poor.

Table 4.23: Analysis of multidimensional poverty for *improved floor* indicator (in Living Standards Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of improved floor	Urban	22.76	37	0.08	15.44	36	0.06
	Rural	31.78	36	0.11	23.77	36	0.09
	Estate	51.65	40	0.21	48.82	39	0.19
	Sri Lanka	34.79	37	0.13	26.08	37	0.10
Households not deprived of improved floor	Urban	5.73	35	0.02	6.13	34	0.02
	Rural	10.69	34	0.04	10.65	33	0.04
	Estate	35.87	39	0.14	28.21	37	0.10
	Sri Lanka	11.37	36	0.04	10.77	34	0.04

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

However, the intensity of deprivation is similar to the other indicators of the living standards dimension where it is 37 per cent at national level in 2007. The highest intensity of deprivation among the households deprived of improved floor is recorded in estate areas which is around 40 per cent. Following the same trend of multidimensional poverty headcount, estate areas records the highest multidimensional poverty index among the households deprived of improved floor followed by rural and urban areas.

Multidimensional poverty headcount among the households with improved floor is around 10 per cent in all the areas other than in the estate areas. Estate areas record more than 35 per cent multidimensional poverty prevalence among the households with access to improved floor. This is mainly due to the higher prevalence of multidimensional poverty in the estate areas. But, the multidimensional poverty headcount among household with improved floor in estate areas is still lesser than that of the households deprived of access to improved floor indicator. The intensity of deprivation and

multidimensional poverty index also follow the same trend of multidimensional poverty headcount, yet these estimates are also relatively lesser than the estimates among the households deprived of access to improved floor indicator.

Multidimensional poverty headcount among households without improved floor decreased by more than 25 per cent at national level between 2007 and 2010 (see table 4.24). This higher reduction of multidimensional poverty at national level is mostly due to the higher reduction of multidimensional poverty in urban (32.16 per cent) and rural (25.20 per cent) areas. Multidimensional poverty headcount among the households without access to improved housing floor in estate areas decreased only by five per cent between the same period. This indicates that households with poor housing conditions at urban and rural areas had performed better in reducing multidimensional poverty during the study period. Nevertheless, this performance cannot be observed in the estate areas. Households without improved floor did not show a higher reduction and their multidimensional poverty levels are significantly high as compared to the other areas. This suggests that, special attention for this group of households is required for a higher reduction of multidimensional poverty in Sri Lanka. However, a significant reduction of the intensity of deprivation, which measures the average percentage of deprivation among the poor people, cannot be seen in any area. The intensity of deprivation among households with poor housing conditions decreased by one per cent at national level, between 2007 and 2010, while it increased in rural areas during the same period. Reduction of multidimensional poverty index, which measures the acute multidimensional poverty, follows the same trend of multidimensional poverty headcount among the households deprived of housing floor. Reduction of acute multidimensional poverty is high among the urban and rural areas while it is much lesser in the estate areas. This relationship is observed mainly due to the effect of lower reduction of multidimensional poverty among the households with poor housing conditions in estate areas. However, multidimensional poverty reduction among the households with access to

improved housing floor is always lesser than the multidimensional poverty level among the households without improved floor.

Table 4.24: Percentage point difference and percentage change of multidimensional poverty estimates for improved floor indicator (in Living Standards Dimension) by areas

Sample	Area	MPH		ID		PGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of improved floor	Urban	7.32	32.16	0.01	2.64	0.03	33.95
	Rural	8.01	25.20	0.00	-0.13	0.03	25.11
	Estate	2.83	5.48	0.01	3.38	0.02	8.68
	Sri Lanka	8.71	25.04	0.00	1.01	0.03	25.79
Households not deprived of improved floor	Urban	-0.40	-6.98	0.01	3.45	0.00	-3.29
	Rural	0.04	0.37	0.01	2.92	0.00	3.28
	Estate	7.66	21.35	0.02	5.69	0.04	25.83
	Sri Lanka	0.60	5.28	0.01	4.16	0.00	9.22

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

The reduction of multidimensional poverty headcount among the households with access to improved floor is less than one per cent at national level between the two surveys while it increased by nearly 7 per cent in urban areas during the same period. Contradictory to the reduction of prevalence of multidimensional poverty among households with poor housing conditions, prevalence of multidimensional poverty among the households with improved floor in estate areas decreased considerably (by more than 20 per cent). This suggests that households with better housing conditions in estate areas performed better in reducing multidimensional poverty during the study period. Following the same pattern of reduction of the intensity of deprivation among the households without access to improved floor, the households with access to improved floor also do not show a significant reduction between 2007 and 2010. This suggests that multidimensional poverty conditions of the remaining poor households did not change significantly during the study period. The reduction of acute multidimensional poverty

among the households with access to improved floor is also smaller in all the areas other than in the estate areas. Reduction of multidimensional poverty index among the households with access to improved floor in estate areas is more than 25 per cent, mostly due to the higher reduction of multidimensional poverty headcount.

Majority of the households in Sri Lanka use firewood as their major source of cooking fuel and therefore considered as deprived of this indicator. This is mainly due to the easy access to firewood as well as due to the fact that firewood is relatively cheaper than the other sources of cooking fuel in Sri Lanka. Therefore, use of firewood as the major source of cooking fuel is more than 90 per cent irrespective of the area of living. Nonetheless, Table 4.25 shows that there is a significant difference in the estimated multidimensional poverty levels between the households deprived and not deprived of cleaner cooking fuel indicator.

Table 4.25: Analysis of multidimensional poverty for *cooking fuel* indicator (in Living Standards Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of cleaner cooking fuel	Urban	15.38	36	0.05	14.12	35	0.05
	Rural	18.86	36	0.07	16.58	35	0.06
	Estate	28.66	39	0.11	20.78	37	0.08
	Sri Lanka	20.69	37	0.08	17.71	36	0.06
Households not deprived of cleaner cooking fuel	Urban	2.07	36	0.01	2.21	34	0.01
	Rural	1.46	34	0.00	1.49	35	0.01
	Estate	7.50	30	0.02	n.a.	n.a.	n.a.
	Sri Lanka	1.87	35	0.01	1.91	34	0.01

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

Multidimensional poverty headcount among the households deprived of access to cleaner cooking fuel indicator at national level is more than 20 per cent in 2007. The highest multidimensional poverty headcount is recorded from the estate areas (28.66 per

cent) while urban and rural areas record 15 per cent and 19 per cent respectively. As many of the households are considered as deprived of this indicator by definition, these poverty estimates are more or less similar to the poverty estimates of the total sample. The highest intensity of deprivation among the households deprived of cleaner cooking fuel is also reported from estate areas which signifies that multidimensional poverty situation is worse in estate areas than in other areas. Due to significant effect of multidimensional poverty headcount, multidimensional poverty index also shows a similar trend of multidimensional poverty headcount among the households deprived of cleaner cooking fuel indicator. Multidimensional poverty index of the estate areas is 0.11 while it is 0.05 and 0.07 in urban and rural areas respectively. All the estimations of 2010 follow a similar trend of 2007.

It is interesting to find that the prevalence of multidimensional poverty is significantly lesser among the households not deprived of cleaner cooking fuel. Other than estate areas, all the other areas reports multidimensional poverty headcount below two per cent. This suggests that almost all the multidimensionally poor households use firewood as their major source of cooking fuel. The only difference is in the estate areas, where the multidimensional poverty headcount is recorded as 7.5 in 2007. The intensity of deprivation as well as multidimensional poverty index among the households not deprived of access to cleaner cooking fuel indicator is also significantly lesser than the estimates among the households deprived of access to cleaner cooking fuel indicator. Even though the multidimensional poverty estimates among the households not deprived of access to cleaner cooking fuel indicator in 2010 follow the same trend of 2007, there was no sufficient sample size for this category in estate areas for 2010. This is due to the fact that almost all of the poor households in estate areas use firewood as their major source of cooking fuel.

Table 4.26 shows that the reduction of multidimensional poverty among the households deprived of access to cleaner cooking fuel indicator is higher than the

households with access to cleaner cooking fuel. Multidimensional poverty headcount among the households deprived of access to cleaner cooking fuel indicator decreased by around 15 per cent at national level between the two surveys. The highest reduction of multidimensional poverty headcount is recorded from the estate areas which is 27 per cent between 2007 and 2010. Multidimensional poverty headcount among the households deprived of access to cleaner cooking fuel indicator is eight per cent and 12 percent in urban and rural areas respectively. There is no considerable difference in the reduction of the intensity of deprivation among the households deprived of access to cleaner cooking fuel indicator and all the areas records less than five per cent reduction of the intensity of deprivation. Reduction of acute multidimensional poverty among the households deprived of access to cleaner cooking fuel indicator is high in the estates areas which record more than 30 per cent reduction between the two surveys.

Table 4.26: Percentage point difference and percentage change of multidimensional poverty estimates for *cooking fuel* indicator (in Living Standards Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of cleaner cooking fuel	Urban	1.26	8.19	0.01	2.98	0.01	10.93
	Rural	2.28	12.09	0.01	1.94	0.01	13.80
	Estate	7.88	27.49	0.02	4.62	0.03	30.84
	Sri Lanka	2.98	14.40	0.01	3.09	0.01	17.05
Households not deprived of cleaner cooking fuel	Urban	-0.14	-6.76	0.02	4.54	0.00	-1.92
	Rural	-0.03	-2.05	-0.02	-4.56	0.00	-6.71
	Estate	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Sri Lanka	-0.04	-2.14	0.00	1.22	0.00	-0.89

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

The other areas record around 10 per cent reduction in multidimensional poverty index during the same period. All these reduction rates are also similar to the

multidimensional poverty reduction in the total sample between 2007 and 2010. Almost all the estimates of reduction in multidimensional poverty between two surveys among the households not deprived of access to cleaner cooking fuel indicator increased during the study period. But these estimations are highly questionable due to the smaller sample size of this group due to the definition of deprivation of this indicator (using firewood as a non-cleaner source of cooking fuel).

Table 4.27 shows that around 15 per cent of the households deprived of assets indicator are multidimensionally poor, which is significantly higher than the multidimensional poverty levels among the households not deprived of assets indicator.

Table 4.27: Analysis of multidimensional poverty for assets indicator (in Living Standards Dimension) by areas

Sample	Area	2007			2010		
		MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (Value)
Households deprived of assets	Urban	6.70	36	0.02	6.06	35	0.02
	Rural	14.41	37	0.05	12.68	36	0.05
	Estate	42.58	41	0.17	33.18	39	0.13
	Sri Lanka	15.28	38	0.06	12.89	36	0.05
Households not deprived of assets	Urban	1.20	40	0.00	1.78	33	0.01
	Rural	2.32	32	0.01	3.42	33	0.01
	Estate	n.a.	n.a.	n.a.	3.70	30	0.01
	Sri Lanka	1.91	33	0.01	2.93	33	0.01

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index.

The highest multidimensional poverty headcount among the households deprived of assets indicator is from the estate areas (more than 42 per cent), while urban and rural areas reports seven per cent and 14 per cent respectively in 2007. The intensity of deprivation also follow same trend of multidimensional poverty headcount where estate areas record the highest intensity of deprivations and rural and estate areas follow the next. The highest acute multidimensional poverty is also recorded from estate areas (17 in

2007) due to the effect of higher multidimensional poverty headcount during the study period. The estimates of 2010 also follow similar trends of 2007, yet almost all the estimates show relatively lower poverty levels. As in the households not deprived of cleaner cooking fuel indicator, the sample size of the households not deprived of assets indicator is smaller and the estimations are not reliable.

Multidimensional poverty headcount among the households deprived of assets indicator decreased by more than 15 per cent at national level during the study period (see Table 4.28). Multidimensional poverty headcount among the households deprived of assets indicator in estate areas decreased by more than 22 per cent and it decreased by 10 per cent and 12 per cent in urban and rural areas respectively.

Table 4.28: Percentage point difference and percentage change of multidimensional poverty estimates for *assets* indicator (in Living Standards Dimension) by areas

Sample	Area	MPH		ID		MPI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of assets	Urban	0.64	9.55	0.01	2.74	0.00	12.03
	Rural	1.73	12.01	0.01	3.31	0.01	14.92
	Estate	9.40	22.08	0.02	4.76	0.04	25.79
	Sri Lanka	2.39	15.64	0.01	3.94	0.01	18.97
Households not deprived of assets	Urban	-0.58	-48.33	0.07	17.59	0.00	-22.24
	Rural	-1.10	-47.41	-0.01	-3.47	0.00	-52.52
	Estate	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Sri Lanka	-1.02	-53.40	0.01	2.03	0.00	-50.29

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: MPH: Multidimensional Poverty Headcount, ID: Intensity of Deprivation, MPI: Multidimensional Poverty Index, (-) denotes lesser poverty with HIES 2010.

The intensity of deprivation did not change considerably between 2007 and 2010, yet decrease in multidimensional poverty index shows a similar trend of multidimensional poverty headcount index, mostly due to the higher effect of multidimensional poverty index. Even though most of the estimations among the households not deprived of assets

indicator show an increase of poverty in 2010, these estimations are not reliable due to the smaller sample sizes.

4.5 Conclusion

This chapter proposed a new method of selecting dimensions and allocating weights for the dimensions for the AF method in analysing multidimensional poverty trends and issues in Sri Lanka. Household Income and Expenditure Survey 2006/07 and 2009/10 were used as the primary data of the study. The chapter first proposed a data driven method of selecting dimensions and weighting dimensions. Polychoric Principal Component Analysis (PPCA) was employed in this regard. The study secondly estimated the multidimensional poverty headcount, the intensity of deprivations, and the MPI at national, provincial and district levels using the dimensions and weights drawn by the PPCA. Additionally, the chapter estimated the multidimensional poverty levels among the households deprived of each indicator of the multidimensional poverty index to the relationship of deprivation of other indicators with the particular indicator.

The proposed dimensional selection and weighting method add value to the standard Alkire and Foster method of multidimensional poverty analysis. The standard Alkire Foster method selects dimensions and allocates equal weights arbitrarily, but the proposed method use the actual behaviour of the data and select the dimensions and weights. If we add a new variable to the standard Alkire Foster method, the total weight of the particular dimension will be divided by the new number indicators in the standard Alkire Foster Method. But the statistical method proposed in this chapter first examines the actual relationship of the new variable among the existing variables and then allocate the weights based on the actual relationship of the new variable. Therefore, the proposed technique of dimensional selection and allocating weights using Polychoric Principal Component Analysis improve the standard Alkire Foster multidimensional poverty

estimation techniques. On the basis of the analysis using proposed method of dimensional selection and weight allocation, the following conclusions are derived.

First, based on the PPCA, six dimensions of multidimensional poverty in Sri Lanka could be identified, namely *economic wealth*, *housing condition*, *access to public services*, *health*, *access to clean water* and *education*. The PPCA also identified 18 indicators as important variables in explaining multidimensional poverty in Sri Lanka out of 22 variables included. In allocating weights among the dimensions and indicators, the highest weight was allocated for *economic wealth* dimension. This is justifiable as much of the variation of the original data is explained by the *economic wealth* dimension and most of the poor people in Sri Lanka are poor in the indicators included in this dimension. The next three dimensions, namely, *housing conditions*, *access to public services*, and *health* received similar weights while *access to clean water*, and *education* dimensions received lesser weights.

Second, the multidimensional poverty level of Sri Lanka estimated using HIES data is considerably high. One quarter of the total population of Sri Lanka was multidimensionally poor, while the levels were significantly high in the rural and estate areas. War affected North and Eastern Provinces and remote rural areas recorded a higher level of multidimensional poverty. The intensity of deprivation and acute multidimensional poverty also showed a similar trend as shown by the multidimensional poverty incidence. Multidimensional poverty in Western Province (and its districts) was considerably lower than the other areas, which is evident even in the monetary poverty levels.

Third, around a 25 per cent reduction of poverty could be seen between the two survey periods. The rate of reduction was considerably high in the estate areas followed by the rural areas. Showing the same trend of reduction of national multidimensional poverty, provinces and districts with a larger share of estate areas showed a higher rate of reduction of multidimensional poverty. When the total sample disaggregated by the ten

indicators of the multidimensional poverty index and estimate the multidimensional poverty levels, the same results of the total sample could be observed with disaggregated samples. It further confirmed that there is a significant reduction of multidimensional poverty between 2007 and 2010. The trend of multidimensional poverty in war affected areas could not be estimated as the HIES data were available only for one period of time for these areas. However, the only available district, “Batticaloa” showed that the multidimensional poverty levels increased in these areas. It is the only district that showed an increase in poverty.

Fourth, though the proposed PPCA based weight allocation and selection of dimensions propose improvement to the existing aggregation method of the Alkire Foster method, this approach also has a major drawback as a larger proportion of total weight is allocated for the first dimension selected. The method is appropriate for the selection of dimensions. The selected dimensions reflect the local socio economic conditions. However, as the first component of a PPCA explains most of the variation in data as the first dimension receives a larger weight. This can distort the poverty estimations, especially estimations of contribution from each dimension to the total MPI. This warrants further research on an alternative way of allocating weights for the Alkire Foster estimation method of multidimensional poverty.

Finally, the analysis of multidimensional poverty for different indicators of the multidimensional poverty index shows the necessity of different policies for the reduction of multidimensional poverty. For example, even though there is a higher reduction of multidimensional poverty among the households not having at least primary education in urban areas between 2007 and 2010, there is no such a huge reduction in estate areas. A higher reduction of multidimensional poverty in estate areas can be observed among the households at least with primary education. Therefore, multidimensional poverty reduction policies should be focused on the households with lower education levels in estate areas of Sri Lanka. On the other hand, it is clearly observed that a higher proportion

of children of multidimensionally poor households do not attend schools compared to the other households. Multidimensional poverty among the households with poor health conditions is also significantly high compared to the other households. Therefore, emphasis on these types of households is necessary if Sri Lanka needs to reduce its multidimensional poverty level further. Moreover, the study finds that multidimensional poverty among the households not having access to household utilities such as electricity, sanitary facilities, improved housing conditions, and without accumulated assets have higher level of poverty. Therefore, it is important to improve the access to household utilities and other public services to poor households for further reduction of multidimensional poverty. However, the study finds that there is no such a significant relationship between the access to clean drinking water and poverty in Sri Lanka. This is probably due to the fact that access to clean drinking water is high among the poor in Sri Lanka. However, with the analysis of multidimensional poverty for different indicators of multidimensional poverty suggests that “one size does not fit all”, therefore, it can be concluded that different interventions are needed for further reduction of multidimensional poverty in Sri Lanka.

Chapter 5

Poverty in the estate areas of Sri Lanka

Multidimensional poverty indices in Chapter 4 confirm that Sri Lanka has achieved a significant level of poverty reduction in recent years. However, the data source for estimating both the multidimensional as well as monetary poverty indices were the household income and expenditure survey data of the Department of Census and Statistics of Sri Lanka for the years 2007 and 2010. Measuring poverty with an alternative data source can provide further evidence of reduction of poverty or can question the estimated poverty levels of the HIES data. Furthermore, if recent data are available this will provide the recent trends in poverty in Sri Lanka. Therefore, this chapter analyses both multidimensional and monetary poverty levels of one of the poorest areas of Sri Lanka using data collected by the author, and makes a comparison between the estimated poverty levels of the HIES data and the author's data to find any significant difference in the estimated poverty levels using the two data sources. Furthermore, the study analyses the perceptions of the poor and relevant stake holders in the estate areas in order to complement the estimates of household data of both the surveys. In analysing the poverty in the estate areas, the study also estimates both monetary and multidimensional poverty levels among the households which are deprived of each indicator of the multidimensional poverty index using both HIES and the author's data.

5.1 Poverty in estate areas of Sri Lanka

Estate areas, comprised of different socio-economic characteristics of the urban and rural areas, are home to around one million people in Sri Lanka.²¹ Even though the estate areas contribute about 2.2 per cent to the total economy through foreign earnings (Plantations Ministry of Sri Lanka, 2012), the welfare level of these people is below the other areas (Shunsuke, 2012). Recently, some development programmes are taking place in the area, but welfare of the estate workers is not greatly improved due to historical facts, geographical location, and the ethnic composition (Centre for Poverty Analysis, 2005).

Monetary poverty estimates of the area are higher than the national averages for the past three decades and they were on an increasing trend until 2002 (DCS, 2009). However, HIES 2009/10 shows that monetary poverty in the estate areas decreased by more than 60 per cent within three years (DCS, 2011). The proportion of poor households in estate areas decreased from 32 per cent in 2007 to 11.4 per cent in 2009. This controversial improvement of the poverty estimates of HIES data led to the primary data collection and for a comparison of poverty estimates using the author's survey and HIES data. Furthermore, it is important to understand how the poor people themselves (in the estate areas) describe their poverty situation and recent improvements in their welfare.

5.1.1 *Monetary poverty estimates*

In analysing monetary poverty, three standard FGT measures, namely Headcount Index (HCI), Poverty Gap Index (PGI) and Squared Poverty Gap Index (SPGI) are estimated. Poverty levels for the total sample as well as for the samples disaggregated by the households deprived of 10 indicators are estimated. Data collected by the author in the estate areas of Badulla and Nuwaraeliya districts and the household income and expenditure data are used as the major data sources.

²¹ About 5 per cent of the total population of the country

Table 5.1 shows that monetary poverty headcount ratio, which shows the proportion of the poor population, is recorded as 12.6 per cent in HIES 2009/10 for Nuwara Eliya and Badulla districts while it is marginally increased to 16.7 per cent in the author's survey. Poverty gap index which measures the intensity of poverty also shows a similar trend between the two surveys. The average poverty gap, which was 1.9 per cent in 2009/10, increased to 2.3 in the author's survey. This signifies that poor people in the author's survey have become slightly poorer than in the HIES 2009/10.

However, inequality among the poor, which is shown by the squared poverty gap index, seems to be rather stable compared to the previous estimates. After disaggregating the total sample by the deprivation of different indicators, the increase in monetary poverty headcount cannot be seen with all the samples. Monetary poverty among the households who lacks access to electricity, cleaner cooking fuel and assets increased in the author's survey as is found in the total sample. Households with fewer or no assets have high risk of falling into poverty from small external shocks. Tea plantations are highly vulnerable to climate changes as well as external price variability which reduce the earning ability of estate works (GTZ, 2010). Therefore, the increased poverty among households lack of assets may be explained by the decreased tea prices²² in the world market as well as the unfavourable weather conditions in the districts in recent years. Almost all the households of the estate areas use firewood as the major cooking fuel, which is considered as a non-clean source of cooking fuel. Hence, the subsample of households lack of access to cleaner cooking fuel is also the same as the total sample.

Nevertheless, as expected, monetary poverty headcount of the without full primary schooling, with chronically ill or disabled member, and lack of access to

²² 2009 recorded the historical high tea prices in the world market (Fairtrade International) and by November 2013, it recorded the five years low (Financial Times)

Table 5.1: Monetary poverty estimates for estate areas of Nuwara Eliya and Badulla districts using the author's survey and HIES data

Sample		Author's Survey			Household Income and Expenditure Survey					
Year		2013			2010			2007		
Dimension	Index	HCI (%)	PGI (%)	SPGI (%)	HCI (%)	PGI (%)	SPGI (%)	HCI (%)	PGI (%)	SPGI (%)
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	49.4*** (4.17)	11.8*** (3.23)	3.9** (2.52)
	Primary schooling	10.9** (2.34)	2.2** (2.09)	0.5* (1.90)	14.9*** (4.17)	3.0*** (2.81)	1.2** (2.02)	34.7*** (8.17)	6.4*** (6.11)	1.8*** (4.61)
Health	Chronically ill/disabled	4.3* (1.76)	1.3 (1.63)	0.5 (1.42)	6.3** (2.42)	1.0** (2.19)	0.2* (1.74)	26.7*** (6.08)	3.3*** (4.52)	0.6*** (3.10)
	Hospitalized	18.2 (1.49)	3.9*** (14.80)	0.8 (1.45)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	20.7*** (2.70)	3.8* (1.94)	1.2 (1.58)	18.9*** (4.12)	2.9*** (2.62)	1.0 (1.50)	36.3*** (8.39)	6.5*** (6.03)	1.9*** (4.51)
	Sanitary facilities	18.4*** (4.12)	2.6*** (3.14)	0.6*** (2.64)	20.5*** (5.42)	3.7*** (4.41)	1.0*** (3.25)	28.8*** (7.56)	6.0*** (6.12)	1.7*** (5.02)
	Drinking water	12.0*** (3.18)	2.5*** (2.96)	0.6*** (2.63)	18.9*** (6.62)	3.4*** (4.53)	1.1*** (2.86)	33.9*** (10.34)	5.4*** (7.86)	1.4*** (5.70)
	Housing floor	18.4*** (6.04)	2.7*** (4.57)	0.6*** (3.53)	21.6*** (4.71)	4.3*** (3.33)	1.5** (2.07)	22.2*** (5.29)	4.6*** (4.12)	1.6*** (3.38)
	Cooking fuel	16.8*** (7.42)	2.4*** (5.81)	0.5*** (4.35)	12.9*** (8.31)	1.9*** (6.11)	0.5*** (3.70)	31.5*** (14.39)	5.3*** (10.89)	1.4*** (5.70)
	Assets availability	26.6*** (6.26)	3.8*** (4.79)	0.8*** (3.39)	19.6*** (6.87)	2.8*** (3.80)	0.8** (2.18)	31.5*** (6.05)	4.2*** (12.95)	1.3*** (4.99)
	Total	16.7*** (7.42)	2.3*** (5.80)	0.5*** (4.35)	12.6*** (8.30)	1.9*** (6.10)	0.5*** (3.70)	30.4*** (14.27)	5.2*** (10.84)	1.4*** (8.15)

Source: Author's estimates based on HIES 2009/10, 2006/07, and the author's survey data, Note; HCI: Headcount Index, PGI: Poverty Gap Index, SPGI: Squared Poverty Gap Index, N: Sample size, *, **, *** denotes 10%, 5% 1% significant respectively, n.a.: no sufficient data, t values are within parentheses

improved sanitary facilities, drinking water and improved floor further decreased in the author's survey. The average education level of Sri Lanka is continuously increasing over time (Institute of Policy Studies, 2010). The younger generation is more educated than the older generation. The increased educational level and the receiving of citizenship increased the mobility of the younger generation, thus most of them migrated to other areas of the country for work. This migration increased the working hours of the remaining less educated elderly people. Improved income of the less educated elderly people as well as the remittances from outside increased the consumption expenditure of the remaining less educated people of the estate areas. This may have reduced both the headcount index and poverty gap index among the households without full primary education.

A slight decrease of poverty among the households who have a chronically ill or disabled member is possibly due to the interventions of government and non-government institutions in the health sector. Households that are deprived of three housing related indicators, namely lack of access to safe sanitary facilities, to clean water, and improved floor show decreased poverty headcount ratios, implying that the population below the poverty line has decreased. Poverty gap index and squared poverty gap index also show the same decreasing trend, suggesting that intensity and severity of monetary poverty decreased in the author's survey. The government as well as non-government organizations provided many housing related facilities to the poor households and the selection of these beneficiaries was based on the existing housing conditions. Therefore, households with poor housing conditions have a higher probability of being selected as the beneficiaries of these government and non-government programmes. This may have reduced the poverty among these households.

Even though the two surveys are not strictly comparable, estimates of both surveys infer that there is a significant reduction in poverty during recent years in Sri Lanka (Table 5.2). Irrespective of the three years period after the HIES 2009/10, the prop-

Table 5.2: Percentage point difference and percentage change of monetary poverty estimates between the author's survey, HIES 2010 and HIES 2007 in the estate areas of Nuwara Eliya and Badulla districts

Dimension	Indicator	HCI		PGI		SPGI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between the author's survey 2013 and HIES 2010 (base year 2010)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-4.0	31.10	-0.8	32.05	-0.7	78.88
Health	Chronically ill/disabled	-2.0	38.34	0.3	22.45	0.2	64.76
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	1.8	8.93	0.9	25.45	0.3	22.92
	Sanitary facilities	-2.1	10.82	-1.1	35.23	-0.5	57.80
	Drinking water	-6.9	44.55	-0.9	31.01	-0.5	61.47
	Housing floor	-3.2	15.96	-1.6	45.93	-0.8	79.16
	Cooking fuel	3.9	26.24	1.4	20.29	-0.0	3.77
	Assets availability	7.0	30.37	0.9	28.22	-0.0	2.97
Total		4.1	28.02	0.5	22.08	-0.0	1.96
Between the author's survey 2013 and HIES 2007 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-23.9	68.70	-4.2	65.94	-1.8	70.38
Health	Chronically ill/disabled	-22.5	83.97	-2.0	60.37	-0.6	26.55
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-15.6	43.06	-2.7	41.19	-1.9	36.74
	Sanitary facilities	-10.4	35.98	-3.4	56.48	-1.7	65.97
	Drinking water	-21.9	64.65	-2.9	54.27	-1.4	58.40
	Housing floor	-3.8	17.16	-1.9	40.97	-1.6	59.15
	Cooking fuel	-14.7	46.55	-3.0	55.84	-1.4	64.69
	Assets availability	-4.9	15.61	-0.4	10.17	-1.3	36.17
Total		-13.7	45.19	-2.8	54.72	-1.4	63.79

Dimension	Indicator	HCI		PGI		SPGI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between HIES 2007 and HIES 2010 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-19.9	57.2	-3.4	52.9	-0.6	31.8
Health	Chronically ill/disabled	-20.4	76.4	-2.2	68.4	-0.4	62.5
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-17.4	47.9	-3.5	54.5	1.0	49.7
	Sanitary facilities	-8.2	28.7	-2.3	37.9	-0.7	38.3
	Drinking water	1-5.1	44.4	-2.0	37.5	-0.3	21.5
	Housing floor	-0.6	2.8	-0.3	5.8	-0.1	5.6
	Cooking fuel	-18.6	58.9	-3.4	64.0	-0.9	63.3
	Assets availability	-11.9	37.9	-1.4	32.4	-0.4	34.2
Total		-17.8	58.7	-3.3	63.7	-0.9	63.1

Source: Author's estimates based on HIES 2006/07, 2009/10 and the author's survey data, n.a: no sufficient data, (-) denotes poverty levels of the latest survey decreased compared to the previous survey.

tion of the poor people of these two districts is nearly 30 per cent higher than the HIES 2009/10 level. Furthermore, intensity among the remaining poor is also high in the author's survey. However, almost 50 per cent reduction of poverty could be observed between the author's survey and the HIES 2006/07. Reduction of monetary poverty levels among households lacks access to electricity, cleaner cooking fuel, and without assets is also higher between HIES 2009/10 and HIES 2006/07 than the reduction between the author's survey and HIES 2009/10. However, a decrease in monetary poverty among households without full primary education, with chronically ill or disabled member and poor housing conditions between the author's survey and HIES 2006/07 is higher than the reduction between HIES 2009/10 and 2006/07. The reasons for this higher reduction are explained in the above section.

It is interesting to see whether these changes in monetary poverty could also be seen in the multidimensional poverty estimates. Therefore, this study estimates multidimensional poverty levels for the two surveys using the Alkire Foster multidimensional poverty measurement method. Multidimensional poverty headcount (MPH), intensity of deprivations (ID) and multidimensional poverty index (MPI) are estimated and they are the multidimensional counterparts of standard FGT measures.

5.1.2 *Multidimensional poverty estimates*

Table 5.3 shows that multidimensional poverty headcount (MPH) of the author's survey is slightly higher than the MPH of the HIES 2009/10 as in the monetary poverty estimates. Intensity of deprivation (ID), which measures the average number of deprivations that poor households experienced, also marginally increased from HIES 2006/07. Multidimensional poverty estimates of the disaggregated samples of the author's survey also records a minor increase of poverty compared to the HIES 2009/10. However, the reduction of multidimensional poverty between the HIES 2006/07 and the author's survey amount to more than a 32 per cent decrease in MPH. Moreover, the desegregated

Table 5.3: Multidimensional poverty estimates for estate areas of Nuwara Eliya and Badulla districts using the author's survey and HIES data.

Sample		Author's Survey			Household Income and Expenditure Survey					
Year		2013			2010			2007		
Dimension	Index	MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (value)
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	39.13	0.57	0.22
	Primary schooling	35.56	0.38	0.14	26.12	0.42	0.11	32.95	0.46	0.15
Health	Chronically ill/disabled	36.84	0.47	0.17	25.62	0.40	0.10	44.91	0.44	0.20
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	42.07	0.43	0.18	35.00	0.38	0.13	53.15	0.39	0.21
	Sanitary facilities	32.42	0.39	0.13	29.17	0.37	0.11	44.10	0.39	0.17
	Drinking water	33.33	0.40	0.13	22.28	0.37	0.08	31.42	0.39	0.12
	Housing floor	44.17	0.42	0.18	43.90	0.37	0.16	55.36	0.39	0.22
	Cooking fuel	16.13	0.40	0.06	13.66	0.36	0.05	24.36	0.38	0.09
	Assets availability	41.28	0.43	0.18	39.25	0.37	0.15	52.28	0.38	0.20
Total		15.85	0.44	0.07	13.32	0.39	0.05	23.56	0.41	0.10

Source: Author's estimates based on HIES 2009/10, 2006/07, and the author's survey data, n.a.: no sufficient data. Note; MPH: multidimensional poverty headcount, ID: intensity of deprivations, MPI: multidimensional poverty index

samples also show a quite higher rate of reduction of multidimensional poverty between the author's survey and HIES 2006/07. This signifies that multidimensional poverty levels of these two districts also decreased in recent years.

Acute multidimensional poverty, which is measured by the multidimensional poverty index (MPI), shows that acute multidimensional poverty of the author's survey is 0.02 percentage points higher than the HIES 2009/10 level. This is also true for all the disaggregated samples. Even though there is a slight increase in multidimensional poverty between the HIES 2009/10 and the author's survey, the estimated differences of all the multidimensional poverty indexes between the author's survey and HIES 2006/07 are always similar to the reduction of multidimensional poverty between HIES 2009/10 and HIES 2006/07.

Table 5.4 suggests that though the reduction of monetary poverty between the two HIES surveys are confirmed by the monetary poverty estimates of the author's survey, the multidimensional poverty estimates of the author's survey do not lead to a clear conclusion. Multidimensional poverty estimates between the author's survey and HIES 2009/10 marginally increased while it decreased between the author's survey and the HIES 2006/07. This may be due to the fact that even though the household consumption expenditure (income) level of the household significantly increased in recent years, these increases may have not lead to significant differences in other achievements of the households.

This indicates that changes in monetary expenditure can occur within a shorter period of time while changes in other aspects of welfare may take a longer time. For instance, increased income may increase the household consumption expenditure which is easily observed. But it may take a much longer time to observe a one percentage change in education level of the head of the households. Therefore, the recent changes in the increased welfare levels of the households will be reflected in the multidimensional poverty estimates of later surveys.

Table 5.4: Percentage point difference and percentage change of multidimensional poverty estimates between the author's survey, HIES 2007 and HIES 2010 in the estate areas of Nuwara Eliya and Badulla districts

Dimension	Indicator	MPH		ID		MPI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between the author's survey 2013 and HIES 2010 (base year 2010)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	9.44	30.61	-0.03	7.79	0.03	22.95
Health	Chronically ill/disabled	11.22	35.93	0.07	16.56	0.07	51.72
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	7.07	18.35	0.06	14.23	0.05	32.36
	Sanitary facilities	3.25	10.55	0.02	4.35	0.02	14.89
	Drinking water	11.05	39.74	0.03	7.42	0.05	46.82
	Housing floor	0.27	0.61	0.05	11.82	0.02	12.43
	Cooking fuel	2.47	16.58	0.04	11.69	0.02	28.14
	Assets availability	2.03	5.04	0.06	14.85	0.03	19.86
Total		2.53	17.35	0.05	11.70	0.02	28.90
Between the author's survey 2013 and HIES 2007 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	2.61	7.92	-0.07	15.62	-0.01	8.94
Health	Chronically ill/disabled	-8.07	17.97	0.03	7.04	-0.02	12.20
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-11.08	20.85	0.05	12.50	-0.02	10.95
	Sanitary facilities	-11.68	26.49	-0.00	0.26	-0.05	26.68
	Drinking water	1.91	6.08	0.01	1.66	0.01	7.84
	Housing floor	-11.19	20.21	0.03	7.19	-0.03	14.47
	Cooking fuel	-8.23	33.78	0.03	7.20	-0.03	29.02
	Assets availability	-11.0	21.04	0.05	12.10	-0.02	11.48
Total		-7.71	32.72	0.03	7.78	-0.03	27.49

Dimension	Indicator	MPH		ID		MPI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between HIES 2007 and HIES 2010 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-6.83	20.73	-0.04	8.78	-0.04	27.69
Health	Chronically ill/disabled	-19.29	42.95	-0.04	9.33	-0.10	48.28
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-18.15	34.15	-0.01	2.45	-0.07	35.76
	Sanitary facilities	-14.93	33.85	-0.02	4.51	-0.06	36.84
	Drinking water	-9.14	29.09	-0.02	5.62	-0.04	33.08
	Housing floor	-11.46	20.70	-0.02	4.77	-0.05	24.48
	Cooking fuel	-10.70	43.92	-0.02	4.64	-0.04	46.53
	Assets availability	-13.03	24.92	-0.01	3.40	-0.06	27.47
Total		-10.24	43.46	-0.02	4.13	-0.04	45.80

Source: Author's estimates based on HIES 2006/07, HIES 2009/10, and the author's survey data, n.a.: no sufficient data, (-) denotes poverty levels of the latest survey decreased compared to previous survey.

5.2 Poverty in the estate areas of Badulla district

This subsection will estimate monetary and multidimensional poverty estimates of estate areas of Badulla district. Badulla district is considered as one of the poorest areas of Sri Lanka and is the home for more than 20 per cent of the estate workers of Sri Lanka. Tea plantations dominate the estate areas of the district though some rubber plantations are also available. Data for this section is derived from Badulla district data of the author's survey (142 households), HIES 2010 (214 households) and HIES 2007 (230 households). In estimating monetary poverty, the standard FGT monetary poverty indices are estimated, while Alkire and Foster counterparts of FGT indices are estimated in calculating the multidimensional poverty level.

5.2.1 Monetary poverty estimates

Table 5.5 shows the monetary poverty estimates of Badulla district using author's survey, and HIES 2010 and HIES 2007 data. Monetary poverty headcount of the author's survey is recorded as 19 per cent which is similar to the estimate of HIES 2010 (20 per cent) but less than the HIES 2007 (30 per cent). Monetary poverty prevalence is considerably high among the households with less assets as well as poorer housing conditions. Prevalence of monetary poverty is also considerably high among the households deprived of primary schooling indicator (none of the household members attained at least primary education) in the HIES survey data though it decreased in the author's survey data. This shows that irrespective of the level of education, income of the estate workers increased in recent years. This will be discussed in detail in the following chapter.

Depth of monetary poverty, measured by poverty gap index (PGI) is around two and even more than two in some samples indicating that the poor households in the estate areas of Badulla district are poorer than the other poorer households in Sri Lanka.

Table 5.5: Monetary poverty estimates for estate areas of Badulla district using the author's survey and HIES data

Sample		Author's Survey			Household Income and Expenditure Survey					
Year		2013			2010			2007		
Dimension	Index	HCI (%)	PGI (%)	SPGI (%)	HCI (%)	PGI (%)	SPGI (%)	HCI (%)	PGI (%)	SPGI (%)
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	47.5*** (3.26)	11.7*** (2.46)	4.1*** (2.08)
	Primary schooling	17.4** (2.15)	3.0* (1.90)	0.6* (1.78)	28.0*** (4.09)	7.5*** (2.68)	3.4** (2.05)	40.4 (0.67)	6.7*** (4.27)	2.1*** (2.77)
	Chronically ill/disabled	8.1** (1.78)	2.4*** (1.64)	0.9 (1.43)	6.0* (1.76)	1.1 (1.34)	0.4 (1.14)	32.0*** (4.58)	3.9*** (3.56)	0.7*** (2.63)
Health	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	26.3** (2.54)	5.6* (1.91)	1.9 (1.59)	34.0*** (3.88)	6.4** (2.06)	2.6 (1.35)	41.4*** (6.55)	7.7*** (6.51)	2.5*** (2.89)
	Sanitary facilities	18.2*** (3.09)	1.6** (2.27)	0.2* (1.73)	34.2*** (4.75)	8.0*** (3.70)	2.7** (2.88)	33.8*** (5.17)	6.4*** (3.81)	1.9*** (2.83)
	Drinking water	11.4** (2.09)	2.4** (2.05)	0.5** (1.96)	20.1*** (6.38)	3.9*** (4.30)	1.3*** (2.78)	40.5*** (6.32)	8.4*** (4.67)	2.7*** (3.29)
	Housing floor	21.7*** (4.77)	3.4*** (3.68)	0.6*** (28.80)	38.1*** (5.08)	8.2*** (3.13)	3.1** (2.00)	27.1*** (4.12)	6.5*** (2.86)	2.8*** (2.37)
	Cooking fuel	19.1*** (5.76)	2.9*** (46.12)	0.6*** (3.39)	21.1*** (7.29)	3.9*** (4.88)	1.3*** (3.14)	32.6*** (10.00)	6.3*** (7.23)	2.0*** (5.24)
	Assets availability	30.2*** (4.74)	4.8*** (3.71)	1.1** (2.54)	23.5*** (4.21)	4.1*** (4.44)	1.1*** (3.49)	38.5*** (9.34)	8.3*** (5.71)	1.7*** (7.43)
	Total	19.0*** (5.75)	2.9*** (4.61)	0.6*** (3.39)	20.8** (2.27)	3.9*** (4.91)	1.3*** (3.14)	30.9*** (9.82)	6.0*** (7.16)	1.8*** (5.21)

Source: Author's estimates based on HIES 2009/10, 2006/07, and the author's survey data, Note; HCI: Headcount Index, PGI: Poverty Gap Index. SPGI: Squared Poverty Gap Index, *, **, *** denotes 10%, 5% 1% significant respectively, n.a.: no sufficient data, t values are within parentheses

Severity of poverty measured by squared poverty gap index (SPGI) is high among the households in estate areas of Badulla district in HIES 2007 survey, nevertheless all three surveys record more than one per cent of squared poverty gap index. Though this is relatively high compared to the national estimates of severity of poverty, this is on par with the estimates of estate areas of the country. The high correlation of poverty and availability of assets, and housing condition is apparent as the availability of assets among the estate workers are very limited and most of these workers still live in line houses built more than five decades ago. As these workers are not the owners of the land and the houses that they are living in, the probability of improvement to these houses are also very limited. On the other hand, this suggests that their income levels are low such that they cannot invest in either household assets or improvement of their houses.

Data for child enrolment and hospitalization are not available. Child enrolment in Sri Lanka is almost 100 per cent as public education system is universally free which is also available in the estate areas. Also most of the primary schools are located within close proximity of the residential areas of estate workers (nevertheless, secondary schools are quite far from the residential areas which is not considered in the child enrolment indicator). Unavailability of data for hospitalization does not indicate that poor estate workers are healthier than the average poor people of the country, but rather due to the fact that estate workers do not become hospitalized frequently because of two reasons. As explained previously, estate workers are daily paid workers, if they become hospitalized, they may not get their wage for that day. On the other hand, hospitalization facilities are not available in most of the estate hospitals; therefore they have to travel to the nearest city, bearing an additional cost.

Following the trend of monetary poverty at national level, Table 5.6 shows that monetary poverty in the estate areas of Badulla district also significantly decreased in the latest surveys. Monetary poverty headcount of the HIES 2010 decreased by nearly 40 per cent between HIES 2010 and 2007, which is also confirmed by the author's survey.

Table 5.6: Percentage point difference and percentage change of monetary poverty estimates between the author's survey, HIES 2010 and HIES 2007 in the estate areas of Badulla district

Dimension	Indicator	HCI		PGI		SPGI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between the author's survey 2013 and HIES 2010 (base year 2010)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-10.6	46.61	-4.6	87.32	-2.8	138.29
Health	Chronically ill/disabled	2.1	30.32	1.4	76.92	0.5	83.61
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-7.7	25.55	-0.8	12.75	-0.8	33.83
	Sanitary facilities	-16.0	61.11	-6.4	133.09	-2.5	167.46
	Drinking water	-8.6	54.85	-1.5	47.71	-0.8	86.73
	Housing floor	-16.4	54.84	-4.8	83.19	5.5	94.43
	Cooking fuel	-1.9	9.67	1.0	29.96	-0.7	67.37
	Assets availability	6.6	24.74	0.7	15.69	0.0	1.47
Total		-1.8	9.02	-1.0	29.32	-0.6	66.79
Between the author's survey 2013 and HIES 2007 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	1.5	n.a.
	Primary schooling	-23.0	56.96	-3.8	56.21	-0.1	70.51
Health	Chronically ill/disabled	-23.9	74.68	-1.4	36.72		20.77
	Hospitalized	n.a.	n.a.	n.a.	n.a.	0.7	n.a.
Standard of living	Lighting source	-15.0	36.37	-2.1	26.97	1.7	27.04
	Sanitary facilities	-15.7	46.26	-4.8	75.06	2.2	87.49
	Drinking water	-29.1	71.78	-6.0	71.63	-5.9	81.06
	Housing floor	-5.4	19.90	-3.1	47.98	1.3	213.63
	Cooking fuel	-13.4	41.24	3.4	54.05	0.6	66.97
	Assets availability	-8.3	21.64	-3.4	41.70	1.5	35.93
Total		-11.09	38.41	-3.1	51.43	1.2	65.37

Dimension	Indicator	HCI		PGI		SPGI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between HIES 2007 and HIES 2010 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-10.1	30.8	0.8	11.7	1.3	61.6
Health	Chronically ill/disabled	-26.0	81.3	-2.8	71.9	-0.4	50.4
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-7.3	17.7	-1.3	17.0	0.1	2.7
	Sanitary facilities	0.3	1.0	1.6	24.2	0.8	41.2
	Drinking water	-20.4	50.4	-4.5	53.8	-1.4	52.0
	Housing floor	11.0	40.6	1.7	26.1	0.3	12.5
	Cooking fuel	-11.5	35.3	-2.4	37.9	-0.7	33.4
	Assets availability	-15.0	38.9	-4.1	50.2	-0.6	36.9
Total		-10.1	32.6	-2.1	35.3	-0.6	30.7

Source: Author's estimates based on HIES 2006/07, 2009/10 and the author's survey data, n.a: no sufficient data, (-) denotes poverty levels of the latest survey decreased compared to the previous survey.

Monetary poverty headcount decreased by more than 30 per cent between the author's survey and the HIES 2007. Moreover, monetary poverty headcount of the author's survey decreased by more than nine per cent as compared to HIES 2010. Nevertheless, estimates of the monetary poverty prevalence among the households deprived of different indicators of the multidimensional poverty index do not show a considerably decrease in poverty as shown by the aggregate figures. Monetary poverty headcount index of disaggregated samples also decreased between the HIES 2010 and 2007, yet monetary poverty headcount index of some samples increased between HIES surveys and the author's survey, i.e. chronically ill or disabled and availability of assets. However, monetary poverty headcount of the households deprived of access to improved sanitation and clean drinking water indicators of the authors survey decreased by more than 50 per cent compared to HIES 2010 and 2007.

The depth and severity of monetary poverty among the households in estate areas of Badulla district also decreased in recent years. Poverty gap index of the author's survey decreased by 30 per cent and 50 per cent compared to the HIES 2010 and 2007 respectively. Disaggregated samples also confirms the decreasing trend though poverty gap index among the households deprived of primary schooling shows an increasing trend. Severity of monetary poverty among the households in estate areas of Badulla district also follows a similar trend of prevalence and depth of poverty even though some of the estimates of squared poverty gap index is positive, suggesting that severity of poverty increased recently in disaggregated samples. All these indicate that monetary poverty in the estate areas of Badulla district decreased considerably in recent times.

5.2.2 *Multidimensional poverty estimates*

Table 5.7 shows multidimensional poverty levels among the households in estate areas of Badulla district for the three surveys. Multidimensional poverty headcount of the

Table 5.7: Multidimensional poverty estimates for estate areas of Badulla district using the author's survey and HIES data

Sample		Author's Survey			Household Income and Expenditure Survey					
Year		2013			2010			2007		
Dimension	Index	MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (value)
Education	Child enrolment	n.a.	n.a.	n.a.	75.00	0.460	0.345	46.15	0.593	0.273
	Primary schooling	13.04	0.333	0.043	6.38	0.407	0.026	14.08	0.511	0.072
Health	Chronically ill/disabled	10.81	0.333	0.036	8.70	0.403	0.035	12.77	0.537	0.069
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.		n.a.	n.a.	n.a.
Standard of living	Lighting source	57.89	0.379	0.219	54.29	0.384	0.209	44.62	0.391	0.174
	Sanitary facilities	25.00	0.370	0.092	46.94	0.387	0.182	42.11	0.397	0.167
	Drinking water	20.00	0.367	0.073	45.16	0.396	0.179	21.59	0.368	0.079
	Housing floor	31.33	0.362	0.113	51.06	0.381	0.194	44.90	0.385	0.173
	Cooking fuel	21.99	0.359	0.079	20.19	0.363	0.073	23.55	0.379	0.089
	Assets availability	32.08	0.369	0.118	22.23	0.369	0.082	35.85	0.399	0.143
Total		21.83	0.390	0.080	20.00	0.391	0.078	22.61	0.41	0.090

Source: Author's estimates based on HIES 2009/10, 2006/07, and the author's survey data, n.a.: no sufficient data. Note; MPH: multidimensional poverty headcount, ID: intensity of deprivations, MPI: multidimensional poverty index

the author's survey is 21 per cent while it is 20 and 22 per cent in the HIES 2010 and 2007 respectively. Multidimensional poverty estimates of the three surveys indicate that multidimensional poverty in the estate areas of Badulla district is significantly high among the households deprived of access to electricity indicator, which shows that almost 50 per cent of the households without access to electricity are multidimensionally poor (at least 30 per cent of the weighted indicators in this study). Even though data is not available for the author's survey, estimates show that prevalence of multidimensional poverty is high among the households with school aged children who however do not attend schools. As explained previously, public education in Sri Lanka is free and primary schooling is compulsory. Households with school aged children without attending schools means that those households are very poor. This is proven by the highest intensity of deprivation and multidimensional poverty index for this group. Intensity of deprivation is 0.46 and 0.59 in 2010 and 2007 respectively (average is around 0.38), multidimensional poverty index is 0.345 and 0.273 in 2010 and 2009 respectively (average is 0.100). This signifies that households with school aged children who however do not attend schools in the estate areas of Badulla district are poorer than the average poor households in the country. As in monetary poverty estimates, multidimensional poverty headcount of households deprived of assets indicator is also high in recent years.

Estimates of the intensity of deprivation of the three surveys suggest that poor households in estate areas of Badulla district are on average deprived of 40 per cent of the total weighted indicators of the multidimensional poverty index. In the disaggregated samples, households deprived of child enrolment indicator followed by households without access to electricity record the highest intensity of deprivation. The same trend can be observed with the multidimensional poverty index. Almost all the values of multidimensional poverty index are considerably higher than the national average.

Table 5.8 shows the changes of multidimensional poverty estimates in estate areas of Badulla district in recent years.

Table 5.8: Percentage point difference and percentage change of multidimensional poverty estimates between the author's survey, HIES 2007 and HIES 2010 in the estate areas of Badulla district

Dimension	Indicator	MPH		ID		MPI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between the author's survey 2013 and HIES 2010 (base year 2010)							
Education	Child enrolment						
	Primary schooling	6.66	68.59	-0.07	20.00	0.02	50.31
Health	Chronically ill/disabled	2.11	21.63	-0.07	18.87	0.00	2.79
	Hospitalized						
Standard of living	Lighting source	3.60	6.42	-0.01	1.42	0.01	5.00
	Sanitary facilities	-21.94	61.00	-0.02	4.56	-0.09	65.10
	Drinking water	-25.16	77.23	-0.03	7.80	-0.11	83.76
	Housing floor	-19.73	47.89	-0.02	5.13	-0.08	52.70
	Cooking fuel	1.80	8.53	0.00	1.01	0.01	7.53
	Assets availability	9.85	36.27	0.00	0.02	0.04	36.29
Total		1.83	8.75	0.00	.066	0.01	8.09
Between the author's survey 2013 and HIES 2007 (base year 2007)							
Education	Child enrolment						
	Primary schooling	-1.04	7.39	-0.18	34.78	-0.03	39.60
Health	Chronically ill/disabled	-1.96	15.35	-0.20	37.93	-0.03	47.46
	Hospitalized						
Standard of living	Lighting source	13.27	29.74	-0.01	3.07	0.04	25.75
	Sanitary facilities	-17.11	40.63	-0.03	6.93	-0.07	44.75
	Drinking water	-1.59	7.36	0.00	0.24	-0.01	7.59
	Housing floor	-13.57	30.22	-0.02	6.06	-0.06	34.45
	Cooking fuel	-1.56	6.62	-0.02	5.20	-0.01	11.48
	Assets availability	-3.77	10.52	-0.03	7.50	-0.02	17.23
Total		-0.78	3.45	-0.02	5.70	-0.01	8.95

Dimension	Indicator	MPH		ID		MPI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between HIES 2007 and HIES 2010 (base year 2007)							
Education	Child enrolment						
	Primary schooling	-7.70	54.69	-0.10	20.29	-0.05	63.88
Health	Chronically ill/disabled	-4.07	31.87	-0.13	25.00	-0.03	48.90
	Hospitalized						
Standard of living	Lighting source	9.67	21.67	-0.01	1.69	0.03	19.62
	Sanitary facilities	4.83	11.47	-0.01	2.58	0.01	8.59
	Drinking water	23.57	109.17	0.03	7.86	0.10	125.61
	Housing floor	6.16	13.72	0.00	1.12	0.02	12.45
	Cooking fuel	-3.36	14.27	-0.02	4.24	-0.02	17.90
	Assets availability	-13.62	37.99	-0.03	7.52	-0.06	42.66
Total		-2.61	11.54	-0.02	5.07	-0.01	16.03

Source: Author's estimates based on HIES 2006/07, HIES 2009/10, and the author's survey data, n.a.: no sufficient data, (-) denotes poverty levels of the latest survey decreased compared to previous survey.

Compared to the decrease of monetary poverty, multidimensional poverty of the estate areas of Badulla district decreased only by smaller percentages or increased in some cases. Multidimensional poverty headcount decreased by more than 11 per cent between the HIES 2007 and 2010, yet it again increased by one per cent between the authors survey and HIES 2010. In the disaggregated samples, multidimensional poverty among the households deprived of most of the housing conditions related indicators showed a higher trend of reduction in recent years. But some of the disaggregated samples (Households deprived of health and education related indicators) show that prevalence of multidimensional poverty increased during the same period. Decrease of the intensity of deprivation and multidimensional poverty index follow the same trend of multidimensional poverty headcount.

5.3 Poverty in the estate areas of Nuwaraeliya district

This subsection will estimate monetary poverty and multidimensional poverty in the estate areas of Nuwara Eliya district of Sri Lanka. Nuwara Eliya district is also considered as one of the poorest districts of the country (by monetary poverty standards). Nuwara Eliya district mostly consists of large scale tea plantations and it is the home for more than 40 per cent of the estate workers of the country. As in the previous section, authors survey (134 households) and HIES 2010 (272 households) and HIES 2007 (297 households) survey data of the estate areas of the district are the major data sources of this section. The standard FGT monetary poverty indices and Alkire and Foster multidimensional counter parts of monetary poverty indices are estimated.

5.3.1 Monetary poverty estimates

Table 5.9 shows that similar to the monetary poverty estimates of the estate areas of Badulla district, monetary poverty levels of the estate areas of Nuwara Eliya district are also considerably high.

Table 5.9: Monetary poverty estimates for estate areas of Nuwara Eliya district using the author's survey and HIES data

Sample		Author's Survey			Household Income and Expenditure Survey					
Year		2013			2010			2007		
Dimension	Index	HCI (%)	PGI (%)	SPGI (%)	HCI (%)	PGI (%)	SPGI (%)	HCI (%)	PGI (%)	SPGI (%)
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	51.7 (25.51)	12.0 (2.01)	3.7 (1.42)
	Primary schooling	4.3 (1.80)	1.4 (1.63)	0.4 (0.72)	7.8 (2.04)	0.6 (1.68)	0.1 (1.48)	31.3 (5.45)	6.2 (4.46)	1.6 (3.75)
Health	Chronically ill/disabled	n.a.	n.a.	n.a.	6.5 (1.75)	1.0 (1.73)	0.2 (1.69)	24.6 (4.48)	3.0 (3.29)	0.6 (2.24)
	Hospitalized	14.3 (4.3)	2.7 (0.10)	0.2 (0.30)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	10.0 (7.97)	0.4 (1.29)	0.0 (1.57)	11.6 (2.34)	1.3 (2.16)	0.2 (1.92)	33.7 (5.92)	5.9 (4.34)	1.6 (3.49)
	Sanitary facilities	18.8 (2.67)	3.9 (2.34)	1.0 (2.18)	14.5 (3.38)	1.8 (2.74)	0.3 (2.19)	27.1 (5.89)	5.8 (4.93)	1.6 (4.14)
	Drinking water	12.5 (2.36)	2.5 (2.12)	0.6 (1.83)	14.1 (2.10)	1.3 (1.67)	0.2 (1.50)	32.3 (8.56)	4.6 (6.42)	1.0 (4.79)
	Housing floor	15.0 (3.73)	2.0 (2.73)	0.5 (2.35)	8.4 (1.78)	1.2 (1.77)	0.2 (1.73)	20.0 (3.74)	3.7 (2.98)	1.0 (2.53)
	Cooking fuel	14.4 (4.69)	1.8 (3.55)	0.4 (2.79)	9.0 (4.97)	0.9 (4.00)	0.1 (3.21)	31.0 (11.02)	4.9 (8.29)	1.2 (6.31)
	Assets availability	23.2 (4.08)	2.8 (3.06)	0.5 (2.34)	13.3 (7.26)	1.4 (5.82)	0.2 (7.95)	33.3 (12.54)	5.2 (6.07)	0.2 (1.85)
	Total	14.2 (4.69)	1.7 (3.55)	0.4 (2.79)	8.6 (4.96)	0.9 (4.00)	0.1 (3.21)	30.2 (10.95)	4.8 (8.26)	1.2 (6.30)

Source: Author's estimates based on HIES 2009/10, 2006/07, and the author's survey data, Note; HCI: Headcount Index, PGI: Poverty Gap Index. SPGI: Squared Poverty Gap Index, *, **, *** denotes 10%, 5% 1% significant respectively, n.a.: no sufficient data, t values are within parentheses

Monetary poverty headcount of the authors survey in the estate areas of Nuwara Eliya district is around 14 per cent while it is around nine and 30 per cent in HIES 2010 and 2007 respectively. Estimates of the prevalence of monetary poverty in all the three samples are higher than the national average. Nevertheless, monetary poverty headcount of the estate areas of Nuwara Eliya district of the HIES 2010 is significantly lower than the two other surveys. In disaggregated samples, monetary poverty headcount among the households deprived of child enrolment indicator is quite high in HIES 2007. But data for this sample is not available for HIES 2010. As in Badulla district, availability of assets highly correlates with the prevalence of monetary poverty in the estate areas of Nuwara Eliya district. Monetary poverty headcount among the households deprived of assets indicator is 23 per cent in the author's survey while it is 13 and 30 per cent in HIES 2010 and 2007 respectively.

Compared to the levels of depth of poverty (measured by poverty gap index) recorded in Badulla district, poverty gap is relatively low in Nuwara Eliya district. Poverty gap of the author's survey is 1.7 per cent though it is little high in HIES 2007. Poverty gap among the households deprived of sanitary facilities indicator is the highest among the ten indicators of the multidimensional poverty index, indicating that monetary poverty conditions of the households without access to improved sanitary facilities is worse and need more attention. Squared poverty gap which measures the inequality among the poor people (severity of poverty) is also relatively low in the estate areas of Nuwara Eliya district compared to their counterparts of Badulla district. Severity of monetary poverty in the estate areas of Nuwara Eliya district is recorded as 0.4, 0.1 and 1.2 in the author's survey, HIES 2010 and HIES 2007 respectively. As in monetary poverty headcount and gap, severity is also high in the HIES 2007.

Table 5.10 shows the changes in monetary poverty levels between the author's survey and the two HIES surveys (2010 and 2009).

Table 5.10: Percentage point difference and percentage change of monetary poverty estimates between the author's survey, HIES 2010 and HIES 2007 in the estate areas of Nuwara Eliya district

Dimension	Indicator	HCI		PGI		SPGI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between the author's survey 2013 and HIES 2010 (base year 2010)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-3.4	56.57	0.8	86.68	0.4	153.47
Health	Chronically ill/disabled	n.a.	na	n.a.	n.a.	n.a.	n.a.
	Hospitalized	n.a.	na	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-1.6	14.96	-0.9	102.46	-0.2	163.76
	Sanitary facilities	4.3	25.65	2.1	74.74	0.7	109.31
	Drinking water	-1.6	11.76	1.2	61.37	0.4	105.34
	Housing floor	6.6	56.96	0.8	49.13	0.3	88.69
	Cooking fuel	5.4	46.63	0.8	61.29	0.2	84.15
	Assets availability	10.0	54.61	1.5	70.18	0.4	98.63
Total		5.5	48.65	0.8	63.22	0.2	85.91
Between the author's survey 2013 and HIES 2007 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-27.0	86.13	-4.8	77.37	1.6	72.35
Health	Chronically ill/disabled	n.a.	n.a.	n.a.	n.a.	n.a	n.a.
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a	n.a.
Standard of living	Lighting source	-23.7	70.36	-5.4	92.84	1.6	98.90
	Sanitary facilities	-8.3	30.70	-1.8	31.83	1.6	35.74
	Drinking water	-19.8	61.33	-2.1	45.32	1.0	40.23
	Housing floor	-5.0	24.84	-1.7	45.55	1.0	53.59
	Cooking fuel	-16.7	53.64	-3.1	63.92	1.2	70.27
	Assets availability	-10.0	30.20	-2.4	46.20	0.2	134.67
Total		-16.0	53.04	-3.0	63.45	1.2	69.88

Dimension	Indicator	HCI		PGI		SPGI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between HIES 2007 and HIES 2010 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	-23.6	75.2	-5.6	91.1	-1.6	96.4
Health	Chronically ill/disabled	-18.1	73.4	-2.0	67.0	-0.4	73.6
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-22.1	65.6	-4.6	77.8	-1.4	89.0
	Sanitary facilities	-12.6	46.5	-4.0	68.9	-1.3	81.2
	Drinking water	-18.3	56.5	-3.3	71.0	-0.8	81.5
	Housing floor	-11.6	58.2	-2.5	67.0	-0.8	82.1
	Cooking fuel	-22.1	71.2	-4.0	80.8	-1.1	87.9
	Assets availability	-20.0	60.1	-3.9	74.1	0.0	20.3
Total		-21.6	71.4	-3.9	81.0	-1.0	88.0

Source: Author's estimates based on HIES 2006/07, 2009/10 and the author's survey data, n.a: no sufficient data, (-) denotes poverty levels of the latest survey decreased compared to the previous survey.

Monetary poverty headcount of the estate areas of Nuwara Eliya district decreased by more than 50 per cent between the author's survey and the HIES 2007 as well as HIES 2007 and HIES 2010. However, there is nearly a 50 per cent increase in monetary poverty headcount between the author's survey and the HIES 2010. Nevertheless, monetary poverty headcount index of almost all the disaggregated samples show that there is a decrease in monetary poverty prevalence in all the three surveys. In disaggregated samples, monetary poverty headcount among the households deprived of access to electricity decreased by more than 70 per cent between HIES 2007 and the author's survey but the rate of reduction is reduced to less than 15 per cent between HIES 2010 and the author's survey. Other than that, in general, monetary poverty headcount among the households deprived of housing related indicators show a higher reduction between HIES 2007 and the author's survey as well as the HIES 2007 and HIES 2010.

As in the monetary poverty headcount, monetary poverty gap index of the estate areas of Nuwara Eliya district decreased more than 60 per cent between 2007 and the author's survey as well as HIES 2007 and HIES 2010. Yet, it records an increase in poverty gap index between the HIES 2010 and the author's survey. Poverty gap index of the disaggregated samples also shows the same trend of total sample. But some of the disaggregated samples (primary schooling, access to electricity and drinking water) show a reduction of poverty gap index even between HIES 2010 and the author's survey. Severity of poverty is increased in many of the disaggregated samples.

5.3.2 *Multidimensional poverty estimates*

This subsection will estimate the multidimensional poverty levels in the estate areas of Nuwara Eliya district of Sri Lanka. Alkire and Foster multidimensional poverty indices are estimated using both author's survey and HIES data.

Table 5.11 shows that compared to the monetary poverty estimates of the area, prevalence of multidimensional poverty is relatively high.

Table 5.11: Multidimensional poverty estimates for estate areas of Nuwara Eliya district using the author's survey and HIES data

Sample		Author's Survey			Household Income and Expenditure Survey					
Year		2013			2010			2007		
Dimension	Index	MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (value)	MPH (%)	ID (%)	MPI (value)
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	30.00	0.519	0.156
	Primary schooling	21.74	0.378	0.082	5.88	0.426	0.025	13.76	0.389	0.054
Health	Chronically ill/disabled	18.18	0.435	0.079	2.33	0.389	0.009	16.42	0.389	0.064
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	30.30	0.367	0.111	20.00	0.363	0.073	60.26	0.385	0.232
	Sanitary facilities	37.50	0.386	0.145	16.90	0.353	0.060	45.19	0.391	0.177
	Drinking water	17.00	0.333	0.057	26.92	0.376	0.101	26.22	0.392	0.103
	Housing floor	35.00	0.371	0.130	34.29	0.356	0.122	63.49	0.394	0.250
	Cooking fuel	25.00	0.365	0.091	8.37	0.356	0.030	25.00	0.377	0.094
	Assets availability	37.50	0.368	0.138	19.26	0.362	0.070	36.33	0.393	0.143
Total		24.63	0.400	0.100	8.06	0.391	0.032	24.32	0.410	0.100

Source: Author's estimates based on HIES 2009/10, 2006/07, and the author's survey data, n.a.: no sufficient data. Note; MPH: multidimensional poverty headcount, ID: intensity of deprivations, MPI: multidimensional poverty index

Nearly 25 per cent of the households in the estate areas of Nuwara Eliya district of the author's survey are multidimensionally poor which is similar to the rate in the HIES 2007. However, multidimensional poverty headcount of the HIES 2010 is much smaller (eight per cent). These estimates are similar to the multidimensional poverty headcounts recorded for Badulla district (other than HIES 2010) and considerably higher than the national averages. Households deprived of housing conditions and assets indicators show higher multidimensional poverty headcount ratios in the disaggregated samples. However, households with school aged children not attending schools also show a higher rate of multidimensional poverty headcount though the availability of data is limited to HIES 2006.

The intensity of deprivation which measures the average percentage of indicators deprived by poor people is around 40 per cent in all the three samples. Even though the prevalence of multidimensional poverty is less among the households with chronically ill or disabled member, the intensity of poverty is relatively high. This indicates that poor households with chronically ill or disabled person face more hardships than average poor households. The Intensity of multidimensional poverty among the households where none of the household members completed primary education is also relatively high, especially in the HIES 2010 and HIES 2007. Multidimensional poverty index which measures the acute multidimensional poverty is slightly higher in the estate areas of Nuwara Eliya district as compared to their counterparts in the Badulla district, but considerably higher than the national averages. Multidimensional poverty index value is around 0.1 in all the three samples. Households deprived of access to utilities such as electricity and water shows a higher multidimensional poverty index values mainly due to the effect of higher multidimensional poverty headcount ratios.

Table 5.12 shows that the reduction of multidimensional poverty in the estate areas of Nuwara Eliya district is less than the reduction of monetary poverty in the same areas in recent years.

Table 5.12: Percentage point difference and percentage change of multidimensional poverty estimates between the author's survey, HIES 2007 and HIES 2010 in the estate areas of Nuwaraeliya district

Dimension	Indicator	MPH		ID		MPI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between the author's survey 2013 and HIES 2010 (base year 2010)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	15.86	72.95	-0.05	12.75	0.06	69.51
Health	Chronically ill/disabled	15.85	87.18	0.05	10.64	0.07	88.55
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	10.30	33.99	0.00	1.01	0.04	34.66
	Sanitary facilities	20.60	54.93	0.03	8.63	0.09	58.82
	Drinking water	-9.92	58.35	-0.04	12.86	-0.04	78.71
	Housing floor	0.71	2.03	0.02	4.27	0.01	6.21
	Cooking fuel	16.63	66.52	0.01	2.35	0.06	67.31
	Assets availability	18.24	48.64	0.01	1.60	0.07	49.46
Total		16.57	67.28	0.01	1.48	0.07	67.76
Between the author's survey 2013 and HIES 2007 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	7.98	57.99	-0.01	2.86	0.03	53.48
Health	Chronically ill/disabled	1.76	10.72	0.05	11.90	0.02	23.90
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-29.96	49.72	-0.02	4.76	-0.12	52.11
	Sanitary facilities	-7.69	17.02	0.00	1.19	-0.03	18.01
	Drinking water	-9.22	35.16	-0.06	15.02	-0.05	44.90
	Housing floor	-28.49	44.87	-0.02	5.77	-0.12	48.05
	Cooking fuel	0.00	0.00	-0.01	3.40	0.00	3.40
	Assets availability	1.17	3.23	-0.02	6.19	0.00	3.16
Total		0.31	1.27	-0.01	1.98	0.00	0.73

Dimension	Indicator	MPH		ID		MPI	
		difference	Change (%)	difference	Change (%)	difference	Change (%)
Between HIES 2007 and HIES 2010 (base year 2007)							
Education	Child enrolment	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Primary schooling	7.98	57.99	-0.01	2.86	0.03	53.48
Health	Chronically ill/disabled	1.76	10.72	0.05	11.90	0.02	23.90
	Hospitalized	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Standard of living	Lighting source	-29.96	49.72	-0.02	4.76	-0.12	52.11
	Sanitary facilities	-7.69	17.02	0.00	1.19	-0.03	18.01
	Drinking water	-9.22	35.16	-0.06	15.02	-0.05	44.90
	Housing floor	-28.49	44.87	-0.02	5.77	-0.12	48.05
	Cooking fuel	0.00	0.00	-0.01	3.40	0.00	3.40
	Assets availability	1.17	3.23	-0.02	6.19	0.00	3.16
Total		0.31	0.27	-0.01	1.98	0.00	0.73

Source: Author's estimates based on HIES 2006/07, 2009/10 and the author's survey data, n.a: no sufficient data, (-) denotes poverty levels of the latest survey decreased compared to the previous survey.

The estimates further confirm that reduction of multidimensional poverty in the estate areas of Sri Lanka is lesser than the reduction of monetary poverty observed in the area. Multidimensional poverty headcount index increased by more than 50 per cent between HIES 2010 and the author's survey while there is no much difference in the estimated values of the multidimensional poverty headcount between HIES 2007 and the author's survey. Nevertheless, in the disaggregated samples, households deprived of access to electricity, improved sanitary facilities, clean drinking water and improved housing floor indicators show a significant reduction of multidimensional poverty headcount especially between HIES 2007 and the author's survey as well as the HIES 2007 and the HIES 2010. Reduction of the intensity of deprivations and multidimensional poverty index also follow a similar trend of multidimensional poverty headcount.

The analysis of monetary and multidimensional poverty in the estate areas of Badulla and Nuwara Eliya districts where more than half of the estate workers are concentrated suggests that there is a considerable reduction of monetary poverty in recent years. Even though, the level of multidimensional poverty also decreased during the same period, the percentages of reduction are relatively low as compared to the monetary poverty reduction. The estimates of the disaggregated samples by the ten indicators of the multidimensional poverty index also shows that poverty in the estate areas decreased in recent years, yet poverty among the households deprived of some indicators of the multidimensional poverty index decreased marginally or even increased in some cases.

5.4 Perceptions of the poor

To check the validity of the above estimates, individual and group interviews of estate workers were carried out in the same areas where household surveys were conducted. Furthermore, interviews were conducted with government and non-government workers who were engaged with the welfare of estate workers. Individual interviews with estate workers, social activists in the area and even some government

officers stated that there is no evidence for such a huge improvement in their lives during the past years; however, they stated that there is an improvement in their lives in recent years.

Table 5.13 shows that more than 27 per cent of the total sample expressed that there was an increase in their earning ability. The same trend could be observed with the ability to spend. More than 24 per cent of the households stated that there was an increase in spending ability in recent years. This suggests that there is a reduction of monetary poverty in the estate areas in recent years. Corresponding to the low level of reduction of multidimensional poverty in the two districts, only 17 per cent of households stated that their health conditions improved in recent years. Around 19 per cent of the households mentioned that they bought some kind of durable goods (television, DVD/VCD player, radio, bicycle or motorcycle etc.) in the past years while 27 per cent of them stated that they obtained new access to utilities.

Table 5.13: Perception of the poor on recent welfare changes

Item	Much improved		Improved		No change		Deteriorated		Much deteriorated		Total	
	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%	HHs	%
Ability to earn	9	3.26	65	23.55	129	46.74	55	19.93	18	6.52	276	100.0
Ability to spend	4	1.45	69	25.00	141	51.09	54	19.57	8	2.90	276	100.0
Health condition	4	1.45	45	16.30	164	59.42	59	21.38	4	1.45	276	100.0
Overall satisfaction	12	4.35	55	19.93	145	52.54	53	19.20	11	3.99	276	100.0

Source: Author's calculations using the author's survey data, Note: HHs: number of households

Around 25 per cent of them claimed that there was an increase in their overall satisfaction of life while only around 23 percent stated that their overall living conditions deteriorated in past years (the last row of Table 5.13). This suggests that the increased income has changed their living conditions as seen with HIES data and the author's survey data even though a huge reduction of multidimensional poverty could not be observed.

The estate workers mentioned that their earning ability within the estate areas deteriorated in recent years due to non-availability of work and less payments, therefore, most of them are trying to move out of estate areas for their earnings. They mostly work in the nearest cities as labourers for housing construction, cleaning activities, vending and farm activities. This makes their lives better than working in the estate. The younger generation prefers to work outside the estate areas, thus they migrate to different cities, mostly to the commercial capital Colombo. These internally migrated members remit a significant amount of money to the remaining members in the family.

Another recent development in the estate areas is the international migration of estate workers. Since they have been provided with Sri Lankan citizenship, they have access to a passport and thereby migrate to Middle Eastern countries as domestic workers. This international migration has brought a significant amount of remittances to the estate areas that have led to a significant difference in the lives of the remaining members in the household (Centre for Poverty Analysis, 2005). Within the residential areas, a clear difference can be seen between the households with a migrated (internal or international) member and without a migrated member. However, these migrants have brought a new culture to the estate areas. Most of them have bought televisions and satellite antennas, which can be easily seen above the poor houses. Mobile telephones and other communication equipment are also becoming popular. This has created an additional burden on the residents of the area as they are also trying to own these items, mostly on lease. This has increased household consumption expenditure while reducing savings. Almost all of them mentioned that they have no savings in recent years, and seek loans from plantation management, which creates a bond for their labour.

Improvements in availability of electricity and water were clearly seen in the area. Road accessibility was very poor in remote areas while it is becoming improved in areas near cities. Public services are gradually being provided. Health and education facilities are now being provided by the government even though some conflicts arise between

plantation management and the government. Access to public services is provided through the village officers while some mobile service clinics operate in their resident areas frequently. Furthermore, NGOs are active in popularizing public services among the estate workers.

Other than the above socio-economic changes in estate areas, the government recruited 3000 estate youths as government school teachers to be employed in the estate areas. The welfare level of these households is higher than the average of estate areas as they also receive the same salary scale of the other public school teachers of their grade.

Moreover, 2009 and 2010 had better climatic conditions in Sri Lanka and there were high tea and rubber prices in the world market (Central Bank of Sri Lanka, 2010). Because of these external conditions, production and demand for labour in the plantations were high. Due to the high demand for labour, workers may have worked full time or overtime which may have resulted in higher household income and consumption expenditure in the estate areas. Furthermore, by early 2009 Sri Lanka's civil war completely stopped. This resulted in a stable economic and political condition in the country and economic growth was quite high towards the end of the war. Also, the end of the war enhanced the mobility of estate workers, as they also speak Tamil language (minority language) which is spoken in the conflict areas. These may have improved the earning ability of estate workers by the time of HIES 2009/10 data collection.

These are the possible major reasons behind the higher reduction of poverty (especially monetary poverty) in Sri Lanka in recent years. This warrants a detailed analysis of possible sources of reduction of poverty and determinants of poverty in recent years in Sri Lanka, which is the aim of the next chapter of this thesis.

5.4 Conclusion

This chapter employed standard FGT monetary poverty estimates and their multidimensional counterparts of the Alkire-Foster method in order to estimate poverty in

the estate areas of Sri Lanka. The study used data of 276 households collected by the author in late 2013 in Nuwara Eliya and Badulla districts of Sri Lanka and the HIES 2009/10 and HIES 2006/07 survey data for the same districts. These two districts account for more than 60 per cent of the total estate areas of Sri Lanka and records higher poverty levels than the other districts.

The study found that poverty in the estate areas of these two districts is high compared to the national averages irrespective of the data type and analytical method used. The higher poverty levels could be observed with both monetary and multidimensional poverty estimates while multidimensional poverty is significantly higher than monetary poverty levels. A reduction of monetary poverty could be observed between the author's survey and HIES 2009/10 for most of the disaggregated samples while reduction of multidimensional poverty could be observed only between the author's survey and the HIES 2006/07. This suggests that the household consumption expenditure level of the estate workers has relatively increased in recent years. However, the increase in household income or household consumption expenditure will not lead to faster achievements in other aspects of life such as health, education and access to utilities.

Furthermore, HIES data shows a sharp reduction of monetary and multidimensional poverty in the estate areas of these two districts between HIES 2006/07 and HIES 2009/10. Even though a significant reduction of poverty can be observed between the author's survey and the HIES data, the reduction is lower than the difference between the two HIESs.

Perception of the estate workers reveals that their welfare levels have improved up to a certain level. The driving forces of these changes are the internal and external migration of the younger generation of estate workers. And, this has resulted in inadequate labour for plantations and broken relationships between workers and management. Residents in the estate areas feel that government is gradually providing

basic welfare services for them while plantation management is providing fewer services than in the past.

It is important to find the possible sources of the higher reduction of poverty in these areas in recent years. External factors (climatic conditions and socio economic conditions) may explain some parts of the difference and the improvements of the household's characteristics may explain some other. This will be explored in the next chapter.

The estate workers agree that their employment is guaranteed though there are some variations in working days and hours depending on weather conditions. But, they also feel that the income generated from estate labour is not enough for having a decent life. Therefore, the poverty situation in estate areas should be understood by the multidimensional nature of poverty. The provision of better health, education and other utilities is important in improving the lives of estate workers. Also, the complex nature of the cultural attitudes, geographical location, plantation management and last but not least their basic human rights should be understood in formulating any policies.

Chapter 6

An analysis of poverty reduction in Sri Lanka

Chapters 4 and 5 have confirmed that there was a significant reduction of poverty in Sri Lanka between 2007 and 2010. Is the reduction due to the changes in household characteristics such as increased education, improved health conditions or changes in employment or household sizes etc.? Or is it due to the recent socio-economic development of the country or some other environmental or external shocks? In order to find the answer, this chapter first analyses the recent socio-economic changes in Sri Lanka that could have affected the recent reduction of poverty. And then applies poverty decomposition techniques to determine the major causes of poverty reduction. Finally, the chapter identifies the determinants of poverty in Sri Lanka to find the sources of reduction of poverty at household level.

6.1 Macro-economic changes and poverty reduction

The Sri Lankan economy shows a higher GDP growth rate between 2007 and 2010. The political and economic stability of the country is improved due to the end of the civil war that prevailed during the previous three decades. Moreover, during the study period, climate conditions were conducive for agricultural production (especially for estate areas). Therefore, this section aims at analysing the changes in economic, political and environmental conditions of the country between the two survey periods. Due to the short study period (three years and two surveys) this subsection conducts a macro data analysis of descriptive nature.

Table 6.1 shows that Sri Lanka reported a higher GDP growth rate during the study period, especially in 2010. The annual average GDP growth rate of Sri Lanka is more than six per cent during the study period and, importantly, it is more than eight per cent in 2010. The agriculture sector, where most of the poor people live in Sri Lanka also recorded a higher average annual growth rate of 5.27, of which the growth rate is nearly seven per cent in 2010.

Table 6.1: Annual GDP growth rates of Sri Lanka by sector

Sector	2007 (%)	2008 (%)	2009 (%)	2010 (%)	2007-2010 (%)
Agriculture	3.39	7.53	3.22	6.95	5.27
Tea	-1.83	4.18	-8.44	13.84	1.94
Rubber	4.25	10.34	7.92	12.67	8.79
Coconut	5.08	5.17	5.35	-14.34	0.32
Industry	7.61	5.92	4.21	8.44	6.55
Services	7.12	5.65	3.28	8.03	6.02
GDP	6.80	5.95	3.54	8.02	6.08

Source: Author's compilation using Annual Reports of Central Bank of Sri Lanka from 2006 to 2010

The tea sector, which contains most of the estate areas, has also shown average annual growth rate of two per cent during the study period, but the growth rate of tea sector is nearly 14 per cent in 2010. Rubber and coconut sectors have also shown a higher annual average growth rates during the study period. Table 6.2 shows that the higher GDP growth rates can also be observed at the provincial level other than in Western Province.

Table 6.2: GDP Growth rates by province

Province	Annual growth (%)			
	2007	2008	2009	2010
Western	-0.9	3.5	4.5	5.7
Central	16.1	7.6	3.9	10.8
Southern	13.2	5.8	3.5	9.6
Northern	11.6	14.6	5.9	13.5
Eastern	13.4	14.2	7.1	11.4
North Western	16.1	6.6	0.4	6.9
North Central	6.1	24.6	1.1	12.4
Uva	23.8	-2.8	3.5	7.6
Sabaragamuwa	13.4	4.9	-1.1	10.9
Sri Lanka	6.8	5.9	3.6	8.0

Source: Central Bank of Sri Lanka (Annual Report, 2007-2010)

Remote rural provinces such as North Central, Sabaragamuwa, Northern, Eastern, Southern and Central Provinces which are traditionally considered as poor provinces, have recorded an impressive annual average GDP growth rates in recent years.

This higher level of GDP growth has brought significant improvements in the level of household income and consumption expenditure. Table 6.3 shows the increase in household income and expenditure during the two surveys. Around 38 percent increase in mean household income can be observed at the national level while the income level at rural and estate areas increased faster than urban areas. Mean household consumption expenditure also shows a similar increase between the two periods while household consumption expenditure increased faster in the estate areas than the other areas. This suggests that increased economic growth has led to significant increase in household income and consumption expenditure, especially in the poorer areas which could lead to a higher reduction of poverty.

Table 6.3: Mean household income and consumption expenditure (in current prices)

Area	Mean household income (Rs.)			Mean household consumption expenditure (Rs.)		
	2007	2010	Change %	2007	2010	Change %
Urban	41,928	47,783	13.96	35,274	44,928	27.37
Rural	24,039	35,228	46.55	21,440	29,423	37.23
Estate	19,292	24,162	25.24	13,456	23,988	78.27
National	26,286	36,451	38.67	22,952	31,331	36.51

Source: Department Census and Statistics of Sri Lanka, using HIES 2006/07 and HIES 2009/10 data

However, according to the literature on poverty and economic growth (Bourguignon, 2003; Fosu, 2011), growth alone may not reduce poverty; it needs to accompany fair redistribution. Therefore, it is important to examine the trends in inequality during this period. Table 6.4 shows that inequality, measured by the Gini coefficient²³, decreased between the two survey periods for the first time in recent history.

²³ Gini coefficient is estimated using household consumption expenditure

The Gini coefficient which was 0.41 in 2007 at the national level decreased to 0.38. Estate areas record a sharp reduction of Gini coefficient, which was 0.38 in 2007 and 0.30 in 2010. Confirming the decrease in the Gini coefficient, the share of income received by the richest 20 per cent of the country decreased while the share of income of the poorest 40 per cent increased during the study period.

Table 6.4: Changes in inequality measures between 2007 and 2010

Area	Gini coefficient		% of income received by			
			Richest 20 %		Poorest 40%	
	2007	2010	2007	2010	2007	2010
Urban	0.42	0.41	59.3	53.3	11.9	13.6
Rural	0.39	0.37	51.8	53.8	13.6	14.2
Estate	0.38	0.30	61.7	49.4	12.6	16.4
National	0.41	0.38	54.7	54.1	13.2	13.3

Source: Department of Census and statistics of Sri Lanka based on HIES 2006/07 and HIES 2009/10

Table 6.5 shows that government welfare expenditure, which is mostly directed at poor people, has also increased during the study period. Government expenditure on health increased nearly by 15 per cent in 2010 while public expenditure on education increased by more than 12 per cent. Furthermore, public expenditure on social welfare increased by more than 21 per cent by the latest survey. Even though the welfare payment of the *Samurdhi* programme – the public welfare programme dedicated for uplifting the lives of poor people – did not show a significant increase, the programme was included under a new ministry, with a budget of more than Rs. 65,000 million.

Table 6.5: Public expenditure on welfare (Rs. million in current prices)

Year	Health	Education	Social Welfare	<i>Samurdhi</i>	Needy people	Fertilizer subsidy
2007	68,702	92,500	120,015	9,200	1,666	11,000
2010	78,585	104,248	145,758	9,241	6,638	26,028

Source: Ministry of Finance and Planning (2012) and Annual Report of Central Bank of Sri Lanka (2008-2012)

Government transfers to the needy people increased by more than threefold between the two survey periods. These transfers are targeted specifically at old aged people and chronically ill or disabled people, thus it shows a significant increase in

monetary assistance to the poorest of the poor people. Furthermore, public expenditure on fertilizer subsidy, which is targeted at poor paddy farmers, increased by more than 136 per cent during the study period. Under the fertilizer subsidy programme, the government subsidizes more than 85 per cent of the market price of the fertilizer and farmers bear only less than 15 per cent of the market price.

These increases of welfare payment were accompanied by a relatively lower level of inflation rate during the latest survey. Inflation, which is measured by the consumer price index, was recorded as 15.8 in 2007, while it drastically decreased to 5.9 by 2010. Due to reduction of inflation, the effect of increased household incomes as well as government subsidies on the reduction of poverty is high in recent years.

While higher GDP growth rates were recorded, the country also experienced stable socio-political conditions during the study period. Sri Lanka was badly affected by the civil war that it experienced from the early 1980s. The intense fighting between government forces and (Fighters of Liberation Tigers of Tamil Eelam (LTTE))²⁴ continued for three decades. Economic centres such as the Central Bank of Sri Lanka and the only international airport were destroyed. The civil life of the country was affected by the war to the extent that Sri Lanka was listed as a dangerous place to visit by many developed countries. The development of the Northern and Eastern Provinces was far behind the other provinces due to the fighting. The movement of estate Tamil workers was further reduced due to their fear of being arrested as LTTE Fighters.

By early 2007, government armies started taking control of the areas previously controlled by LTTE Fighters and then by early 2009, government armies took control of the all the areas. The road barriers and check points were withdrawn, enhancing free movement within the country. This especially affected the welfare of estate workers whose free movements were significantly hindered by the war. The estate Tamil workers

²⁴ Fighters of the Liberation Tigers of Tamil Eelam (LTTE) fought for a separate land for Tamils originating from north of the country.

started domestic and international migration, which contributed to a significant improvement in their level of welfare.

This stable political condition may have positively affected the higher reduction of poverty in recent years. Increased demand for labour with the improved economic conditions increase the wage rates of the workers. Free movement of the public may also increase economic efficiency. After the fighting ended, Sri Lanka experienced an increase in foreign investment (Central Bank of Sri Lanka, 2013) and development assistance, especially for the development of war affected areas. The number of tourist arrivals jumped from 447,890 in 2007 to 654,476 by 2010.²⁵ All these suggest that increased economic and political stability of the country also may have positively affected on the recent reduction of poverty.

As poverty levels at estate areas considerably decreased in 2010, it is important to see what factors affected estate areas other than the above. Table 6.6 shows that production and prices of three major plantation products of Sri Lanka substantially increased between the two survey periods.

Table 6.6: Production and prices of tea, rubber and coconut

Year	Production (Kg. million)			Prices (Rs.)				
				Tea		Rubber		coconut
	Tea	Rubber	Coconut	Colombo auction	Export	Colombo auction	Export	Export
2007	304	118	2,869	279	364	234	234	24
2010	329	153	2,317	372	494	403	374	26

Source: Annual Report of Central Bank of Sri Lanka (2008-2012)

Production of tea recorded the highest ever production, which is a more than 8 per cent growth between the two survey periods. The average yield per hectare of tea also increased to a record yield of 1484 kg per hectare. This higher production is mainly due to fertilizer subsidies for the small scale tea producers and the favourable weather

²⁵ This further increased to 1,274,593 by 2013.

conditions²⁶ of the tea producing districts (Central Bank of Sri Lanka, 2010). Increased tea production was also accompanied by a 33 per cent increase in tea prices at Colombo tea auction which is fuelled by the increase in export tea prices (nearly 36 per cent).

Production of rubber also recorded more than a 30 per cent increase between the two survey years which also was accompanied with more than a 70 percent increase of average price of rubber at Colombo auction and nearly 60 per cent of export prices. Even though production of coconut decreased by 20 per cent, export prices of coconut increased slightly. The increase of oil prices and adverse weather conditions of rubber exporting countries led for a substantial increase in rubber prices.

Furthermore, the workers' unrest in the estate areas was least during the latest survey. Table 6.7 shows that nearly 200,000 workers were involved in strikes and the sector lost nearly five million work days of which the workers did not receive their wages in 2007. The number of workers involved in strikes considerably decreased in 2010, and only 23,000 work days were lost. Importantly, there were only three strikes in which 300 workers were involved and 300 work days lost in 2009. One of the major reasons for the lesser number of strikes is the continuous increase in daily wages of estate workers in recent years.

Table 6.7: Workers' unrest

Year	Worker's unrest (number of)		
	strikes	workers	man days
2007	19	196,520	4,821,394
2010	9	3,185	23,037

Source: Annual Report of Central Bank of Sri Lanka (2008-2012)

Table 6.8 shows that the average daily wages of estate workers increased by 50 per cent in recent years. Average daily wages of male workers of the tea sector increased by more than 43 per cent while it increased by 50 per cent for female workers. The

²⁶ The average rainfall of Kandy, Nuwaraeliya and Ratnapura districts was 2202 mm (185 rainy days) in 2007, which increased to 3136 mm (204 rainy days) in 2010.

highest increase in daily wages was recorded by the rubber sector where average daily wages of male workers increased by 53 per cent while average daily wages of female workers increased by nearly 66 per cent. Average daily wages of the coconut sector also shows more than a 42 per cent increase between the two survey periods. The increase in average daily wages increases the income of estate workers, which leads to an increase in household consumption expenditure, thus a reduction of poverty. Moreover, due to the stable labour conditions in the plantation sector, productivity of the sector also may have increased.

Table 6.8: Average daily wages in estate areas

Year	Average daily wage (Rs.)					
	Tea		Rubber		Coconut	
	Male	Female	Male	Female	Male	Female
2007	378	261	384	279	490	453
2010	543	391	588	463	699	658

Source: Annual Report of Central Bank of Sri Lanka (2008-2012)

According to the Central Bank of Sri Lanka (2010), government budget allocation for ministry of plantation industries which aimed at development of the plantation industries also increased by 40 per cent between the survey periods (Rs. 110,910 million in 2007 and Rs 156,194 million in 2010). Furthermore, government social welfare payments to the estate areas amount to Rs. 677 million in 2010.

The ending of the civil conflict also positively affected the welfare of estate workers. The free movement allowed for domestic and international migration, which improved their earnings as well as access to new technologies and knowledge. These factors have resulted in an increase of household income and consumption expenditure of the estate areas, which have led to a significant reduction in poverty.

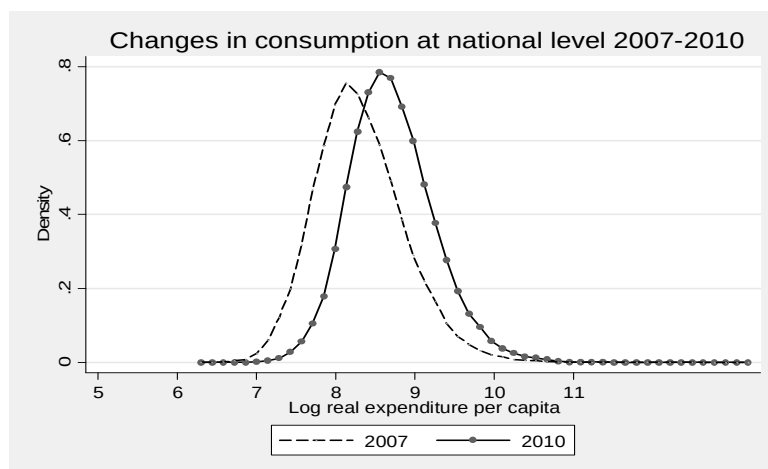
This section discussed the macro level changes of the country during the study period that could have led to the recent reduction of poverty in Sri Lanka. The next section will examine the sources of reduction of poverty using poverty decomposition analysis.

6.2 Sources of poverty reduction

This section estimates the overall change in household consumption expenditure per capita between 2007 and 2010, and decomposes it into two components. One component that is due to the changes in observable household characteristics, such as increased education level, increased employment, decreased household sizes and so on, and the other component that is due to the changes in returns to observable characteristics with the recent socio-economic conditions of the country (this component also includes the effect of changes in unobservable household characteristics on household consumption expenditure). Conditional quantile regression (Machado and Mata, 2005) and unconditional quantile regression (Fortin, Lemieux and Firpo, 2011) decomposition techniques, which are the extensions of the Blinder-Oaxaca counterfactual decomposition technique (Blinder, 1973; Oaxaca, 1973), are applied in decomposing the change in welfare measure. Household consumption expenditure per capita is used as a proxy for the welfare measure, which is a common practice in poverty research (Grootaert, 1997; Duclos and Araar, 2006; Heltberg, 2003; Deaton, 1997; Atkinson, 1991).

Figure 6.1 shows that there is a significant increase in logarithm of real household consumption expenditure per capita between 2007 and 2010.

Figure 6.1: Kernel density curves of the changes in household consumption expenditure per capita between 2007 and 2010 at national level

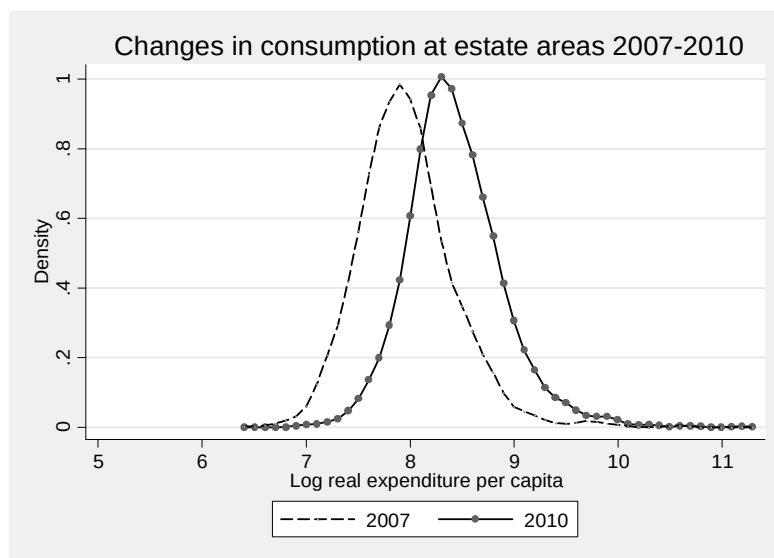


Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data

The distribution of logarithm of real household consumption expenditure per capita of 2010 always lies towards the right hand side of the distribution of 2007. This suggests that real household consumption expenditure increased between the two survey periods. This is true for national as well as estate areas.

Figure 6.2 depicts that the real household consumption expenditure per capita distribution of the estate areas is always lower than the national distribution which indicates the higher poverty levels in estate areas compared to the other areas, as observed in Chapters 4 and 5. Nevertheless, the increase in household consumption expenditure per capita of the estate areas is higher than the national averages at any level between 2007 and 2010.

Figure 6.2: Kernel density curves of the changes in household consumption expenditure per capita between 2007 and 2010 in estate areas



Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data

This is in line with the higher reduction of poverty levels of the estate areas especially with monetary poverty estimates in recent years, which is also observed in the previous two chapters. This indicates that the increase in household consumption expenditure has a positive relationship with recent poverty reduction in Sri Lanka, especially for the estate areas. In order to determine the causes of the increase in

household consumption expenditure per capita during the two survey periods, first quantile regression based poverty decomposition analyses are conducted.

6.2.1 Results

(a) Conditional quantile regression decomposition (Machado and Mata, 2005)

Table 6.9 shows the decomposition results of the change in real household consumption expenditure per capita between 2007 and 2010 using conditional quantile regression analysis (Machado and Mata, 2005).

Table 6.9: Decomposition of the change in household consumption expenditure per capita between 2007 and 2010 using conditional quantile regression analysis

	Percentile					
	Mean	5 th	25 th	50 th	75 th	95 th
Overall change						
National	0.401*** (0.006)	0.441*** (0.011)	0.420*** (0.007)	0.409*** (0.006)	0.381*** (0.008)	0.360*** (0.014)
Estate	0.468*** (0.016)	0.470*** (0.031)	0.474*** (0.017)	0.452*** (0.016)	0.480*** (0.020)	0.473*** (0.047)
Unexplained component by the differences in observable characteristics						
National	0.343*** (0.005)	0.377*** (0.020)	0.359*** (0.013)	0.346*** (0.012)	0.330*** (0.014)	0.313*** (0.026)
Estate	0.402*** (0.013)	0.405*** (0.016)	0.408*** (0.010)	0.406*** (0.009)	0.394*** (0.013)	0.413*** (0.025)
Unexplained component as a percentage of overall change						
National	85.46	85.69	85.40	84.50	86.59	87.06
Estate	85.94	86.10	86.12	89.87	82.03	87.18

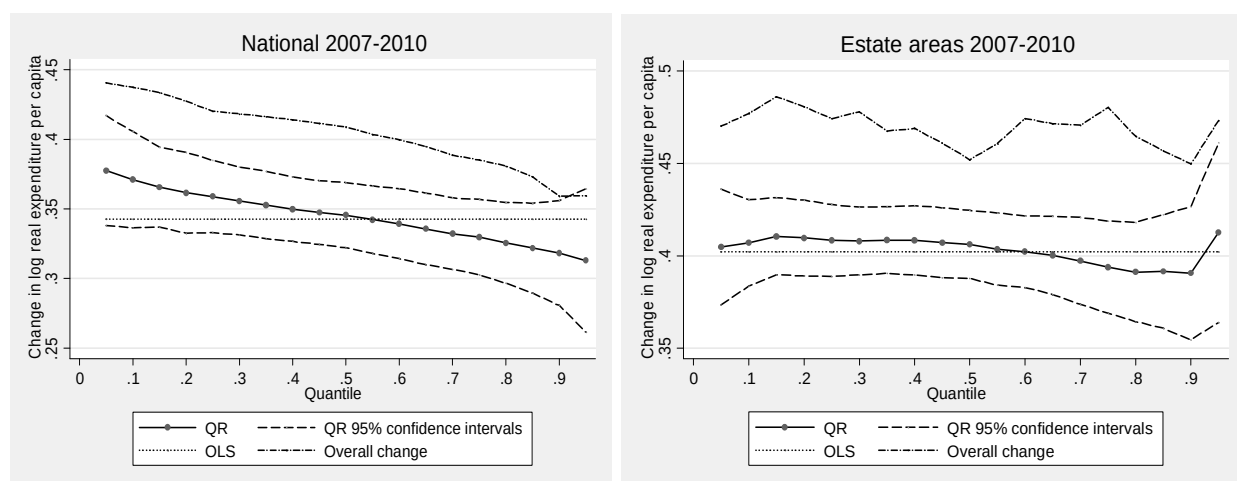
Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *** denotes 1% significant, Standard deviations are within parentheses

The first panel shows the overall change in household consumption expenditure between 2007 and 2010. The second panel shows the unexplained component, estimated using counterfactual distribution of the household characteristics, which is termed as “returns to household characteristics”. The second column shows the decomposition results using OLS (Blinder – Oaxaca) which decomposes the observed change in household consumption expenditure at the mean, and the rest of the columns show the

decomposition at different quantiles (5th, 25th, 50th, 75th, and 95th) using Machado and Mata decomposition technique. All the estimations are statistically significant at 1 per cent level.

The increase in logarithm of real household consumption expenditure per capita between 2007 and 2010 is 0.40 at the 5th quantile while it is 0.36 at the 95th quantile at the national level. This indicates that the overall increase in real household consumption expenditure per capita is high for the lower quantiles of the national sample. The downward sloped “Overall change” curve on the left hand side in Figure 6.3 clearly depicts that change in household consumption expenditure per capita for the upper quantiles gradually decreases. The overall change in household consumption expenditure per capita in the estate areas is always higher than the change in national level. The logarithm of household consumption expenditure per capita of the 5th and the 95th quantiles of estate areas increased by 0.47, while it increased by 0.45 for the median quantile.

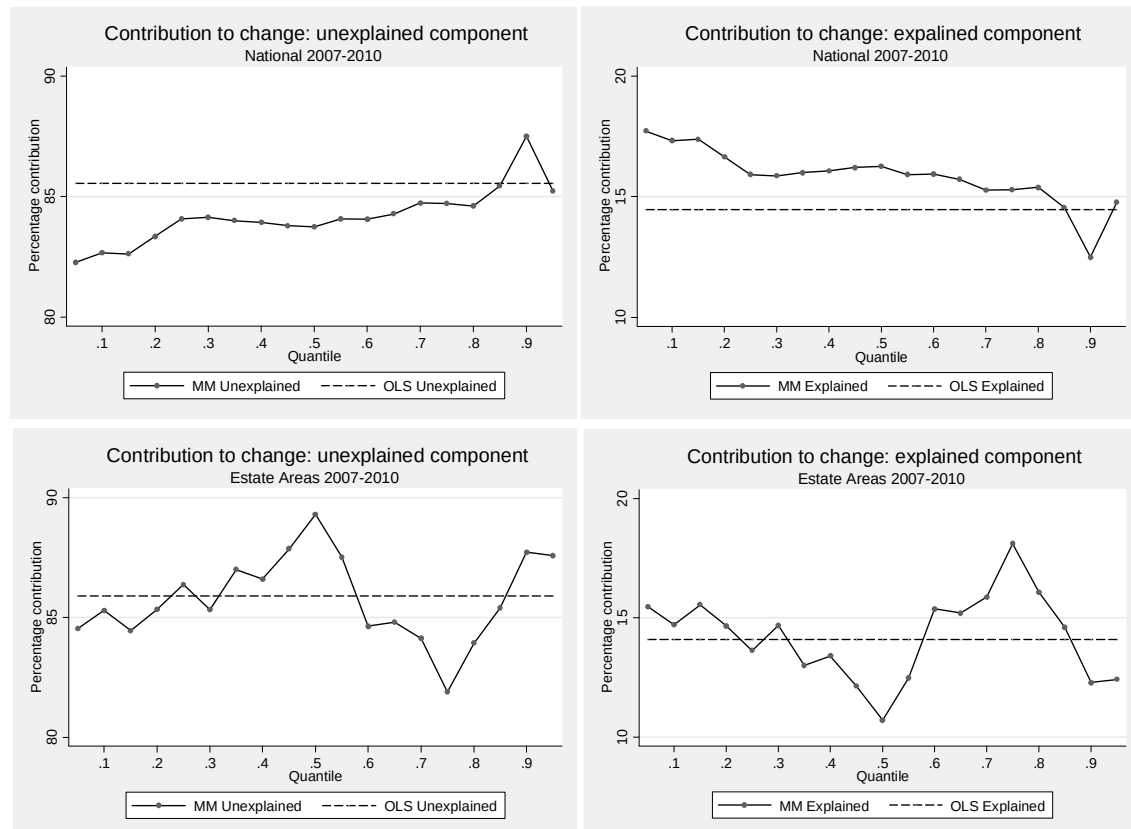
Figure 6.3: Conditional quantile regression decomposition of change in real household consumption expenditure per capita



Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data

Figure 6.4 shows that the returns to household characteristics dominate in explaining the increase in household consumption expenditure, thus reducing poverty in recent years.

Figure 6.4: Contribution to change in household consumption expenditure using conditional quantile regression decomposition



Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data, note: MM: Machado and Mata, OLS: Blinder Oaxaca

The unexplained component of the change in household consumption expenditure per capita after accounting for the changes in household characteristics (using counterfactual distribution) between the two survey years accounts for 85 per cent of the overall change at national level (this also includes the changes in unobservable household characteristics such as change in productivity, quality of education). A similar trend is observed in estate areas where more than 80 per cent of the overall change in household consumption expenditure per capita is explained by the returns to household characteristics.

Even though Machado and Mata (2005) decomposition technique decomposes the change in welfare measure along the distribution of welfare measure, it does not provide details of the decomposition of individual variables included in the specification. Therefore it is not possible to estimate the contribution of individual variables to the two components (explained and unexplained) in decomposing the overall change. Fortin, Lemieux and Firpo (2011) propose a solution for the above limitation by using unconditional quantile regression that allows for a detailed analysis of contribution from each variable.

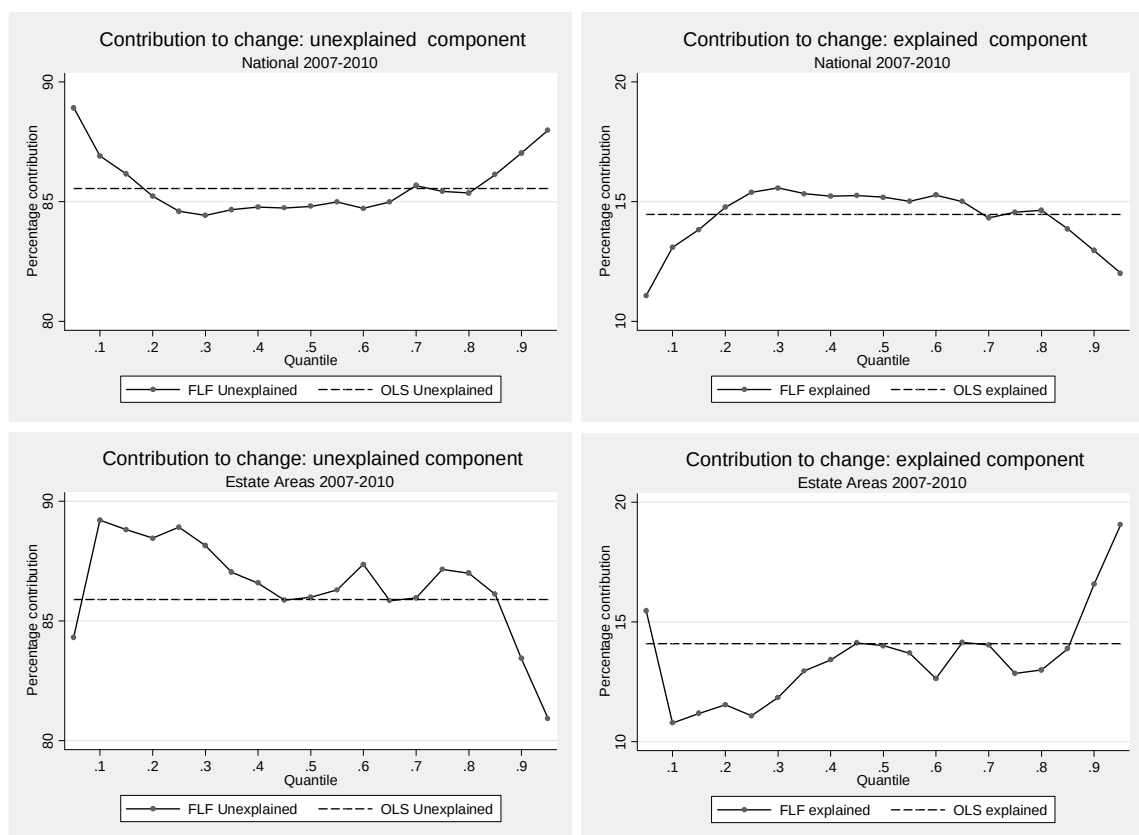
(b) Unconditional quantile regression decomposition (Fortin, Lemieux and Firpo, 2011)

One of the major limitations of the conditional quantile regression decomposition is that it does not allow for a detailed decomposition such that the contribution of differences in household characteristics and returns to these characteristics cannot be estimated for individual variables. As discussed in Chapter 3, the decomposition technique developed by Fortin, Lemieux and Firpo (2011) uses unconditional quantile regression and allows for detailed decomposition of individual contributions. This subsection uses Fortin, Lemieux and Firpo (2011) decomposition technique to examine the behaviour of individual variables as well as to check for the robustness of the results of the conditional quantile regression decomposition.

The unconditional quantile regression decomposition also generates similar results of the conditional quantile regression decomposition in estimating the overall change in household consumption expenditure per capita. The increase in logarithm of real household consumption expenditure per capita is 0.45 at the 5th quantile while it is 0.45 at the 95th quantile at the national level. The estimates of the overall change at all quantiles are statistically significant at 1 per cent level.

Figure 6.5 shows that similar to the findings in conditional quantile regression analysis, the contribution from the unexplained component to the overall change in household consumption expenditure per capita is around 85 per cent, which is true for both national and estate level decompositions. Yet, the contribution of unexplained component to the overall change in household consumption expenditure per capita for middle quantiles are slightly higher in the national estimates while they are slightly low in the estimates of estate areas.

Figure 6.5: The contribution to the change in household consumption expenditure using unconditional quantile regression decomposition



Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data, , note: FLF: Fortin Lemieux and Firpo, OLS: Blinder Oaxaca

As shown by the last panel of Table 6.10, contribution from unexplained component to the overall change is around 89 per cent for the 5th quantile while it is around 88 per cent for the 95th quantile. Contribution from unexplained component to the overall change in household consumption expenditure per capita is 84.61, 84.81, and 85.44 for the 25th, 50th, and 75th quantiles respectively.

Table 6.10: Decomposition of change in household consumption expenditure per capita between 2007 and 2010 at national level using unconditional quantile regression

	Percentile				
	5 th	25 th	50 th	75 th	95 th
Overall difference	0.454*** (47.63)	0.443*** (66.43)	0.449*** (65.51)	0.468*** (55.69)	0.450*** (41.29)
Explained by changes in distribution of characteristics					
Region	0.003*** (3.68)	0.008*** (8.12)	0.012*** (8.95)	0.020*** (9.96)	0.077*** (11.47)
Remoteness	-0.007** (2.03)	0.001 (0.52)	0.000 (0.01)	0.002 (0.63)	0.002 (0.25)
Access to utilities	0.016*** (9.54)	0.010*** (9.65)	0.005*** (5.42)	0.001 (1.24)	-0.008*** (2.69)
Household size	0.009*** (4.91)	0.010*** (5.04)	0.011*** (4.99)	0.012*** (4.85)	0.010*** (4.13)
Head's age	0.000 (0.331)	0.000 (1.53)	0.000** (2.1)	0.000 (1.13)	0.000 (0.35)
Male head	0.000 (0.54)	0.000 (0.55)	0.000 (0.55)	0.000 (0.55)	0.000 (0.55)
Employment	0.000 (0.552)	0.002*** (2.86)	0.002*** (3.09)	0.003*** (3.04)	0.008*** (4.26)
Assets	0.026*** (12.47)	0.036*** (17.76)	0.037*** (17.81)	0.028*** (14.44)	-0.005 (1.33)
Education	0.003*** (3.93)	0.002*** (0.001)	0.002* (1.94)	0.003* (1.73)	0.006* (1.80)
Total	0.050*** (10.05)	0.068*** (16.44)	0.068*** (15.00)	0.068*** (12.5)	0.090*** (7.64)
Unexplained by changes in distribution of characteristics (Returns to characteristics)					
Region	0.036 (1.63)	-0.012 (0.90)	-0.076*** (5.69)	-0.133*** (7.83)	-0.542*** (13.33)
Remoteness	-0.019** (2.04)	0.022*** (3.70)	0.028*** (4.90)	0.035*** (4.70)	0.107*** (0.6.04)
Access to utilities	0.014 (0.34)	-0.055** (2.16)	-0.084** (3.44)	-0.087*** (2.79)	-0.260*** (3.4)
Household size	0.058 (1.36)	0.073*** (2.75)	0.094*** (3.63)	0.079** (2.42)	0.231*** (2.93)
Head's age	-0.107 (1.03)	-0.139** (2.15)	-0.014 (0.22)	-0.045 (0.57)	-0.273 (1.43)
Male head	-0.019 (1.03)	0.018 (1.55)	0.005 (0.41)	0.005 (0.37)	0.080*** (2.36)
Employment	0.011 (0.74)	-0.015* (1.69)	0.005 (0.56)	-0.002 (0.22)	-0.063** (2.32)
Assets	-0.115*** (2.63)	-0.007 (0.24)	0.098*** (3.68)	0.200*** (5.94)	0.341*** (4.20)
Education	0.001 (0.2)	-0.041* (1.67)	-0.013 (0.54)	0.037 (1.23)	0.223*** (3.08)
Total	0.404*** (40.59)	0.375*** (60.38)	0.381*** (62.90)	0.400*** (51.35)	0.660*** (33.74)
Unexplained as a percentage of overall change (%)	88.93	84.61	84.81	85.44	87.99

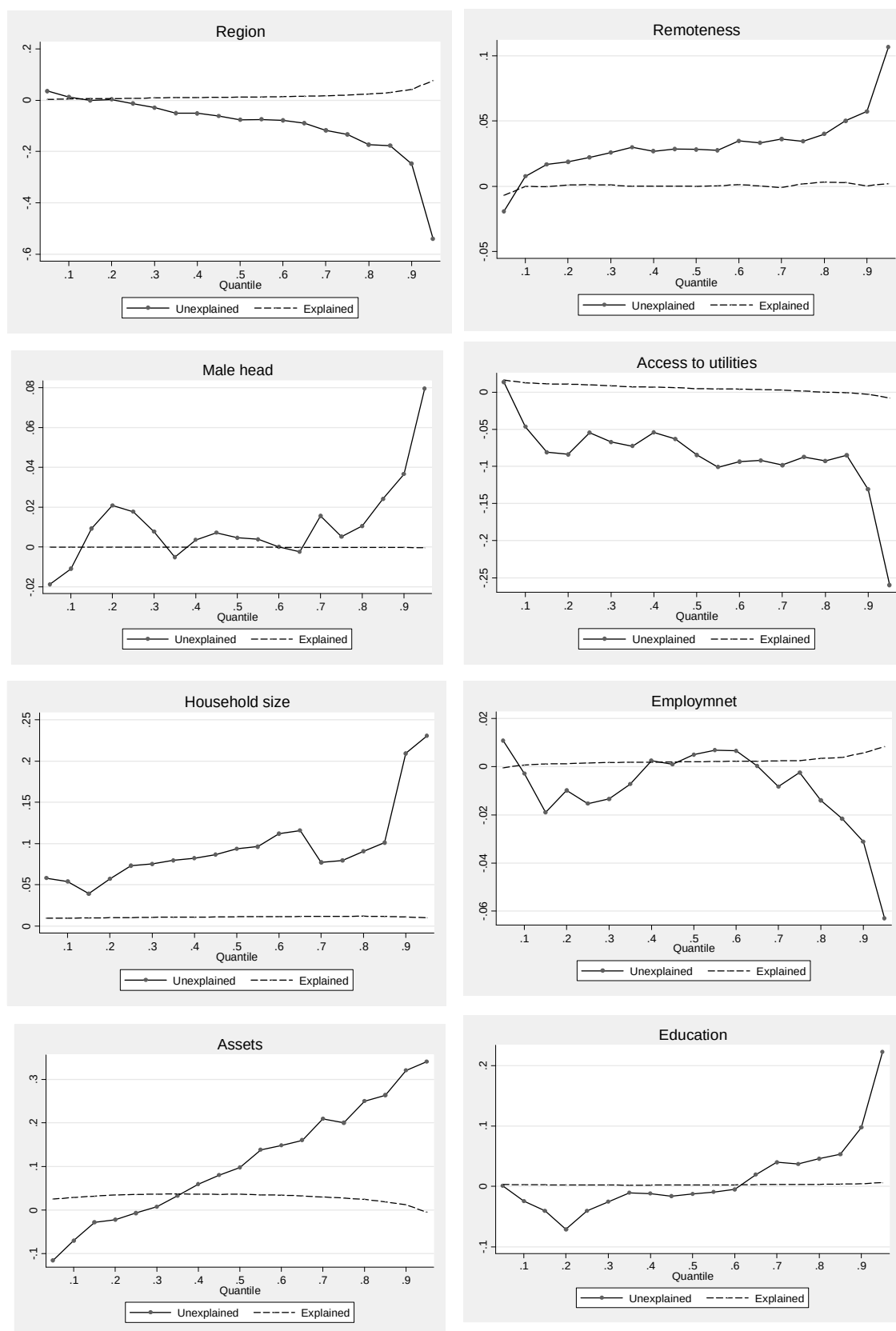
Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses.

Furthermore, adding value to the analysis of conditional quantile regression decomposition, the unconditional quantile regression decomposition estimates the contribution from different variables to the overall change due to the changes in household characteristics and returns to these characteristics at national level. The explained component of education which shows the effect of increased education on household consumption per capita is 0.003 for the 5th and 75th quantiles at national level. The effect decreased to 0.002 for the middle quantiles while it increased to 0.006 for the top quantile. Also the coefficients of the 5th and 25th quantiles are statistically significant at 1 per cent level and it decreased to 10 per cent level for other quantiles. However, unexplained component of education, which shows the returns to education, is statistically significant only for the 25th quantile and the 95th quantiles. The unexplained component is 0.223 for the top quantile and statistically significant at 1 per cent level. Nevertheless, it is negative for 25th quantile and statistically significant only at 10 percent level.

The explained component of household size, on the other hand, indicates 0.01 effect on household consumption expenditure and statistically significant at 1 per cent level for all the quantiles. The unexplained component of the household size is around 0.08 for the middle quantiles and increases considerably to 0.23 for the top quantile. The estimates are statistically significant at 1 per cent level. However, this effect is not statistically significant for the lowest quantile. The explained component of assets is around 0.03 and statistically significant at 1 per cent for all the quantiles other than the 95th quantile. But, the unexplained component of assets is -0.115 for the lowest quantile and statistically significant at 1 per cent level. Nevertheless, the returns effect of assets is positive and increases from 0.10 at the 50th quantile to 0.34 at the 95th quantile. For the 25th quantile, there is no statistically significant relationship.

Figure 6.6 shows the distribution of explained and unexplained components of variables along the distribution of quantiles at national level.

Figure 6.6: Explained and unexplained components for different variables at national level



Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data

The change in household consumption expenditure per capita due to increased employment (explained component) is around 0.002 and statistically significant at 1 per cent level for the middle quantiles. It however increased to 0.008 for the top quantile. On the contrary, returns effect of employment is negative and not statistically significant for most of the quantiles at national level.

Explained component of access to household utilities varies from 0.005 to 0.016 and statistically significant at 1 per cent level for all the quantiles except the 75th quantile. Furthermore, unexplained component of access to utilities monotonically decreases towards the upper quantiles and is statistically significant at 5 per cent for the middle quantile and also statistically significant at 1 per cent for the top quantiles. Region and remoteness variables are included in the national specification to control for the regional differences. The explained component of region as well as the unexplained component of remoteness is statistically significant at the national level

The second and third panels of Table 6.11 indicate the individual contributions from different variables to the overall change at estate areas using unconditional quantile regression decomposition.²⁷ Region as a grouped variable included for controlling regional differences is excluded from the decomposition at estate areas due to its irrelevance (area) and also having a small number of observations (province). Contribution to the two components from individual variables at estate areas follows a similar pattern at the national level, but most contributions from these variables are not statistically significant.

The explained component of assets is statistically significant for all the quantiles at 1 per cent level in estate areas while the coefficient increase from 0.022 for the lowest quantile to 0.059 for the top quantile.

²⁷ See Annex 11 for the graphical presentation of the distribution of explained and unexplained components of variables along the distribution of quantiles at estate areas.

Table 6.11: Decomposition of change in household consumption expenditure per capita between 2007 and 2010 at estate areas using unconditional quantile regression

	Percentile				
	5 th	25 th	50 th	75 th	95 th
Overall difference	0.472*** (16.27)	0.474*** (26.66)	0.452*** (25.54)	0.481*** (22.01)	0.471*** (10.23)
Explained by changes in distribution of characteristics					
Remoteness	0.005 (0.59)	0.001 (0.27)	0.003 (0.55)	0.006 (1.01)	0.017 (1.33)
Access to utilities	0.042*** (4.46)	0.021*** (4.18)	0.018*** (3.78)	0.008 (1.44)	0.005 (0.012)
Household size	0.007 (0.87)	0.006 (0.82)	0.006 (0.66)	0.004 (0.36)	0.002 (0.19)
Head's age	-0.003 (1.31)	-0.001 (0.97)	0.000 (0.36)	-0.001 (0.26)	-0.001 (0.46)
Male head	0.001 (0.85)	0.001 (0.85)	-0.001 (1.01)	-0.001 (1.07)	-0.005 (1.25)
Employment	-0.003 (0.68)	-0.002 (1.08)	0.001 (0.27)	0.003 (1.07)	0.008** (1.64)
Assets	0.022*** (3.07)	0.025*** (5.64)	0.036*** (6.89)	0.042*** (6.81)	0.059*** (5.22)
Education	0.001 (0.41)	0.002 (1.01)	0.003 (1.15)	0.002 (0.46)	0.004 (0.17)
Total	0.073*** (4.64)	0.052*** (5.02)	0.063*** (5.48)	0.062*** (4.22)	0.090*** (2.6)
Unexplained by changes in distribution of characteristics (Returns to characteristics)					
Remoteness	-0.092** (2.23)	-0.034 (1.43)	0.027 (1.20)	-0.008 (0.28)	0.003 (0.06)
Access to utilities	0.199*** (3.25)	0.040 (1.14)	0.056 (1.7)	-0.010 (0.25)	-0.103 (1.23)
Household size	-0.225 (1.79)	-0.057 (0.79)	-0.047 (0.69)	0.021 (0.26)	0.052 (0.30)
Head's age	-0.435 (1.4)	-0.312* (1.76)	-0.191 (1.14)	-0.164 (0.82)	-0.685 (1.60)
Male head	-0.067 (1.18)	-0.052 (1.60)	-0.004 (0.12)	0.012 (0.34)	0.037 (0.48)
Employment	0.019 (0.35)	-0.020 (0.65)	0.000 (0.01)	0.054 (1.58)	0.038 (0.52)
Assets	-0.174 (1.06)	-0.119 (1.24)	-0.080 (0.88)	0.042 (0.39)	-0.168 (0.73)
Education	-0.075 (1.2)	-0.081** (2.25)	-0.006 (0.17)	-0.014 (0.35)	0.051 (0.58)
Total	0.398*** (12.83)	0.421*** (23.92)	0.389*** (23.35)	0.419*** (21.09)	0.381*** (8.75)
Unexplained as a percentage of overall change (%)	84.46	88.93	85.99	87.16	80.93

Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses.

But there is no statistically significant effect from the unexplained component of assets in explaining the overall change in household consumption expenditure. The explained component of access to household utilities decreases from 0.042 for the 5th quantile to 0.018 for the 50th quantile while being statistically significant at 1 per cent level for all the three quantiles. The unexplained component of access to utilities is statistically significant only for the lowest quantile (at 1 per cent level). The explained component of employment is 0.008 for the top quantile and statistically significant at 5 per cent level. But the statistical significance does not hold for either component of any other quantiles. Also, almost all the other variables do not have any statistically significant relationship for either component at estate areas.

6.2.2 Discussion

The study confirms a substantial increase in household consumption expenditure per capita, and hence, the reduction in poverty between 2007 and 2010 as in previous two chapters. The study also finds that the overall increase in household consumption expenditure per capita in the estate areas is higher than the national average at any quantile, which indicates the possibility of higher reduction of poverty in the estate areas. Notably, the study found out that the increase in household expenditure per capita between 2007 and 2010 is high for the lower quantiles, supporting the higher rate of reduction of poverty during the period.

The analysis also uncovered that 85 per cent of change in household consumption expenditure is due to the increased returns to household characteristics.²⁸ This higher reduction of poverty suggests that the macroeconomic changes which took place in the country during the study period have positively affected the reduction of poverty. The previous section elaborated that, GDP of the country increased during the study period,

²⁸ Some part of the unexplained component can be due to the differences in unobservable characteristics such as increased quality of education, increased productivity and decreased transaction costs etc.

and also fair redistribution of growth is observed. Public expenditure on welfare also significantly increased between the two periods. Moreover, stable socio-political conditions prevailed between 2007 and 2010 due to the ending of the long standing civil war. Production and prices of three major plantation products (tea, rubber, and coconut) and favourable weather conditions for agriculture created an economic boom in the estate areas. These changes had a positive effect on the returns to household characteristics. Improved market conditions due improved economic growth increased the household income and consumption which led to the reduction of poverty. In addition, government welfare payments also increased the household consumption especially among the poor households. Increase in the production and prices of plantation sector increased the profitability of the sector which increased the income of estate workers. In fact, the previous section shows that the wage rate of estate workers increased by more than 50 per cent between 2007 and 2010. Therefore, the increased returns to household characteristics are due to the recent socio-economic development of the country.

The estimates of both decomposition techniques suggest that only 15 per cent of overall change in household consumption expenditure per capita between 2007 and 2010 is due to the change in household characteristics. This is an expected outcome due to the three years gap between the two surveys. Since within three years, it is difficult to see much change in education, health, and employment or migration status of the households.

The study also suggests that increased education in Sri Lanka increases the household consumption expenditure especially at the lower end of the household consumption expenditure distribution. But the returns to education do not seem to have such a clear relationship other than for the richer households. This can be due to the fact that increased education will improve the probability of securing a better paid job especially for poor people. But at the same time, the results suggest that the returns to an educational level did not change much during the study period. It is interesting to find that returns to asset ownership for upper quantiles are positive while it is negative for the

lower quantiles. This is due to the fact that assets endowed by richer people, such as agricultural land vehicles and agricultural equipment generate positive gains. But assets own by the poorest quantiles generate negative returns for them. This is true as most of the assets owned by poorer households are limited to basic household equipment such as radio, television, mobile phones and television satellite receivers. This household equipment does not generate any returns for the poor households. Moreover, this equipment is leased with high interest rates which, in fact, can reduce the real household consumption expenditure. The returns to having access to household utilities generate negative results for almost all the upper quantiles and the effect is significantly high for the top quantiles. This can be due to the fact that this coefficient does not provide a causal relationship and it can be explained as a correlation.

Increased remoteness negatively affects household consumption expenditure of the poorest groups but not on the upper quantiles. This is justifiable due to the fact that the distance to public services and financial services is not a problem for most of the better-off families as they have their own mode of transport or access to public transportation. But, poorest people find it difficult to utilize public transport, therefore, the increased distance negatively affects their welfare level. The returns to living in a remote area are also negative and significant for the lowest quantile suggesting that the poorest groups have to spend more on their transportation expenditure which may also reduce their level of welfare. However, the unexplained component of the remoteness of upper quantiles is statistically significant, but the coefficients are positive. This implies that living in a remote area generates increased returns for the upper quantiles. This possibility is due to the increased in economic growth at remote areas or improvements in facilities at rural remote areas which is utilized by the rural elites. The positive explained component of region, which captures the effect of area and province of residence on household consumption expenditure is due to the higher reduction of poverty in rural and estate areas. This trend can be explained with the recent regional development

programmes of the country. Nevertheless, the unexplained component of living in a rural remote area is negative and higher than the explained component, especially for the upper quantiles. This signifies that the negative effect of living in rural and remote areas on household consumption expenditure still persists irrespective of the regional development programmes, which is also stressed by De Silva (2008, 2011) and Kumara (in print).

Analyses of both of the decomposition techniques suggest that the increased household consumption expenditure per capita, hence reduction of poverty, is not mainly due to the changes in household characteristics but due to the returns to household characteristics. Therefore, it confirms that the recent socio-economic changes of the country have positively affected the recent reduction of poverty. The next section further examines the causes of reduction of poverty in Sri Lanka by analysing the determinants of poverty in Sri Lanka using household data.

6.3 Micro-determinants of poverty reduction

The previous section found that the differences in returns to household characteristics, which can be due to the recent socio-economic development of the country, are more important than the differences in household characteristics in explaining the reduction of poverty in Sri Lanka between 2007 and 2010. This section further examines the causes for higher reduction of poverty at the micro level (household level) by analysing the determinants of poverty between 2007 and 2010. Poverty determinants are estimated using quantile, logit, and probit regressions.

6.3.1 Results

(a) Determinants of household consumption expenditure

Table 6.12 shows the determinants of household consumption expenditure at the national level using quantile regression technique (for the 5th, 25th, 50th, 75th, and 95th quantiles).

Table 6.12: Determinants of household consumption expenditure at national level (dependent variable: Logarithm of household consumption expenditure per capita)

Variable	2007					2010				
	Percentile					Percentile				
	5 th	25 th	50 th	75 th	95 th	5 th	25 th	50 th	75 th	95 th
Area: Rural	-0.120*** (9.28)	-0.100*** (10.24)	-0.120*** (14.30)	-0.130*** (12.63)	-0.140*** (7.50)	-0.097*** (7.26)	-0.110*** (12.72)	-0.110*** (14.38)	-0.120*** (12.79)	-0.160*** (8.23)
Area: Estate	-0.100*** (3.40)	-0.043** (2.04)	-0.063*** (3.66)	-0.043** (2.10)	-0.074** (1.99)	-0.043 (1.56)	-0.041** (2.19)	-0.057*** (3.46)	-0.074*** (3.62)	-0.160*** (4.02)
Province: Central	-0.120*** (6.27)	-0.120*** (8.38)	-0.110*** (9.69)	-0.140*** (10.14)	-0.180*** (7.49)	-0.068*** (3.71)	-0.100*** (8.40)	-0.110*** (10.32)	-0.120*** (9.110)	-0.140*** (5.51)
Province: Southern	-0.008 (0.49)	-0.020* (1.70)	-0.024** (2.54)	-0.058*** (5.09)	-0.061*** (2.94)	-0.024 (1.57)	-0.050*** (4.85)	-0.067*** (7.37)	-0.085*** (7.65)	-0.120*** (5.84)
Province: Eastern	0.003 (0.11)	0.018 (0.94)	0.032** (2.07)	-0.023 (1.27)	-0.073** (2.17)	-0.160*** (6.68)	-0.130*** (8.40)	-0.160*** (10.90)	-0.180*** (9.88)	-0.220*** (6.11)
Province: North Western	-0.092*** (4.56)	-0.092*** (6.26)	-0.082*** (6.79)	-0.098*** (6.74)	-0.170*** (6.48)	-0.091*** (4.87)	-0.090*** (6.89)	-0.100*** (9.09)	-0.130*** (8.96)	-0.200*** (7.47)
Province: North Central	-0.088*** (3.70)	-0.086*** (4.89)	-0.100*** (7.08)	-0.150*** (8.56)	-0.210*** (6.31)	-0.043* (1.88)	-0.044*** (2.86)	-0.059*** (4.41)	-0.083*** (5.07)	-0.160*** (5.31)
Province: Uva	-0.160*** (6.72)	-0.190*** (11.11)	-0.170*** (11.94)	-0.200*** (11.64)	-0.240*** (7.44)	-0.200*** (8.67)	-0.160*** (9.96)	-0.160*** (11.69)	-0.160*** (9.49)	-0.200*** (6.18)
Province: Sabaragamuwa	-0.120*** (5.44)	-0.150*** (9.53)	-0.150*** (11.95)	-0.170*** (10.97)	-0.190*** (7.06)	-0.110*** (5.51)	-0.120*** (8.93)	-0.140*** (11.28)	-0.160*** (10.73)	-0.220*** (7.66)
Distance to bus stop	-0.011** (2.06)	-0.009** (2.05)	-0.008** (2.35)	-0.013*** (2.80)	-0.015 (1.64)	-0.003 (0.79)	-0.013*** (4.14)	-0.006** (1.96)	-0.005 (1.37)	-0.005 (0.83)
Electricity	0.160*** (9.74)	0.150*** (12.58)	0.140*** (15.33)	0.130*** (11.26)	0.120*** (5.94)	0.150*** (8.76)	0.110*** (9.07)	0.079*** (7.57)	0.070*** (5.52)	0.020 (0.82)
Clean water	0.034** (2.06)	0.056*** (4.63)	0.069*** (7.07)	0.066*** (5.60)	0.071*** (3.28)	0.018 (1.04)	0.064*** (5.50)	0.074*** (7.26)	0.074*** (6.08)	0.020 (0.87)
Distance to a bank	-0.003** (0.003)	-0.005*** (0.005)	-0.005*** (0.005)	-0.004*** (0.004)	-0.002 (0.002)	-0.003** (0.003)	-0.003*** (0.003)	-0.002*** (0.002)	-0.002** (0.002)	-0.005** (0.005)

	(2.29)	(5.04)	(6.05)	(3.57)	(1.00)	(2.33)	(3.55)	(2.66)	(2.33)	(2.34)
Distance to primary school	0.005**	0.001	-0.002	-0.002	0.001	-0.006*	-0.002	-0.002	-0.005*	-0.009*
	(1.99)	(0.46)	(0.76)	(0.79)	(0.39)	(1.70)	(0.79)	(1.07)	(1.93)	(1.75)
Distance to a health facility	-0.011***	-0.008***	-0.003	-0.003	-0.006	-0.004**	-0.001	-0.002**	-0.001	0.002
	(4.22)	(3.86)	(1.53)	(1.23)	(1.60)	(2.41)	(1.24)	(2.07)	(0.71)	(0.58)
Distance to GN office	-0.003	-0.009***	-0.008***	-0.001	-0.007	0.002	0.004	0.004	0.005	0.004
	(0.72)	(2.61)	(2.99)	(0.36)	(1.22)	(0.60)	(1.22)	(1.48)	(1.52)	(0.77)
Household size	-0.200***	-0.230***	-0.250***	-0.280***	-0.310***	-0.200***	-0.240***	-0.270***	-0.290***	-0.360***
	(19.04)	(27.82)	(39.17)	(37.45)	(23.44)	(21.54)	(31.90)	(42.99)	(40.25)	(25.02)
Household size squared	0.009***	0.012***	0.013***	0.015***	0.019***	0.009***	0.012***	0.015***	0.017***	0.023***
	(9.35)	(14.60)	(22.14)	(23.82)	(17.84)	(9.17)	(16.09)	(24.93)	(26.38)	(19.86)
Number of dependents	-0.020***	-0.017***	-0.020***	-0.013***	-0.033***	-0.016***	-0.016***	-0.015***	-0.020***	-0.020**
	(3.07)	(3.76)	(5.38)	(2.85)	(3.87)	(2.88)	(4.15)	(4.31)	(4.52)	(2.31)
Head's Age	0.004	0.001	0.001	0.004	0.001	0.001	-0.001	-0.001	-0.002	-0.008**
	(1.45)	(0.76)	(0.59)	(0.79)	(0.31)	(0.67)	(0.96)	(0.35)	(1.04)	(2.25)
Head's age squared	-0.000*	-0.000	-0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000**
	(1.81)	(0.65)	(0.35)	(0.52)	(0.07)	(0.85)	(0.85)	(0.48)	(1.30)	(2.37)
Male	0.078***	0.053***	0.056***	0.044***	0.061***	0.052***	0.054***	0.052***	0.057***	0.050***
	(5.55)	(5.17)	(6.71)	(4.47)	(3.39)	(3.79)	(6.03)	(6.55)	(5.95)	(2.73)
Head's ethnicity: Tamil	0.025	0.031**	0.014	-0.0039	-0.018	0.008	-0.003	-0.005	-0.020	-0.038
	(1.06)	(2.04)	(1.15)	(0.25)	(0.69)	(0.39)	(0.20)	(0.38)	(1.29)	(1.26)
Head's ethnicity: Muslim	0.082***	0.064***	0.041***	0.053***	0.050*	0.017	0.009	0.018	0.027**	0.016
	(3.92)	(4.41)	(3.53)	(3.48)	(1.90)	(0.86)	(0.66)	(1.56)	(1.93)	(0.58)
Head's employment: Private	-0.061***	-0.065***	-0.063***	-0.057***	-0.072***	-0.061***	-0.067***	-0.070***	-0.054***	-0.039**
	(4.06)	(5.98)	(7.09)	(5.41)	(3.73)	(4.20)	(6.88)	(8.26)	(5.31)	(2.05)
Head's employment: Employer	0.150***	0.140***	0.220***	0.330***	0.430***	0.190***	0.230***	0.250***	0.310***	0.470***
	(4.15)	(5.12)	(10.26)	(12.68)	(9.10)	(5.11)	(9.15)	(11.41)	(11.39)	(9.01)
Head's employment: Self employed	-0.003	-0.002	0.004	0.016	0.005	0.017	0.006	0.013	0.022**	0.047**
	(0.21)	(0.17)	(0.45)	(1.47)	(0.25)	(1.17)	(0.57)	(1.54)	(2.08)	(2.43)
Head's employment:	-0.018	-0.071	-0.019	0.060	0.078	0.001	0.056	0.009	0.028	0.076

Family worker	(0.21)	(1.12)	(0.37)	(0.96)	(0.84)	(0.01)	(1.05)	(0.20)	(0.49)	(0.76)
Secondary jobs	0.039***	0.032***	0.047***	0.049***	0.029	0.040***	0.054***	0.049***	0.044***	0.051**
	(2.71)	(3.04)	(5.53)	(4.80)	(1.49)	(2.89)	(5.70)	(5.88)	(4.28)	(2.55)
Land (acres)	0.086***	0.073***	0.069***	0.073***	0.094***	0.099***	0.057***	0.028***	-0.029	0.950***
	(6.49)	(7.38)	(8.52)	(7.50)	(5.11)	(12.97)	(7.71)	(2.98)	(0.26)	(30.67)
Household appliances	-0.370***	-0.340***	-0.350***	-0.380***	-0.430***	-0.340***	-0.32***	-0.330***	-0.330***	-0.390***
Remittances	(27.21)	(34.89)	(44.55)	(41.37)	(25.78)	(27.00)	(37.51)	(44.50)	(38.06)	(23.78)
	0.025	0.035	0.052	0.048	0.025	0.031	0.043	0.058	0.072	0.093
	(1.53)	(2.92)	(5.29)	(4.12)	(1.16)	(2.09)	(4.18)	(6.43)	(6.58)	(4.48)
Chronically ill or disabled	-0.003	0.012	0.025***	0.037***	0.039**	-0.002	0.021***	0.026***	0.040***	0.067***
	(0.29)	(1.44)	(3.68)	(4.47)	(2.55)	(0.17)	(2.73)	(3.78)	(4.89)	(4.27)
Head's education: primary	0.060**	0.082***	0.059***	0.063***	0.042	-0.014	0.057***	0.054***	0.042**	-0.007
	(2.48)	(4.66)	(4.09)	(3.63)	(1.34)	(0.61)	(3.59)	(3.80)	(2.41)	(0.21)
Head's education: junior secondary	0.120***	0.160***	0.140***	0.140***	0.098***	0.083***	0.110***	0.110***	0.095***	0.061*
	(4.77)	(9.02)	(9.62)	(8.18)	(3.04)	(3.46)	(6.91)	(8.05)	(5.48)	(1.81)
Head's education: O/L	0.240***	0.310***	0.300***	0.310***	0.270***	0.230***	0.280***	0.270***	0.260***	0.240***
	(8.59)	(14.90)	(18.04)	(15.41)	(7.48)	(8.51)	(14.99)	(16.94)	(13.26)	(6.33)
Head's education: A/L	0.360***	0.420***	0.430***	0.450***	0.510***	0.360***	0.400***	0.410***	0.410***	0.390***
	(11.33)	(17.84)	(22.54)	(19.62)	(12.21)	(11.71)	(19.73)	(22.69)	(18.62)	(9.32)
Head's education: Tertiary	0.560***	0.620***	0.650***	0.700***	0.790***	0.480***	0.520***	0.600***	0.660***	0.740***
	(13.07)	(19.27)	(24.88)	(22.43)	(13.95)	(11.80)	(18.68)	(24.42)	(21.89)	(12.95)
House owner	0.043**	0.034***	0.037***	0.040***	0.045**	0.006	0.032***	0.024**	0.044***	0.016
	(2.55)	(2.83)	(3.76)	(3.37)	(2.02)	(0.33)	(2.76)	(2.35)	(3.58)	(0.70)
Sanitary facilities	0.038**	0.039***	0.048***	0.060***	0.071***	0.100***	0.086***	0.088***	0.094***	0.100***
	(2.20)	(3.08)	(4.62)	(4.95)	(3.21)	(5.92)	(7.32)	(8.54)	(7.46)	(4.22)
Observations	18,544	18,544	18,544	18,544	18,544	18,732	18,732	18,732	18,732	18,732
Pseudo R ²	0.297	0.324	0.346	0.363	0.366	0.276	0.298	0.318	0.336	0.343

Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses, t statistics are based on heteroscedasticity consistent standard errors. Area (urban is the reference group), Province (Western Province is the reference group), Head's ethnicity (Sinhala is the reference group), Head's employment (employed in the public sector is the reference group), Head's education (No education is the reference group) are categorical variables. O/L: Ordinary Level, A/L: Advanced Level.

Column 2 to 6 show the coefficients estimated using HIES 2006/07 and column 7 to 11 shows the coefficients estimated using HIES 2009/10 data. Dependent variable is the household consumption expenditure per capita. Area of living is included as dummies in the national specification where urban area is the reference category. The negative effect of living in a rural area compared to living in an urban area increases towards the upper quantiles. The effect is -0.12 for the 5th quantile for 2007 while it increased to -0.14 for the 95th quantile. The coefficient for the 5th quantile of 2010 decreased to -0.09 while increasing to -0.16 for the 95th quantile.

The effect for the middle quantiles is similar for both surveys and all the coefficients are statistically significant at 1 per cent level. The negative effect of living in an estate area is -0.10 for the 5th quantile and it decreased to -0.07 for the 95th quantile in 2007. All the coefficients are statistically significant at 5 per cent or higher level. Nevertheless, the coefficient of the lowest quantile of 2010 is not statistically significant while the statistical significance as well as the negative effect increases towards the upper quantiles. The province of living is also included in the national specification where Western Province is the reference category. Compared to living in Western Province, living in other provinces generates negative effects on household consumption expenditure for almost all the quantiles, which increases towards the upper quantiles. Other than some of the coefficients of Southern and Eastern Provinces, coefficients of other provinces are statistically significant at 5 per cent or higher level. The negative effect of living in other provinces increased for all the quantiles except North Central Province in the latest survey. Following the similar trend of 2007, almost all the coefficients of upper quantiles are higher than the lower quantiles in 2010 and all the coefficients are statistically significant at 1 per cent level (other than a few coefficients of the 5th quantile).

Household head's educational dummy, where no education is the reference group shows that increased education increases the level of household consumption expenditure.

The positive effect is 0.06 for primary education for the 5th quantile in 2007 which increases to 0.56 for tertiary education for the same quantile in the same year. Coefficients of upper quantiles are considerably higher than the lower quantiles. It is interesting to find that almost all the coefficients of the latest survey are smaller than their counterparts in the previous survey. Other than that, a similar trend in 2007 can be observed also in 2010 where the coefficients of higher educational levels are higher than the lower education levels. Statistical significance at 1 per cent level holds for both surveys for all the coefficients other than few coefficients of the lower education levels.

Compared to public employment, private employment generates negative effects on household consumption expenditure in both surveys. The effect is -0.061 for the 5th quantile in 2007 which increased to -0.072 for the 95th quantile. A similar trend can be observed as well in 2010 and all the coefficients are statistically significant at 1 per cent level for both surveys. Compared to a public employee, an employer generates positive effects on household consumption. Notably, this effect is higher for all the quantiles of the latest survey. A secondary job generates positive gains to the household for both surveys. But this effect is not statistically significant for the top quantile in 2007 and the coefficients are high for the latest survey. Receiving remittances generally increases the household consumption expenditure level. The coefficient of receiving remittances is statistically significant only for the middle quantiles in 2007 where the coefficient is 0.035, 0.052, and 0.048 for the 25th, 50th and 95th quantiles respectively. But, the effect of remittances on household consumption expenditure is statistically significant at 5 per cent or higher for all the quantiles of the latest survey and the effect is high for the upper quantiles.

Increase in household size by one member decreases household consumption expenditure per capita by -0.20 for the 5th quantile, which increases to -0.31 for the 95th quantile. A similar effect can be observed for 2010 and all the coefficients are statistically significant at 1 per cent level for both surveys. Also, an increase in the number of

dependents of the family decreases household consumption expenditure. The negative effect is high for the upper quantiles and statistically significant at 1 per cent level for all the quantiles of both surveys. Consumption of male headed households is higher than female headed households. This effect is statistically significant at 1 per cent level for all the quantiles and both surveys. The positive effect decreases towards the upper quantiles and in the latest survey. Access to utilities generally increases the household consumption expenditure while remoteness generates negative effects. However, these effects are not statistically significant for most of the variables.

Table 6.13 shows that education, household size, number of dependents, remittances, and employment are the major determinants of household consumption expenditure in estate areas as in the national sample. However, the variables of area of residence, province, availability of land, and living in an owned house were dropped from the specification of estate regression either due to irrelevance or less availability of data.

As in the national sample, higher educational level of the household head increase the level of household consumption expenditure and the effect increases towards the upper quantiles. A clear pattern of change between 2007 and 2010 cannot be observed in the estate areas. As in the national sample, increased household size decreases the household consumption expenditure per capita. The effect is -0.15 for the 5th quantile in 2007 and it increases to -0.31 for the 95th quantile. The negative effect of household size on household consumption expenditure increases in the latest survey also where the coefficient of the 5th quantile increased to -0.25 and the coefficient of the 95th quantile increased to 0.32. All the coefficients are statistically significant at 1 per cent level for both surveys. The increased number of dependents also decreases the household consumption expenditure. The coefficients are statistically significant at 1 per cent level for all the quantiles other than the 95th quantile in 2007 and for the 5th and the 25th quantiles in 2010. This effect decreases towards the upper quantiles in 2010 and increases towards the upper quantiles in 2010 however, the coefficients are high in the latest survey.

Table 6.13: Determinants of household consumption expenditure at estate areas (dependent variable: Logarithm of household consumption expenditure per capita)

Variable	2007					2010				
	Percentile					Percentile				
	5 th	10 th	50 th	75 th	95 th	5 th	10 th	50 th	75 th	95 th
Distance to bus stop	-0.022 (1.60)	-0.015 (1.64)	-0.011 (1.09)	-0.014 (1.50)	-0.010 (0.56)	-0.036** (2.09)	-0.009 (0.76)	-0.005 (0.56)	0.001 (0.08)	0.014 (0.94)
Electricity	0.130*** (3.23)	0.100*** (3.98)	0.059** (2.24)	0.055** (2.34)	0.063 (1.39)	0.130*** (2.89)	0.095*** (3.30)	0.093*** (4.11)	0.041* (1.71)	0.054 (1.43)
Clean water	0.030 (0.89)	0.021 (0.89)	0.036 (1.46)	0.053** (2.39)	0.039 (0.92)	0.046 (1.15)	0.061** (2.41)	0.030 (1.50)	0.048** (2.28)	-0.032 (0.99)
Distance to a bank	-0.004 (1.20)	0.003 (1.34)	0.004 (1.63)	0.001 (0.69)	0.004 (0.77)	-0.004 (0.90)	-0.004* (1.66)	-0.005*** (2.62)	-0.005** (2.32)	-0.011*** (3.39)
Distance to primary school	0.013 (1.32)	-0.007 (0.98)	-0.012* (1.66)	-0.013** (2.04)	0.008 (0.61)	-0.007 (0.56)	-0.003 (0.44)	-0.003 (0.50)	-0.008 (1.14)	-0.014 (1.07)
Distance to a health facility	0.011* (1.86)	0.009** (2.18)	0.006 (1.44)	0.004 (1.04)	-0.004 (0.50)	-0.014*** (2.80)	0.005 (1.59)	0.006** (2.45)	0.004* (1.77)	0.003 (0.71)
Distance to GN office	-0.006 (1.04)	-0.012** (2.46)	-0.006 (1.10)	-0.005 (0.98)	-0.005 (0.72)	0.022** (2.13)	0.012 (1.56)	0.007 (1.18)	0.003 (0.51)	-0.002 (0.25)
Household size	-0.150*** (5.28)	-0.180*** (7.66)	-0.240*** (10.02)	-0.270*** (13.15)	-0.310*** (7.76)	-0.250*** (7.10)	-0.240*** (9.02)	-0.250*** (12.84)	-0.260*** (12.44)	-0.320*** (11.22)
Household size squared	0.008*** (4.10)	0.009*** (4.18)	0.014*** (6.63)	0.017*** (9.83)	0.020*** (6.80)	0.014*** (4.73)	0.013*** (5.01)	0.016*** (8.21)	0.017*** (8.54)	0.022*** (8.70)
Number of dependents	-0.065*** (3.14)	-0.039*** (2.80)	-0.038*** (2.69)	-0.038*** (3.07)	-0.038 (1.49)	-0.027 (1.27)	-0.019 (1.37)	-0.043*** (3.95)	-0.054*** (4.63)	-0.055*** (3.57)
Head's Age	0.006 (0.67)	0.011** (2.06)	0.007 (1.26)	0.009* (1.69)	0.011 (1.13)	0.005 (0.52)	0.006 (1.08)	-0.001 (0.15)	0.005 (1.11)	-0.004 (0.72)
Head's age squared	-0.000 (0.79)	-0.000** (2.04)	-0.000 (1.46)	-0.001** (2.02)	-0.000 (1.15)	-0.000 (0.71)	-0.000 (1.45)	-0.000 (0.42)	-0.000 (1.55)	-0.000 (0.21)
Male	0.058 (1.29)	0.026 (0.87)	0.013 (0.41)	0.048* (1.74)	0.097* (1.73)	0.007 (0.16)	0.012 (0.40)	0.011 (0.47)	0.052** (2.04)	0.087** (2.18)
Head's employment: Private	0.046 (1.14)	0.043 (1.54)	0.029 (0.98)	0.006 (0.21)	0.038 (0.75)	0.013 (0.29)	-0.011 (0.40)	-0.031 (1.42)	-0.022 (0.92)	-0.089** (2.55)
Head's employment:	0.640***	0.510**	0.990***	0.830***	1.040***	0.300**	0.500**	0.290	0.990***	0.850***

Employer	(7.03)	(2.21)	(4.46)	(3.81)	(9.20)	(2.57)	(2.00)	(1.63)	(4.86)	(9.75)
Head's employment: Self employed	0.110 (1.34)	0.059 (1.09)	0.057 (1.01)	0.140*** (2.88)	0.100 (1.03)	0.071 (0.81)	-0.012 (0.22)	-0.058 (1.40)	-0.063 (1.49)	0.035 (0.61)
Head's employment: Family worker	0.500*** (5.62)	0.240 (1.06)	0.079 (0.36)	-0.073 (0.340)	-0.230** (2.12)	-0.071 (0.62)	-0.320** (2.25)	-0.021 (0.11)	0.099 (0.84)	-0.280*** (3.33)
Secondary jobs	0.075* (1.73)	0.022 (0.75)	0.014 (0.47)	0.019 (0.720)	-0.021 (0.39)	0.093** (2.25)	0.086*** (2.92)	0.095*** (4.16)	0.091*** (3.77)	0.018 (0.50)
Household appliances	-0.120** (1.97)	-0.170*** (4.03)	-0.240*** (5.59)	-0.260*** (7.01)	-0.390*** (5.59)	-0.290*** (5.45)	-0.230*** (6.84)	-0.210*** (8.19)	-0.230*** (8.50)	-0.290*** (7.43)
Remittances	0.097* (1.88)	0.100*** (2.73)	0.068* (1.70)	0.078** (2.22)	0.062 (0.91)	0.069 (1.29)	0.025 (0.69)	0.061** (2.13)	0.110*** (3.55)	0.095** (2.08)
Chronically ill or disabled	0.044 (1.16)	0.052** (1.97)	0.060** (2.14)	0.061** (2.45)	0.069 (1.44)	0.034 (0.79)	0.047* (1.71)	0.022 (1.02)	0.037 (1.58)	-0.021 (0.57)
Head's education: primary	0.061 (1.30)	0.071** (2.20)	0.072** (2.12)	0.054* (1.81)	0.021 (0.35)	0.023 (0.42)	0.035 (0.99)	0.027 (0.97)	0.010 (0.34)	-0.110** (2.45)
Head's education: junior secondary	0.140*** (2.64)	0.120*** (3.19)	0.099** (2.55)	0.062* (1.79)	0.080 (1.24)	0.063 (1.00)	0.089** (2.17)	0.067** (2.12)	0.100*** (3.17)	0.001 (0.02)
Head's education: O/L	0.350*** (4.66)	0.230*** (3.22)	0.370*** (5.13)	0.310*** (4.88)	0.200* (1.87)	0.290** (2.27)	0.370*** (4.50)	0.320*** (5.12)	0.350*** (5.26)	0.280*** (3.57)
Head's education: A/L	0.710*** (6.23)	0.470*** (5.02)	0.500*** (5.09)	0.360*** (4.17)	0.970*** (10.75)	0.370*** (2.92)	0.630*** (6.63)	0.620*** (8.52)	0.690*** (9.04)	1.210*** (12.37)
Head's education: Tertiary	0.710*** (8.45)	0.600*** (4.13)	0.830*** (5.18)	0.900*** (6.58)	1.150*** (10.44)	0.047 (0.51)	0.840*** (6.15)	0.740*** (6.81)	0.610*** (5.47)	0.540*** (7.59)
Sanitary facilities	-0.068* (1.74)	0.005 (0.19)	0.016 (0.59)	0.015 (0.62)	0.035 (0.76)	0.110** (2.28)	0.110*** (3.89)	0.066*** (2.89)	0.028 (1.18)	0.023 (0.60)
Line house	-0.017 (0.42)	-0.037 (1.38)	-0.032 (1.16)	-0.061** (2.44)	-0.120*** (2.75)	-0.080* (1.88)	-0.059** (2.20)	-0.057*** (2.69)	-0.070*** (3.18)	-0.030 (0.92)
Observations	1,722	1,722	1,722	1,722	1,722	1,736	1,736	1,736	1,736	1,736
R ² (Pseudo R ²)	0.210	0.290	0.249	0.298	0.384	0.244	0.245	0.289	0.347	0.454

Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses, t statistics are based on heteroscedasticity consistent standard errors. Head's employment (employed in the public sector is the reference group), Head's education (No education is the reference group) are categorical variables. O/L: Ordinary Level, A/L: Advanced Level. Education system in Sri Lanka is categorized

On the other hand, receiving remittances generally increases the household consumption expenditure, as in national sample, yet statistical significance is weaker. If the household head is an employer or family worker, it will generate statistically significant positive effects for both surveys.

(b) Determinants of poverty

This section applies logit and probit regression analysis to examine the determinants of poverty in Sri Lanka during 2007 and 2010. The binary dependent variable is defined using both the monetary approach to poverty and the multidimensional approach to poverty. As explained in the methodology, a household is defined as poor or non-poor considering the household consumption expenditure per capita. If a household is above the poverty line (Rs. 3028 in HIES 2009/10 and Rs. 2142 in HIES 2006/07²⁹) that household is coded as 1, if not as 0. Furthermore, the binary variable is also defined using the second cut-off of the Alkire Foster method. This means that, when the weighted deprivation (c_i) of a household is greater than the poverty cut-off point (k , $k=0.3$ in this study), that household is coded as 1, if not 0. Independent variables are the same variables used in the analysis of determinants of household consumption expenditure. Estimations of the probit regression are used to check the sensitivity of the results.

Columns two to five of Table 6.14 show the logit and probit estimations which uses a binary dependent variable defined according to the monetary poverty approach, while the remaining columns show the estimation results using a binary dependent variable defined according to the multidimensional poverty approach. Annex 10 shows the log odds ratios of logit regressions of national and estate areas. The logit and probit analysis also suggests that the area of residence, province, education, employment, access to utilities, household size, gender of the household head, land availability, and remittances are the major determinants of poverty in Sri Lanka.

²⁹ These are the official poverty lines published by the Department of Census and Statistics of Sri Lanka

Table 6.14: Determinants of poverty in Sri Lanka

Variable	Dependent variable: monetary approach				Dependent variable: multidimensional approach			
	2007		2010		2007		2010	
	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
Area: Rural	0.510*** (6.10)	0.270*** (6.17)	0.210** (2.35)	0.110** (2.52)	0.087 (0.62)	0.038 (0.51)	0.340** (2.37)	0.170** (2.34)
Area: Estate	0.150 (1.12)	0.082 (1.10)	0.093 (0.63)	0.056 (0.73)	0.620*** (3.11)	0.350*** (3.41)	0.630*** (3.09)	0.310*** (2.95)
Province: Central	0.740*** (7.82)	0.410*** (7.99)	0.770*** (6.99)	0.390*** (7.02)	0.360** (2.44)	0.150* (1.88)	0.320** (2.01)	0.160* (1.94)
Province: Southern	0.090 (1.04)	0.042 (0.89)	0.320*** (3.19)	0.170*** (3.29)	0.290* (1.96)	0.097 (1.28)	0.520*** (3.46)	0.280*** (3.61)
Province: Eastern	-0.530*** (3.61)	-0.280*** (3.51)	0.440*** (3.63)	0.250*** (3.99)	0.130 (0.66)	0.061 (0.60)	0.150 (0.82)	0.130 (1.30)
Province: North Western	0.530*** (5.25)	0.290*** (5.29)	0.630*** (5.48)	0.330*** (5.61)	0.170 (1.03)	0.042 (0.49)	0.420** (2.30)	0.240*** (2.68)
Province: North Central	0.640*** (5.58)	0.330*** (5.29)	0.330** (2.12)	0.200** (2.45)	0.300 (1.53)	0.120 (1.16)	0.590*** (2.95)	0.320*** (3.09)
Province: Uva	0.980*** (9.41)	0.550*** (9.45)	1.010*** (8.18)	0.550*** (8.56)	0.560*** (3.28)	0.240*** (2.69)	0.600*** (3.35)	0.310*** (3.40)
Province: Sabaragamuwa	0.760*** (7.62)	0.430*** (7.82)	0.490*** (4.14)	0.250*** (4.11)	0.410** (2.55)	0.180** (2.11)	0.230 (1.28)	0.110 (1.19)
Distance to bus stop	0.044* (1.89)	0.028** (2.13)	0.045** (2.00)	0.026** (2.27)	0.016 (0.44)	0.012 (0.62)	-0.034 (1.03)	-0.020 (1.16)
Electricity	-0.790*** (13.34)	-0.460*** (13.61)	-0.580*** (8.09)	-0.320*** (8.23)	-2.470*** (23.30)	-1.320*** (24.38)	-2.190*** (20.48)	-1.170*** (21.43)
Clean water	-0.300*** (4.68)	-0.170*** (4.61)	-0.260*** (3.16)	-0.130*** (3.03)	-0.890*** (8.91)	-0.49*** (9.45)	-1.340*** (12.17)	-0.700*** (12.38)
Distance to a bank	0.009 (1.61)	0.006* (1.81)	0.011 (1.63)	0.006* (1.71)	0.017** (2.01)	0.007* (1.73)	0.013 (1.27)	0.007 (1.47)

Distance to primary school	0.009 (0.62)	0.005 (0.63)	0.054*** (2.75)	0.027*** (2.68)	0.001 (0.05)	0.002 (0.15)	-0.009 (0.33)	-0.002 (0.12)
Distance to a health facility	0.010 (0.82)	0.006 (0.85)	0.000 (0.04)	0.002 (0.34)	0.022 (1.31)	0.012 (1.26)	-0.010 (0.67)	-0.005 (0.66)
Distance to GN office	0.048*** (2.68)	0.026** (2.53)	-0.022 (0.98)	-0.011 (0.93)	0.072** (2.35)	0.040** (2.41)	0.051** (2.01)	0.030** (2.35)
Household size	0.800*** (14.82)	0.460*** (15.79)	0.880*** (14.18)	0.450*** (14.32)	-1.400*** (17.64)	-0.720*** (17.84)	-1.280*** (14.95)	-0.630*** (15.33)
Household size squared	-0.032*** (7.09)	-0.019*** (7.71)	-0.038*** (7.27)	-0.019*** (7.12)	0.082*** (11.68)	0.042*** (12.54)	0.069*** (8.37)	0.036*** (9.73)
Number of dependents	0.190*** (6.55)	0.100*** (6.38)	0.140*** (4.40)	0.078*** (4.78)	0.560*** (10.40)	0.290*** (10.50)	0.540*** (8.91)	0.260*** (8.41)
Head's Age	0.013 (1.07)	0.007 (1.05)	0.016 (1.14)	0.008 (1.15)	0.006 (0.35)	0.005 (0.53)	0.030 (1.57)	0.019* (1.87)
Head's age squared	-0.000 (0.93)	-0.000 (0.91)	-0.000 (0.80)	-0.000 (0.78)	-0.000 (0.86)	-0.000 (1.02)	-0.000** (2.24)	-0.000** (2.44)
Male	-0.250*** (3.62)	-0.140*** (3.83)	-0.150* (1.80)	-0.074* (1.79)	0.420*** (4.12)	0.210*** (3.89)	0.350*** (3.33)	0.170*** (3.18)
Head's ethnicity: Tamil	-0.23** (2.19)	-0.11* (1.88)	-0.43*** (4.29)	-0.22*** (4.19)	0.29* (1.95)	0.14* (1.83)	0.45*** (3.09)	0.26*** (3.45)
Head's ethnicity: Muslim	-0.58*** (5.24)	-0.30*** (5.04)	-0.63*** (5.07)	-0.32*** (5.08)	0.32* (1.79)	0.17* (1.81)	0.41** (2.45)	0.18** (2.18)
Head's employment: Private	0.210*** (2.90)	0.110*** (2.87)	0.180** (2.17)	0.100** (2.37)	0.072 (0.61)	0.040 (0.64)	0.061 (0.51)	0.032 (0.51)
Head's employment: Employer	-0.710*** (2.62)	-0.420*** (2.98)	-1.000** (2.34)	-0.430** (2.10)	-0.340 (0.56)	-0.031 (0.11)	0.099 (0.22)	0.027 (0.12)
Head's employment: Self employed	-0.150* (1.93)	-0.088** (2.08)	-0.140 (1.56)	-0.065 (1.38)	0.049 (0.39)	0.038 (0.58)	0.024 (0.18)	0.011 (0.17)
Head's employment: Family worker	0.120 (0.32)	0.080 (0.37)	-0.130 (0.27)	-0.110 (0.43)	-0.250 (0.32)	-0.190 (0.52)	1.470** (2.39)	0.690** (2.43)

Secondary jobs	-0.080 (1.20)	-0.047 (1.29)	-0.120 (1.51)	-0.056 (1.36)	0.270** (2.30)	0.150** (2.40)	0.230* (1.77)	0.120* (1.86)
Agriculture land availability	-0.370*** (5.68)	-0.210*** (5.65)	-0.340*** (4.58)	-0.180*** (4.85)	-0.170 (1.51)	-0.080 (1.37)	0.004*** (2.99)	0.002*** (3.12)
Household appliances	2.200*** (22.61)	1.120*** (24.43)	1.750*** (20.04)	0.880*** (21.36)	0.130 (0.92)	0.018 (0.25)	0.390*** (3.04)	0.150** (2.38)
Remittances	-0.340*** (3.71)	-0.170*** (3.39)	-0.210** (2.12)	-0.100** (2.08)	-0.048 (0.38)	-0.031 (0.49)	-0.140 (1.17)	-0.078 (1.25)
Chronically ill or disabled	-0.044 (0.80)	-0.018 (0.58)	-0.058 (0.88)	-0.027 (0.78)	3.330*** (31.13)	1.780*** (32.35)	3.270*** (30.25)	1.730*** (31.06)
Head's education: primary	-0.350*** (3.92)	-0.200*** (3.97)	-0.250** (2.48)	-0.130** (2.32)	-0.570*** (4.96)	-0.320*** (5.30)	-0.280** (2.29)	-0.180*** (2.77)
Head's education: junior secondary	-0.700*** (7.36)	-0.390*** (7.37)	-0.620*** (5.99)	-0.340*** (5.90)	-2.640*** (18.61)	-1.400*** (18.76)	-2.320*** (15.42)	-1.180*** (15.30)
Head's education: O/L	-1.370*** (9.56)	-0.740*** (9.77)	-1.290*** (7.44)	-0.630*** (7.48)	-2.830*** (11.08)	-1.460*** (11.55)	-3.060*** (9.63)	-1.460*** (9.47)
Head's education: A/L	-1.920*** (7.77)	-1.010*** (8.44)	-2.440*** (6.10)	-1.060*** (6.57)	-2.550*** (7.09)	-1.270*** (7.31)	-2.940*** (5.84)	-1.370*** (6.47)
Head's education: Tertiary	-3.200*** (3.30)	-1.590*** (4.19)	-2.130*** (3.00)	-0.920*** (3.34)	- (0.32)	- (0.37)	-2.620*** (0.48)	-1.230*** (0.57)
House owner	-0.130* (1.71)	-0.079* (1.82)	-0.010 (0.10)	-0.018 (0.34)	-0.037 (0.32)	-0.023 (0.37)	-0.063 (0.48)	-0.039 (0.57)
Sanitary facilities	-0.190*** (2.67)	-0.097** (2.45)	-0.420*** (5.18)	-0.220*** (5.08)	-1.560*** (16.57)	-0.840*** (16.97)	-1.780*** (17.60)	-0.940*** (18.03)
Observations	18544	18544	19958	19958	18124	18124	19958	19958
Pseudo R ²	0.306	0.307	0.254	0.256	0.555	0.555	0.535	0.534
Chi ²	2731.98	2855.65	2039.59	1985.60	1964.63	1985.84	1709.56	1719.87
Prob. Chi ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses, t statistics are based on heteroscedasticity consistent standard errors. Area (urban is the reference group), Province (Western Province is the reference group),

Head's ethnicity (Sinhala is the reference group), Head's employment (employed in the public sector is the reference group), Head's education (No education is the reference group) are categorical variables. The blanks indicated by “-” are due to the omission of the variable by Stata due to the perfect familiars (all households are not poor), O/L: Ordinary Level, A/L: Advanced Level.

The higher probability to be poor in estate areas is not statistically significant in 2007 when the dependent variable is defined according to the multidimensional approach. The coefficients of estate areas are not statistically significant when monetary approach is considered and significant at 1 per cent level when multidimensional approach is considered. Log odds ratios for both surveys are around 1.8. Following a similar trend of determinants of household consumption expenditure, in comparing a household in Western Province, the probability to be poor is considerably high among the other provinces. A notable exception is the Eastern Province where the log odds ratio is 0.614 and statistically significant at 1 per cent level if the dependent variable is defined according to the monetary approach in 2007, yet the log odds ratio increases to 1.559 in 2010. The statistical significance does not hold for any estimate when multidimensional poverty approach is considered. The probability to be poor is less in 2010 when both definitions of the dependent variable are applied.

A higher level of education of the household head reduces the likelihood to be poor in both surveys as in the previous analysis. This is true for both specification of the dependent variable. The log odds ratio of primary education is 0.703 which decreases to 0.041 for the tertiary education in 2007. The log odds ratio is smaller for multidimensional poverty for almost all the education levels and statistically significant at 5 per cent or higher level. This effect decreases in the latest survey for the lower educational groups and increases for the upper educational groups.

The likelihood to be multidimensionally poor is significantly less among the households with higher access to household utilities. This effect is statistically significant for both surveys and both specifications of the dependent variable. The log odds ratios are smaller if the dependent variable is defined according to the monetary approach to poverty

and statistically significant at 1 per cent level for both surveys and both specifications of the dependent variable.

It is interesting to find that compared to a Sinhala (majority) household, the likelihood to be poor is less among Tamil and Muslim (minority) households when monetary approach is taken, yet, the opposite is true if multidimensional approach is applied. The log odds ratio of Tamil is around 0.8 in the monetary specification of the dependent variable, but increased to 1.3 in the multidimensional specification of the dependent variable. All the coefficients are statistically significant at 5 per cent or a higher significant for monetary definition and 10 per cent or higher for multidimensional definition of the dependent variable.

Emphasising the role of household composition in determining household consumption expenditure, male headed households are less likely to be poor in both the surveys if the dependent variable is defined according to the monetary approach. Contrary to that, the probability to be poor is high among the male headed households if the multidimensional definition of the dependent variable is applied. The log odds ratios of male are around 0.8 when monetary definition is considered, but increases to 1.5 if multidimensional approach is considered. Other than the coefficient of monetary approach in 2010, the rest of the coefficients are statistically significant at 1 per cent level. Following the same pattern of determinant of household consumption expenditure, increasing household size reduces the probability to be poor if the monetary poverty approach is applied, but it increases the probability to be poor when the multidimensional approach is considered.

Household head's employment status is statistically significant at 10 per cent level (or higher) when monetary poverty definition is applied and log odds ratios are around 1.2 in both years if monetary approach is considered. Nevertheless, this effect is not statistically significant when the multidimensional approach is considered. Furthermore, in highlighting the difference between monetary poverty and

multidimensional poverty, increased remittances decrease the probability to be poor when the monetary poverty approach is considered. But it is not statistically significant when the multidimensional poverty approach is used. Log odds ratios of receiving remittances are 0.71 and 0.81 in 2007 and 2010 respectively, and they are statistically significant at 5 per cent or higher. The probability to be multidimensionally poor is also high among the households with chronically ill or disabled members, but this effect is not significant for the monetary poverty definition. Availability of agricultural lands also reduces the likelihood to be poor if the monetary approach to poverty is considered. However, this effect is not important if the multidimensional approach is used.

Columns 2 to 5 of Table 6.15 show the logit and probit estimations using a binary dependent variable defined according to the monetary poverty approach while the remaining columns show the results that use a binary dependent variable defined according to the multidimensional approach for estate areas. Annex 10 shows the log odds ratios of logit regressions of both samples. The same trend of national level can be observed in estate areas, nevertheless statistical significance of most of the variables are either decreased or insignificant.

Higher levels of education of the household head reduce the likelihood to be poor in both surveys as well as in both definitions of poverty as in the national sample. The effect is smaller up to junior secondary level, but this effect is larger for ordinary level (OL) in the latest survey. The statistical significance holds for all the estimates at 5 per cent level or higher except monetary estimates of 2010. As in the national sample, log odds ratio of the multidimensional poverty approach is generally smaller for both years.

Increased household size at estate areas also shows the same trends of the national sample where increased household size decreases the likelihood to be poor when the monetary poverty approach is used but it increases the likelihood to be multidimensionally poor. The same relationship can be identified with the variable secondary job and multidimensional poverty.

Table 6.15: Determinants of poverty in estate areas

Variable	Dependent variable: monetary approach				Dependent variable: multidimensional approach			
	2007		2010		2007		2010	
	Logit	Probit	Logit	Probit	Logit	Probit	Logit	Probit
Distance to bus stop	0.050 (1.00)	0.034 (1.16)	0.160** (2.37)	0.099*** (2.66)	0.045 (0.70)	0.032 (0.90)	-0.061 (0.81)	-0.035 (0.83)
Electricity	-0.510*** (3.97)	-0.310*** (4.05)	-0.630*** (3.88)	-0.340*** (3.73)	-1.680*** (9.08)	-0.940*** (9.46)	-2.080*** (10.38)	-1.150*** (10.87)
Clean water	-0.150 (1.20)	-0.086 (1.19)	-0.280* (1.83)	-0.140* (1.69)	-1.000*** (6.09)	-0.570*** (6.25)	-1.520*** (7.99)	-0.850*** (8.35)
Distance to a bank	-0.014 (1.31)	-0.008 (1.29)	0.042*** (2.64)	0.021** (2.39)	-0.011 (0.69)	-0.006 (0.71)	-0.005 (0.29)	-0.002 (0.24)
Distance to primary school	0.078** (2.14)	0.045** (2.13)	-0.006 (0.12)	-0.003 (0.12)	0.006 (0.13)	0.003 (0.12)	0.050 (0.92)	0.022 (0.73)
Distance to a health facility	-0.044* (1.92)	-0.027** (2.01)	-0.020 (0.92)	-0.006 (0.52)	0.039 (1.43)	0.022 (1.46)	-0.017 (0.70)	-0.008 (0.60)
Distance to GN office	0.058** (2.09)	0.036** (2.20)	-0.042 (0.87)	-0.023 (0.88)	0.063 (1.63)	0.035 (1.61)	0.078 (1.53)	0.044 (1.56)
Household size	0.690*** (5.58)	0.410*** (5.67)	1.380*** (7.40)	0.720*** (7.46)	-1.290*** (7.66)	-0.710*** (7.85)	-1.290*** (7.77)	-0.700*** (7.56)
Household size squared	-0.032*** (2.99)	-0.019*** (3.03)	-0.082*** (5.32)	-0.042*** (5.14)	0.078*** (5.00)	0.043*** (5.46)	0.069*** (4.95)	0.039*** (4.65)
Number of dependents	0.280*** (4.20)	0.170*** (4.37)	0.130* (1.78)	0.083** (1.97)	0.530*** (4.85)	0.290*** (5.03)	0.690*** (5.78)	0.370*** (5.88)
Head's Age	-0.036 (1.19)	-0.021 (1.22)	0.020 (0.52)	0.008 (0.36)	-0.073** (2.05)	-0.043** (2.14)	0.018 (0.44)	0.012 (0.51)
Head's age squared	0.000 (1.21)	0.000 (1.24)	-0.001 (0.28)	-0.000 (0.13)	0.000 (1.56)	0.000* (1.69)	-0.000 (0.67)	-0.000 (0.74)
Male	-0.170 (1.04)	-0.100 (1.11)	0.240 (1.28)	0.160 (1.57)	0.600*** (2.97)	0.340*** (2.93)	0.550** (2.50)	0.310*** (2.61)

Head's employment:	-0.242	-0.150*	-0.078	-0.054	-0.068	0.004	-0.130	-0.067
Private	(1.64)	(1.72)	(0.45)	(0.56)	(0.34)	(0.04)	(0.58)	(0.57)
Head's employment:	-0.508	-0.310*	0.110	0.018	0.053	0.016	0.570	0.390*
Self employed	(1.58)	(1.70)	(0.36)	(0.11)	(0.14)	(0.07)	(1.36)	(1.68)
Head's employment:	-	-	1.360	0.770	1.300	0.710	4.480***	2.390***
Family worker	-	-	(0.94)	(0.96)	(1.60)	(1.38)	(4.70)	(3.82)
Secondary jobs	-0.160	-0.094	-0.650***	-0.350***	0.052	0.020	0.370	0.210*
	(1.04)	(1.07)	(3.57)	(3.54)	(0.26)	(0.18)	(1.62)	(1.70)
Household appliances	0.950***	0.540***	1.130***	0.640***	0.460	0.270	0.810**	0.450**
	(3.55)	(3.67)	(4.56)	(4.99)	(1.16)	(1.24)	(2.45)	(2.54)
Remittances	-0.610***	-0.340***	-0.210	-0.120	-0.310	-0.170	-0.180	-0.110
	(2.78)	(2.75)	(0.88)	(0.94)	(1.20)	(1.19)	(0.65)	(0.70)
Chronically ill or disabled	-0.087	-0.059	-0.320*	-0.190**	3.390***	1.930***	3.020***	1.690***
	(0.63)	(0.73)	(1.80)	(2.02)	(16.48)	(17.35)	(13.48)	(14.52)
Head's education:	-0.520***	-0.300***	-0.074	-0.051	-0.810***	-0.470***	-0.690***	-0.410***
primary	(3.32)	(3.25)	(0.37)	(0.45)	(4.00)	(4.10)	(3.02)	(3.34)
Head's education:	-0.840***	-0.500***	-0.490**	-0.270**	-3.270***	-1.840***	-2.980***	-1.680***
junior secondary	(4.47)	(4.53)	(1.99)	(1.99)	(11.14)	(11.56)	(9.61)	(9.92)
Head's education: O/L	-2.100***	-1.210***	-1.970**	-1.100**	-2.980***	-1.720***	-3.170***	-1.830***
	(3.67)	(4.21)	(1.99)	(2.38)	(5.42)	(5.41)	(4.37)	(4.39)
Sanitary facilities	0.085	0.054	-0.660***	-0.360***	-1.500***	-0.850***	-1.900***	-1.070***
	(0.63)	(0.68)	(4.04)	(3.95)	(8.70)	(9.03)	(9.69)	(9.99)
Line house	0.260*	0.160**	0.150	0.077	0.410**	0.220**	0.490**	0.260**
	(1.84)	(1.98)	(0.89)	(0.84)	(2.03)	(2.02)	(2.37)	(2.26)
Observations	1672	1672	1695	1695	1676	1676	1681	1681
Pseudo R ²	0.180	0.182	0.215	0.214	0.471	0.473	0.487	0.488
Chi ²	303.45	342.18	240.41	263.98	425.90	484.39	349.97	410.35
Prob. Chi ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses, t statistics are based on heteroscedasticity consistent standard errors. Head's employment (employed in the public sector is the reference group), Head's education (No education is the reference group) are categorical variables. The blanks indicated by "-" are due to the omission of the variable by Stata due to the perfect families (all households are not poor), O/L: Ordinary Level, A/L: Advanced Level

Contradictory to the results of the national sample, the effect of employment status of the head of the household is not statistically significant for most of the samples though it is significant at 1 per cent level for the family worker based on multidimensional definition of the dependent variable. Log odds ratio of family worker is 8.25 and statistically significant at 5 per cent level in 2010 if multidimensional specification of the dependent variable is used. As in the national sample, increased remittances reduce the likelihood to be poor when the monetary poverty definition is applied, yet this relationship is not significant for 2010. Increased access to household utilities reduces the likelihood to be poor even in the estate areas when multidimensional poverty is considered. Yet this effect is smaller or not statistically significant when the monetary poverty definition is applied. Log odds ratio of access to electricity is 0.36 and statistically significant at 1 per cent level when multidimensional approach to poverty is considered, but it is not statistically significant when monetary approach is used.

6.3.2 Discussion

The analyses of determinants of poverty and determinants of household consumption expenditure (as a proxy to welfare) show that area of living, province, education, size of the household, number of dependents, gender of the household head, remittances, and availability of land are the major determinants of poverty in Sri Lanka.

Living in a rural remote area negatively affects on household consumption expenditure, therefore, increase the probability to be poor and it is increasing towards the upper quantiles. This relationship holds for both the survey years and the negative effect decreased in the latest survey. This signifies that though the household consumption expenditure level of rural and estate areas are significantly lower than the urban areas, the urban-rural difference is becoming smaller in recent years. This is in line with the increased covariate effect of the “region” in the decomposition analysis and the higher rate of reduction of poverty in these two areas. This could be due to the positive effects of

recent regional development programmes of the country³⁰. But the analysis also suggests that the conditions in estate areas did not improve much, especially if we consider the multidimensional definition of poverty.

Lesser poverty among the households whose household head is an entrepreneur can be explained by the higher income levels of the entrepreneurs compared to the public servants. The higher welfare of the public sector employees compared to the private sector employees suggests that even though the private sector is expanding in recent times, still the gaining from public employment is high. On the other hand, until recent, family background of public servants was better than private servants. Therefore, the family members of public servants are more educated, have better jobs and social relationships. But the decline of this effect in the upper quantiles suggests that the private sector employees are gaining better income than their private sector counterparts at the upper income groups in recent years, which reflects the current labour market trends of Sri Lanka. However, the analysis suggests that importance of employment status is not a significant determinant of multidimensional poverty though it is important in determining monetary poverty. The effect of type of employment is weaker in estate areas. This is due to the employment structure in the estate areas. As explained previously, most of the estate workers are plantation workers and number of government officers, employers and other private sector workers is very limited. However, the results suggest that family worker significantly affects reducing the likelihood to be poor in estate areas.

Even though, it may have reduced the workers' leisure time, doing two jobs (an additional job) increases the household consumption expenditure level. The effect increases towards the upper quantiles and is larger in the latest survey. Having an additional job does not have any significant relationship with household consumption

³⁰ Improvement of facilities of schools in rural and estate areas (1000 schools programme) and establishment of new universities in poor areas, provision of an IT centre to each divisional secretariat, improvement of rural roads, irrigation systems, promotion of rural industries (primarily via small, large and medium scale enterprises), Colombo-Kandy expressway, Southern Highway, Hambantota airport and sea port are few recent examples of government regional development programmes.

expenditure in estate areas other than the lowest quantiles in the previous survey. But it is strongly significant for the latest survey, especially for the middle quantiles. This could be due to the fact that most of the estate workers tend to do an additional job in recent years outside the resident estates after their usual working hours.³¹ Therefore, doing an additional job may have affected positively on the household consumption expenditure and therefore reduced poverty especially in the estate areas.

The study shows that remittances played a key role in determining poverty in Sri Lanka during the study period. More than two thirds of migrant workers of Sri Lanka are either no skilled or housemaids (70 per cent in 2007 and 66 per cent in 2010) who are mostly poor women from rural remote areas (Sri Lanka Bureau of Foreign Employment, 2012³²). Workers' remittances in 2007 was US \$ 2502 million which increased to US \$ 4116 million in 2010, becoming the number one foreign currency earner of the country in 2010 (Central Bank of Sri Lanka, 2007, 2010). This twofold increase in workers' remittances signifies the importance of remittances in the country. Showing the current migration trend of the country, remittances have a positive relationship with household consumption expenditure also in estate areas. However, the positive relationship is statistically significant only for the middle and upper quantiles. This could be due to the barriers to migration among the poorest groups in the estate areas (i.e. cost of migration, less information, and poor networking) and the household members of upper quantiles do not participate in the current type of migration.³³ An interesting finding of the analysis is that increased remittances increase the household income and consumption expenditure therefore reduces monetary poverty but it has no statistically significant relationship with multidimensional poverty. This is accepted as increased income itself does not guarantee

³¹ The regular working hours of estate workers (especially for males) is from 7.00 to 14.00.

³² 218,459 and 267,509 migrant workers in 2007 and 2010 respectively emigrated for foreign employment.

³³ Almost all the international migration taking place in estate areas is limited to unskilled labour migration (mainly domestic workers) to Middle Eastern countries.

a reduction in multidimensional poverty unless increased income transferred to household functionings (achievements).

Education affects positively on household consumption expenditure, thus reduce poverty. The effect is high for upper quantiles in both surveys, but the effect declined in the latest survey. This suggests that the importance of education credentials in securing a better paid job is also decreasing in the estate areas as in the poverty decomposition analysis. The size of the coefficients of education is relatively smaller in estate areas compared to the national sample. This is justifiable as the level of education in estate areas is still lower compared to the urban and rural areas, and improvements are taking place in recent years. Furthermore, traditionally, estate workers were employed in the tea plantations in which do not require any formal education, but the younger generation tends to have higher formal education and many of the educated youths do not like to work in the plantations, thus they tend to migrate locally or internationally.

Household consumption expenditure of the male headed households is higher than the household consumption expenditure of the female headed households for any quantile. This suggests that even though Sri Lanka is performing better in gender equality in comparison to other countries in the region (UNDP, 2011), still gender discrimination prevails to some extent. But the probability to be multidimensionally poor is high among the male headed households while the opposite is true for female headed households. This suggests that earning capacity of males is high but those earnings may not directly indicate the welfare of the household. On the other hand, this is in line with the idea that female household heads are better managers of resources optimizing the household welfare (McCarter, 2006). However, the effect of the household head's gender on the probability to be poor decreases in the latest survey suggesting that the gender difference in Sri Lanka is decreasing in recent years and poverty among the female headed households are also gradually decreasing.

Signifying the importance of other aspects of poverty (multidimensionality), in addition to income, monetary poverty among the households with chronically ill or disabled members is low compared to the other households. This suggests that consumption expenditure level of the households with chronically ill or disabled member can be higher than the other households due to the additional expenditure of the ill or disabled member. This is evident as poverty among the households with ill or disabled member is high when multidimensional approach is taken. The same pattern can be observed with availability of land. Increased land size increases the household income thus household consumption expenditure, yet it does not make much difference in multidimensional poverty. This supports the argument that a household can be above the poverty line, yet their actual achievements can be below the minimum level (when the multidimensional approach is taken) and it is important to consider the multidimensional nature of poverty in estimating poverty, especially among specific groups such as minorities and ill disabled people. Nevertheless, the negative effect greatly decreases in the latest survey suggesting improvements among households with ill or disabled members in recent years. This could be due to the recent programmes targeting households with chronically ill or disabled members.

6.4 Conclusion

This chapter examined the causes of the reduction of poverty found in the previous two chapters. The chapter first examine the socioeconomic changes of country between 2007 and 2010, find that the GDP of the country is significantly improved during the study period while the growth was rather equally distributed among different provinces. The household income also significantly increased, leading to a significant increase in household consumption expenditure. The distribution of income and consumption was more equal as such poor households also benefited from the growth. A significant increase in government expenditure on social welfare such as expenditure on

health, education, fertilizer subsidy, poverty reduction programme (*Samurdhi*) and direct payments to needy people can be observed during the study period while the inflation rate decreased to a record low towards the latter survey. Moreover, the country was experiencing relatively stable socio-political conditions during the latest survey due to the end of the civil war that had negatively affected the development of the country for more than three decades.

Since the estate areas recorded a higher rate of poverty reduction than the national average, the study also examined the factors that may affect the reduction of poverty, specifically for the estate areas. The study found that three major products – tea, rubber and coconut – of estate areas had recorded the highest prices in recent years and higher production levels towards the latter survey period, which could have led to a boom in the plantation industry benefiting the estate workers. The workers unrest in the estate areas was minimal during the latest survey, while it was at the peak during the previous survey which had led to the waste of more than five million work days to the industry. The peace at the work place was due to the significant increase in the wages of estate workers which amounted to a more than 50 per cent increase between the two survey periods. Meanwhile government as well as non-government organizations put special interest in improving the household welfare in estate areas due to the fact that estate areas had recorded poverty levels more than double the national average. These factors combined with stable macroeconomic conditions and favourable weather conditions have generated an economic boom in estate areas which led also to significant improvements in the lives of the estate workers.

The chapter secondly used two quantile regression-based decomposition techniques, namely Machado and Mata (2005) decomposition (using conditional quantile regression) and Fortin, Lemieux and Firpo (2011) decomposition to estimate the changes in household consumption expenditure per capita. Both methods are extensions to the Blinder-Oaxaca counterfactual decomposition technique (Blinder, 1973; Oaxaca, 1973)

which decomposes the observed difference in welfare measure into two components, i.e. explained (due to the differences in distribution of household characteristics between two periods) and unexplained (due to the differences in returns to these characteristics). The decomposition analysis found that there is a significant reduction of poverty between 2007 and 2010, of which more than 85 per cent is due to the differences in returns to household characteristics (and unobservable characteristics). Only around 15 per cent of the difference can be attributable to the differences in observable characteristics between the two survey periods. More or less similar results are observed with the decompositions at the national level as well as estate areas, though the statistical significance is weaker for the decompositions at the estate level, possibly due to the smaller sample sizes.

Furthermore, to explain the recent reduction in poverty, the study examined the determinants of poverty in Sri Lanka as well as in estate areas using three estimation techniques, namely quantile, logit and probit regression analysis. Two specifications were used in analysing determinants of poverty using logit and probit regressions. First the binary dependent variable (poor and non-poor) is defined using minimum monetary expenditure (poverty line) to satisfy the basic needs (according to the monetary approach to poverty) and secondly using the second cut-off (weighted deprivations) of the Alkire–Foster multidimensional poverty estimation method. The analysis found that area and province of living, education, employment, receiving remittances, gender of the head of the household, and size of the household are the major determinants of Sri Lanka. Both survey years tend to hold the same results while the effect of some of the independent variables decreased in the latest survey which confirms that reduced returns effect of these variables in the latest survey.

Moreover, signifying the difference between monetary poverty and multidimensional poverty, health related variables - gender of the household head, size of the household, and land availability - had opposite results for the two specifications of the dependent variable. Also, health related variables are significant only for the

multidimensional definition of the dependent variable while remittances are significant only for the monetary poverty definition of the dependent variable. The results of the estate areas also show similar trends even though the statistical significance is greatly reduced, possibly due to the smaller sample sizes. An important difference found between the determinants at national and estate areas is that the effect of education is high for the upper education levels in estate areas in the latest survey contradictory to the smaller effect in the national sample. This suggests that a return to education is still high in the estate areas due to lower education levels.

Chapter 7

Conclusion

Sri Lanka is considered as one of the outliers in Asia in relation to improved human development given its low level of per capita GDP. This trend has been studied by several studies to find how Sri Lanka progressed in human development with a low level of GDP (Isenman, 1980; Sen, 1988; UNDP 1998, 2013). Yet, the performance of Sri Lanka in reducing poverty was not impressive until recent times. But according to the Department of Census and Statistics, Sri Lanka records a significant reduction of monetary poverty after the mid-2000s (Department of Census and Statistics, 2008, 2011). To the best of the author's knowledge, there is no study that analyses the recent reduction of poverty in Sri Lanka and the causes of reduction of poverty in detail. Therefore this study first estimates poverty in Sri Lanka using the multidimensional approach to measuring poverty as an alternative estimation method. The Alkire and Foster (2009, 2011) multidimensional poverty estimation method is used in this analysis. Though Alkire and Forster (2009, 2011) propose a convenient yet intuitive estimation method of multidimensional poverty, the method is criticized for the arbitrary selection of dimensions and weights. Therefore, this study examines the possibility of using statistical techniques to select the dimensions and weights for the dimensions. Polychoric Principal Component Analysis (PPCA) proposed by Kolenikov and Angeles (2009) is used to select the dimensions and weights. These dimensions and weights are used in analysing multidimensional poverty using Household Income and Expenditure Survey data for 2006/07 and 2009/10.

Secondly, the study estimates both multidimensional and monetary poverty levels of one of the poorest areas – estate areas – in Sri Lanka using data gathered by the author, by conducting a household survey as an alternative to the HIES data. The author's survey was conducted in two of the poorest districts of Sri Lanka (Badulla and Nuwara Eliya) where most of the estate areas are concentrated. The author also conducted individual and group interviews with estate workers and other stake holders to analyse their perceptions on the recent reduction of poverty.

Poverty estimations using both an alternative measuring approach (multidimensional poverty) and an alternative data source (the author's survey data) confirmed the recent reduction of poverty in Sri Lanka. Therefore, the study finally analysed the sources of the recent reduction of poverty in Sri Lanka using poverty decomposition analysis, a descriptive analysis on recent macroeconomic changes, and an analysis of determinants of poverty. In reviewing the recent macroeconomic changes, economic growth, wage rates, income distribution, price changes, socio-political conditions and environmental factors were examined descriptively. In determining the sources of recent reduction of poverty in Sri Lanka, conventional quantile regression Machado and Mata (2005) decomposition and unconditional quantile regression Fortin, Lemieux and Firpo (2011) decomposition techniques were applied. In analysing the determinants of poverty, both directly measuring determinants of poverty using logit and probit regressions as well as indirectly estimating poverty determinants using quantile regression techniques were conducted. Furthermore, both monetary and multidimensional approaches to measuring poverty were employed in defining the dependent variable of determinants of poverty (in logit and probit analysis).

Chapter 4 of this study proposed a new method of statistically selecting the dimensions and allocating weights for dimensions of the multidimensional poverty index proposed by Alkire and Foster (2009). This method statistically selects the dimensions for the multidimensional poverty index. Therefore, only the relevant dimensions (indicators)

for a particular country are selected to the index. This improves the relevance of multidimensional poverty index for a specific country or situation. Furthermore, the proposed method selects the weights for each indicator statistically. Therefore, the allocated weights represent the actual correlation between the concerned variable and the multidimensional poverty. The chapter confirmed that poverty in Sri Lanka considerably decreased between the two survey years. Poverty in the estate areas of Sri Lanka is still higher than the national averages, yet a considerable reduction of poverty can be observed in estate areas between the two survey periods. The analysis of multidimensional poverty for different indicators of the multidimensional poverty index suggested that different areas as well as different households (with different endowments) need different interventions for further reduction of multidimensional poverty.

Chapter 5 of this study confirmed that there is a significant reduction of poverty levels in estate areas. Both monetary and multidimensional poverty levels of the author's survey are higher than the estimations using HIES 2009/10 data. But a significant reduction of poverty can be observed between the author's survey data and HIES 2006/07, which suggests that poverty in the estate areas considerably decreased in recent years. Analysis of the perception of the poor suggests that the poor people do not feel huge improvements in their welfare levels, yet they find that their welfare levels are improving in recent years, especially in terms of education and health conditions. Furthermore, they stated that their income levels are significantly affected by the recent domestic and international migration. Though their household income and consumption expenditure levels increased in recent years, they find that their savings did not increase at all. Therefore, the risk of falling into poverty is high among the estate poor.

The study found that GDP of the country significantly increased during the study period and the growth was rather equally distributed among different provinces. Household income has significantly improved and household consumption expenditure also follows the same trend of income, which suggested that increased household income

led to an increase in household consumption expenditure, therefore, reduction of poverty. A significant increase in government expenditure on social welfare such as expenditure on health, education, fertilizer subsidy, poverty reduction programme (*Samurdhi*) and direct payments to needy people can also be observed during the study period. The inflation rate decreased to a record low towards the latter survey. Moreover, the country was experiencing relatively stable socio-political conditions during the latest survey. The study also found that three major products – tea, rubber and coconut – of estate areas had recorded the highest average prices and production levels towards the latter survey which have led to a boom in the plantation industry benefiting the estate workers. Worker unrest in the estate areas was minimal during the latest survey, while it was at the peak during the previous survey.

The decomposition analysis of Chapter 6 found that than 85 per cent of the reduction of poverty is due to the differences in returns to household characteristics. Only around 15 per cent of the difference can be attributable to the differences in household characteristics between the two survey periods. Analysis at national and estate areas generated similar results, though the statistical significance is weaker for the decompositions at the estate level, possibly due to the smaller sample sizes. This suggests that recent socio-economic development of the country has affected on the reduction of poverty.

The study found that area and province of living, education, employment, receiving remittances, gender of the household head, and size of the household are the major determinants of Sri Lanka during the study period. Signifying the difference between monetary poverty and multidimensional poverty, health related variables, gender of the household head, size of the household, and land availability had opposite results for the two specifications of the dependent variable (multidimensional and monetary). Also health related variables are significant only for multidimensional definition of the dependent variable while remittances are significant only for the monetary poverty

definition of the dependent variable. An important difference found between the determinants at national and estate areas is that the effect of education is high for the estate areas in the latest survey contradictory to the smaller effect in the national sample. This suggests that a return to education is still high in the estate areas due to lower education levels.

Therefore, it can be concluded that

- Polychoric Principal Component Analysis can be used to select statistically the dimensions of the multidimensional poverty index and to allocate the weights for different indicators. However, allocating a higher weight to the first component is natural with the proposed method and this requires further research.
- Sri Lanka has recorded an impressive reduction of monetary and multidimensional poverty levels in the recent years. However, poverty in the estate areas considerably is high irrespective of the measurement method.
- Reduction of poverty among households with different endowments considerably varies. This suggests that “one size does not fit all”. Therefore, tailor-made interventions are needed for further reduction of poverty in Sri Lanka.
- The major part of the reduction of poverty in Sri Lanka is due to the differences of returns to household characteristics between 2007 and 2010 and a smaller part is explained by the differences in household characteristics between the said periods.
- The higher reduction of poverty in Sri Lanka can mainly be attributed to favourable macroeconomic conditions such as, higher economic growth with fair redistribution, stable socio-political conditions, low inflation coupled with favourable weather and price conditions (especially for the estate areas) of the country during the study period.

- The recent regional development programmes of the government may have also positively influenced the reduction of poverty in remote areas of the country.
- The increased migration (remittances), decreased household sizes, and improved education levels also have had positive impact on the recent reduction of poverty in Sri Lanka.

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Annex 1: Land use of estate areas by district

District	Tea		Rubber		Coconut		Total	
	acres	%	acres	%	acres	%	acres	%
Colombo	149	0.05	9,462	5.80	1,047	0.60	10,658	1.68
Gampaha	n.a.	n.a.	1,101	0.67	15,207	8.65	16,308	2.58
Kalutara	2,603	0.89	40,993	25.13	1,466	0.83	45,062	7.12
Kandy	37,041	12.60	500	0.31	1,625	0.92	39,166	6.19
Matale	11,796	4.01	4,179	2.56	4,883	2.78	20,858	3.30
Nuwara Eliya	114,214	38.86	5	0.00	18	0.01	114,237	18.05
Galle	8,816	3.00	11,987	7.35	2,160	1.23	22,963	3.63
Matara	15,760	5.36	5,344	3.28	2,660	1.51	23,764	3.75
Hambantota	n.a.	n.a.	5	0.00	3,133	1.78	3,138	0.50
Killinochchi	n.a.	n.a.	n.a.	n.a.	30	0.02	30	0.00
Ampara	n.a.	n.a.	n.a.	n.a.	118	0.07	118	0.02
Batticaloa	n.a.	n.a.	n.a.	n.a.	588	0.33	588	0.09
Kurunegala	24	0.01	5,425	3.33	93,631	53.24	99,080	15.65
Puttulam	n.a.	n.a.	n.a.	n.a.	42,352	24.08	42,352	6.69
Anuradhapura	n.a.	n.a.	n.a.	n.a.	699	0.40	699	0.11
Polonnaruwa	n.a.	n.a.	n.a.	n.a.	2,038	1.16	2,038	0.32
Badulla	61,833	21.04	908	0.56	82	0.05	62,823	9.93
Moneragala	2,105	0.72	3,212	1.97	447	0.25	5,764	0.91
Ratnapura	31,921	10.86	29,991	18.38	1,708	0.97	63,620	10.05
Kegalle	7,676	2.61	50,038	30.67	1,976	1.12	59,690	9.43
Total	293,938	100.00	163,150	100.00	175,868	100.00	632,956	100.00

Source: Census of Agriculture (2002), Department of Census and Statistics of Sri Lanka, n.a.: not available.

Annex 2: Population distribution of Sri Lanka by district and area

District	Urban			Rural			Estate			Total	
	Population	as a % of total district population	as a % of total urban population	Population	as a % of total district population	as % of total rural population	Population	as a % of total district population	as % of total estate population	Population	as a % of national population
Colombo	1,229,572	54.6	49.8	1,014,388	45.1	7.5	7,314	0.3	0.8	2,251,274	13.3
Gampaha	300,933	14.6	12.2	1,762,028	85.4	13.0	723	0.0	0.1	2,063,644	12.2
Kalutara	113,188	10.6	4.6	915,477	85.9	6.8	37,574	3.5	4.1	1,066,239	6.3
Kandy	155,987	12.2	6.3	1,030,172	80.5	7.6	92,869	7.3	10.2	1,279,028	7.6
Matale	36,103	8.2	1.5	383,468	86.9	2.8	21,757	4.9	2.4	441,328	2.6
Nuwara Eliya	43,073	6.1	1.7	283,659	40.3	2.1	376,878	53.6	41.2	703,610	4.2
Galle	109,921	11.1	4.5	863,309	87.2	6.4	17,257	1.7	1.9	990,487	5.9
Matara	64,361	8.5	2.6	676,499	88.9	5.0	20,510	2.7	2.2	761,370	4.5
Hambantota	21,571	4.1	0.9	503,410	95.6	3.7	1,433	0.3	0.2	526,414	3.1
Ampara	112,536	19.0	4.6	480,461	81.0	3.5	na	na	na	592,997	3.5
Kurunegala	34,691	2.4	1.4	1,418,881	97.2	10.5	6,643	0.5	0.7	1,460,215	8.6
Puttalam	65,294	9.2	2.6	642,210	90.5	4.7	2,173	0.3	0.2	709,677	4.2
Anuradhapura	53,151	7.1	2.2	691,573	92.7	5.1	969	0.1	0.1	745,693	4.4
Polonnaruwa	na	na	na	358,679	99.9	2.6	305	0.1	0.0	358,984	2.1
Badulla	51,536	6.6	2.1	567,178	72.7	4.2	161,269	20.7	17.6	779,983	4.6
Monaragala	na	na	na	388,226	97.7	2.9	9,149	2.3	1.0	397,375	2.3
Ratnapura	58,245	5.7	2.4	855,178	84.2	6.3	102,384	10.1	11.2	1,015,807	6.0
Kegalle	17,139	2.2	0.7	712,914	90.8	5.3	55,471	7.1	6.1	785,524	4.6
Sri Lanka	2,467,301	14.6	100.0	13,547,710	80.0	100.0	914,678	5.4	100.0	16,929,689	100.0

Source: Census of Population and Housing of Sri Lanka (2001) Department of Census and Statistics of Sri Lanka. Note: Population and Housing Census of 2001 was not carried out in seven districts, hence the above data is only for 18 districts of Sri Lanka. However, there is no estate areas in the seven districts left out in the census.

Annex 3: Data summaries of estate areas of Nuwara Eliya and Badulla districts

Item	HIES 2007 %	HIES 2010 %	Author's Survey %
Highest education level of the family			
No Schooling	3.83	2.66	11.59
Some Primary	22.80	17.42	16.67
Some Junior Secondary	36.78	31.56	40.58
Ordinary Level (O/L)	29.50	38.73	24.28
Advanced Level (A/L)	6.70	9.02	6.52
Graduate	0.38	0.61	0.36
Lighting Source			
Kerosene	27.39	16.39	10.51
Electricity	72.41	83.61	88.77
Solar Power	0.19	0.00	0.72
Drinking Water			
Protected Well	5.56	25.00	7.97
Unprotected Well	4.02	2.25	2.54
Tube Well	0.00	0.20	4.35
Pipe born	83.52	69.67	83.33
Stream/river/tank	2.87	2.05	1.45
Other	4.02	0.82	0.36
Toilet Availability/Type			
No toilet	13.79	7.58	8.02
Shared with others	17.05	17.01	18.98
Exclusively for family	69.16	75.41	72.99
Water sealed	97.11	98.26	42.53
Pit type	2.89	1.74	42.53
Floor Type			
Cement	77.78	81.97	61.52
Terrazzo/tiles	0.77	1.23	9.42
Mud	21.44	16.50	29.06
Type of Cooking Fuel			
Firewood	96.55	97.33	98.91
Gas	2.11	1.44	0.36
Kerosene	0.38	0.82	0.72
Electricity	0.77	0.21	0.00
Sawdust/paddy husk	0.19	0.21	0.00
Assets Ownership			
Radio	68.01	70.49	80.31
Television	64.37	75.41	65.28
Land phone	10.54	45.29	91.77
Mobile phone	6.51	33.20	-
Bicycle	2.87	3.89	5.06
Motorcycle	1.72	2.66	6.25
Health status			
Disabled	4.02	8.61	14.82
Hospitalized	0.19	0.82	3.98

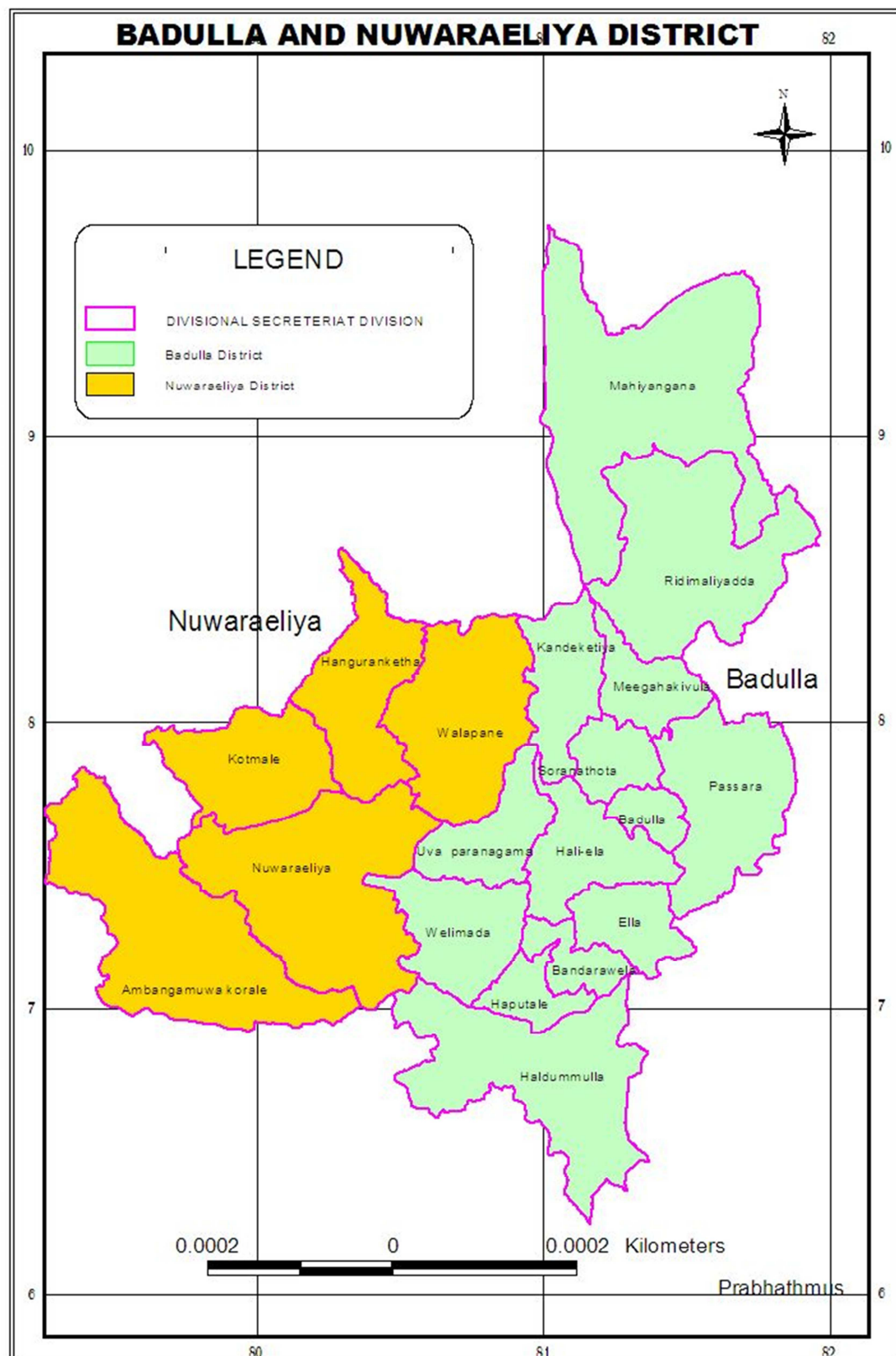
Source: Author's compilation using HIES 2006/07, HIES 2009/10 and the author's data

**Annex 4: Summary statistics of the variables at estate areas of
Badulla and Nuwara Eliya districts**

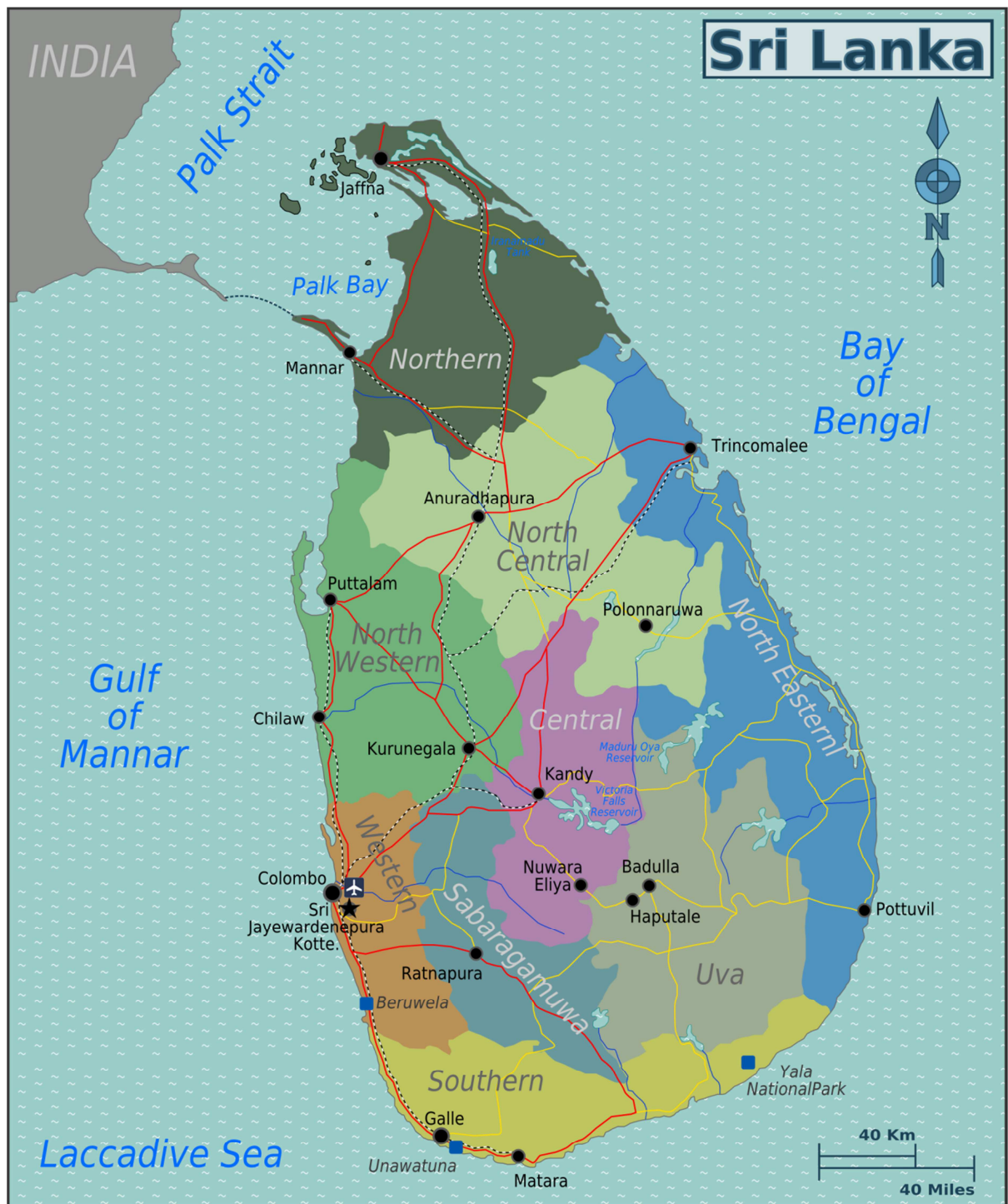
Variable	2007		2010	
	Mean	Std. Dev.	Mean	Std. Dev.
LHCEPC*	7.96	0.44	8.46	0.43
Distance to bus stop	1.03	1.42	1.01	1.41
Access to electricity	0.73	0.45	0.84	0.37
Access to clean water	0.53	0.50	0.56	0.50
Distance to a bank	6.53	5.27	5.78	4.91
Distance to primary school	1.11	1.57	0.89	1.18
Distance to a health facility	3.24	3.97	4.23	3.86
Distance to GN office	2.00	2.93	1.91	2.46
Household size	4.22	1.96	4.19	1.74
Household size squared	21.61	21.44	20.57	16.75
Number of dependents	1.51	1.31	1.37	1.33
Head's Age	50.09	13.35	49.12	12.73
Head's age squared	2,686.63	1,371.40	2,574.60	1,287.75
Male head	0.75	0.43	0.75	0.44
Head's employment: Public is the reference				
Private	0.52	0.50	0.38	0.49
Employer	0.00	0.00	0.00	0.00
Self employed	0.08	0.28	0.09	0.29
Family worker	0.01	0.08	0.00	0.00
Secondary jobs	0.55	0.50	0.52	0.50
Household appliances	1.91	0.29	1.77	0.42
Remittances	0.14	0.35	0.19	0.39
Chronically ill or disabled	0.25	0.44	0.26	0.44
Head's education: No education is the reference				
Some primary	0.52	0.50	0.49	0.50
Some junior secondary	0.25	0.44	0.32	0.47
O/L passed	0.02	0.15	0.02	0.13
A/L passed	0.02	0.14	0.02	0.13
Tertiary	0.00	0.04	0.00	0.06
Sanitary facilities	0.69	0.46	0.75	0.43
Line house	0.69	0.46	0.69	0.46
Observations	522		488	

Source: Authors compilation using HIES 2006/07, HIES 2009/10 data. * Logarithm of household consumption expenditure per capita, O/L: Ordinary Level, A/L: Advanced Level.

Annex 5: Map of Badulla and Nuwara Eliya districts



Annex 6: Map of Sri Lanka



Annex 7: Author's Household Survey Questionnaire

Q. No:

Multidimensional Poverty in Estate Areas

Date:

Household Questionnaire

Thusitha Kumara,

PhD Student, Graduate School of International Cooperation Studies

Kobe University, Japan

Identification

1. Name of the household head (if willing only):.....
2. Address of the household (if willing only):.....
3. Respondent's relationship to the household head:.....
4. Name of the estate:.....
.....
5. Type of the estate: 1. Public, 2. Private 3. Semi government 4. Small holder 5.....
6. Living place: 1. Inside the estate, 2. Outside the estate

1. Family information

ID code	Family Member	Sex	Age	Marital Status	Ethnicity	Max. level of Schooling	Can write
1	HH head						
2	Spouse						
3							
4							
5							
6							
7							
8							

Family Member: (1) son, (2) daughter, (3) father or mother (4) grandchild (5) grandparents, (6) other relative (7) other

Status: (1) single, (2) married, (3) widow or widower, (5) divorced or separated

Max level of schooling: (0) no schooling (1 to 11) grade 1 to 11, (12) GCE O/L, (13) GCE A/L, (14) university graduated (15) technical school

Ethnicity: (1) Sinhala, (2) Tamil, (3) Muslim, (4) Other

Can write: (0) No, (1) Yes

2. Health Condition

Serial No	Member Code (as in the 1 st column of the table 1)	Chronically ill or disable	Hospitalized (within last month, other than for child birth)
1	HH head		
2	Spouse		
3			
4			
5			
6			
7			
8			

Chronically ill or disable: (0) no (1) heart diseases, (2) blood pressure, (3) asthma, (4) Epilepsy, (5) cancer, (6) visibility impairment, (7) hearing impairment, (8) speaking impairment (9) moving difficulties (10) mentally retarded (11) other

Hospitalized: (0) no, (1) one time, (2) two times. (3) more than two times

3. Occupation

Serial No	Member Code (as in the 1 st column of the table 1)	Main activity Main occupation	Wage rate (Average Monthly)	Average number of hours per day	Number of days per month (on average)
1	HH head				
2	Spouse				
3					
4					
5					

Main Occupation: (1) self-employed; (2) daily paid worker, (3) casual worker; (4) salaried worker; (5) student (6) unemployed, looking for a job; (7) unwilling to work or retired; (8) not able to work (handicapped); (9) Other

4. Other sources of income

Source	Average monthly income
Land owned but rented out	
House or room rented out	
Remittances (domestic)	
Remittances (abroad)	
Small shop / boutique	
Money lending	
Samurdhi	
Government subsidies	
Other	

5. Expenditure of the household per month

Item	Expenditure Rs.
Food	
Housing	
Fuel and Light	
Health Expenses	
Transport	
Communication	
Education	
Entertainment and Cultural	
Durable Goods	
Clothing and Textiles	
Loan Repayments	
Liquor and tobacco	
Other	
Total monthly expenditure	

6. Asset ownership

Asset type	Number owned	Estimated resale value at current market price
Livestock		
1 Cattle and buffalo		
2. Adult goats, pigs		
3. Adult poultry		
Transportation		
4. Cars		
5. Motorcycles		
6. Bicycles		
7. Tractors		
8. carts		
Appliances and Electronics		
9. Televisions		
10. Video cassette recorders		
11. Refrigerators		
12. Electric gas cookers		
13. Washing Machines		
14. Radios		
15. Fans		
16. Gold		
17. Other		

7. Housing condition and access to utilities

Facility/Utility	Condition
1. Type of house	
2. Wall material	
3. Floor material	
4. Roof	
5. Source of drinking water	
6. Distance to drinking water (m)	
7. Availability of toilets	
8. Type of toilet	
9. Main type of lighting	
10. Main type of cooking fuel	

House: (1) single, (2) flat, (3) annex, (4) line, (5) slum (6) other

Wall material: (1) brick, (2) cement block, (3) mud (4) plank, (5) palm leaves, (6) other

Floor material: (1) cement, (2) terrazzo/tile (3) mud (4) other

Roof: (1) tile, (2) asbestos, (3) concrete, (4) metal sheets, (5) palm leaves/straw (6) other

Drinking water: (1) protected well (2) unprotected well, (3) tube well (4) tap within premises (5) tap outside premise, (6) stream, river, tank, (7) other

Availability of toilets: (0) no toilet (1) exclusively for household, (2) sharing with other (3) public

Type of toilet: (1) water sealed, (2) pit (3) other

Type of lighting: (1) kerosene, (2) electricity, (3) solar, (4) generator/battery, (5) other

Cooking fuel: (1) firewood, (2) gas, (3) kerosene, (4) electricity, (5) sawdust/paddy husk (6) other

8. Change of living conditions

1. Earning ability within the last four years

1. Much improved 2. Improved 3. No change 4. Deteriorated 5. Much deteriorated

2. Consumption expenditure of the household within the last four years

1. Much improved 2. Improved 3. No change 4. Deteriorated 5. Much deteriorated

3. Did you buy any durable goods within the last four years: (0) No, (1) Yes

If yes, list them:

4. Health conditions within the last four years

1. Much improved 2. Improved 3. No change 4. Deteriorated 5. Much deteriorated

5. Access to utilities (water, electricity, telephones, internet) within last four years:

(0) No, (1) Yes, If yes, list them:

6. Overall satisfaction of life within the last four years

1. Much improved 2. Improved 3. No change 4. Deteriorated 5. Much deteriorated

7. Anything else you want to say about change of living conditions within last four years

(if willing to tell, please write them all in a separate paper(s))

Annex 8: Eigenvalues and proportion explained of Principal component analysis

k	Eigenvalues	Proportion explained %	Cumulative explained %
1	5.08	0.23	0.23
2	2.47	0.11	0.34
3	1.69	0.08	0.42
4	1.39	0.06	0.48
5	1.10	0.05	0.53
6	1.02	0.05	0.58
7	0.97	0.04	0.62
8	0.94	0.04	0.67
9	0.90	0.04	0.71
10	0.81	0.04	0.74
11	0.68	0.03	0.77
12	0.66	0.03	0.80
13	0.64	0.03	0.83
14	0.60	0.03	0.86
15	0.54	0.02	0.89
16	0.49	0.02	0.91
17	0.48	0.02	0.93
18	0.43	0.02	0.95
19	0.41	0.02	0.97
20	0.27	0.01	0.98
21	0.26	0.01	0.99
22	0.17	0.01	1.00

Source: Author's calculations using HIES 2006/07 and 2009/10

Annex 9: Ranking of component loadings

	e1	e2	e3	e4	e5	E6
1	Total HH equipment	Toilet availability	Drinking water	Hospitalized	Dis. to drinking water	Disability
2	Access to power grid	Housing roof	Dis. to DS office	Chronically ill	Disability	Drinking water
3	Telephone line	water line	Dis. to health fac.	Disability	Drinking water	Chronically ill
4	Cooking fuel	housing wall	Dis. to post office	Cooking fuel	Primary schooling	Dis. to drinking wa.
5	Lighting source	Cooking fuel	Water line	Telephone line	Housing wall	Water line

Source: Author's calculations using HIES 2006/7 and 2009/10

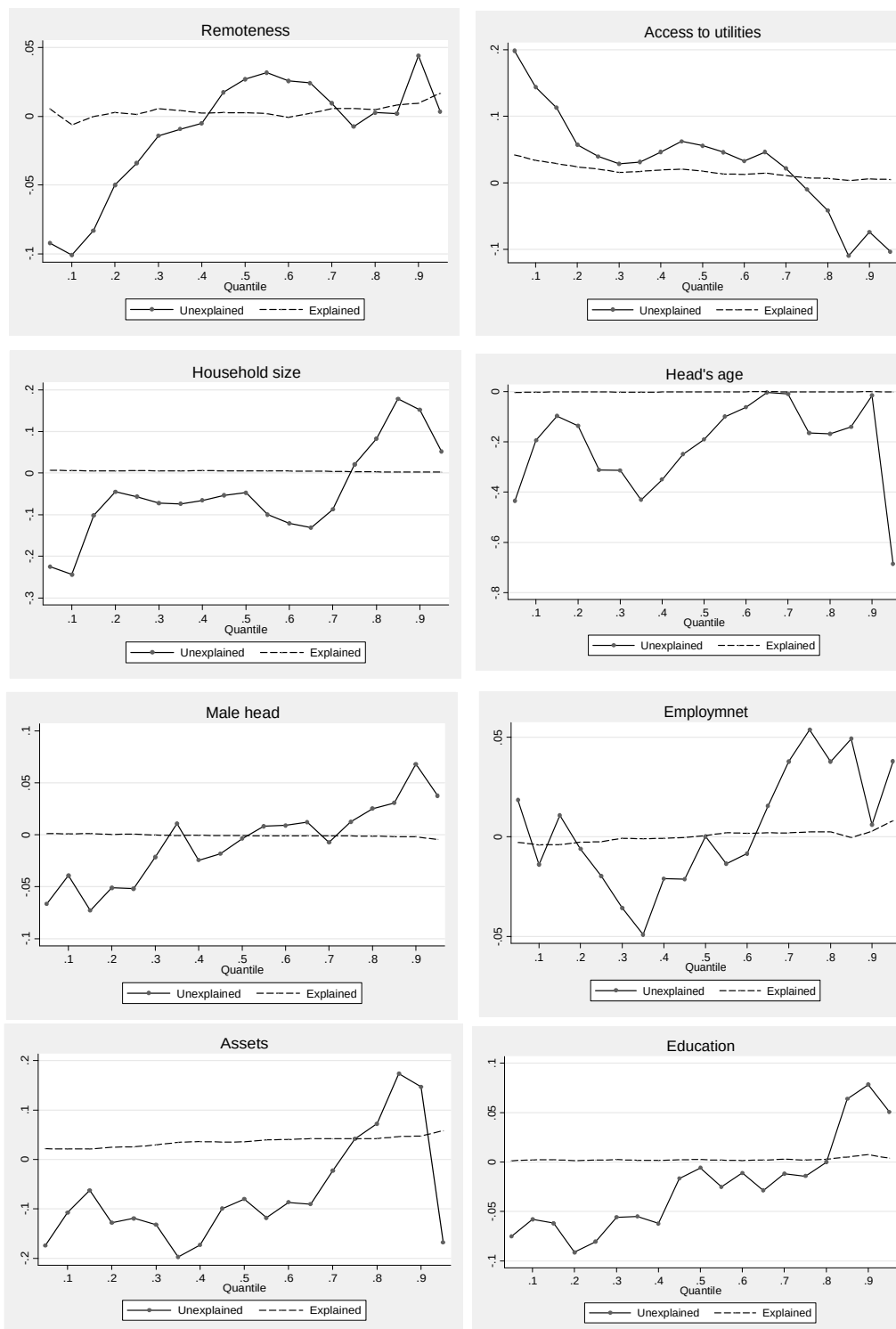
Annex 10: Log odds ratios of determinant of poverty in Sri Lanka

Variable	National				Estate			
	Monetary		Multidimensional		Monetary		Multidimensional	
	2007	2010	2007	2010	2007	2010	2007	2010
Area: Rural	1.667*** (6.10)	1.234** (2.35)	1.072 (0.62)	1.406** (2.37)	n.a.	n.a.	n.a.	n.a.
Area: Estate	1.148 (1.12)	1.098 (0.63)	1.825*** (3.11)	1.886*** (3.09)	n.a.	n.a.	n.a.	n.a.
Province: Central	2.058*** (7.82)	2.150*** (6.99)	1.416** (2.44)	1.371** (2.01)	n.a.	n.a.	n.a.	n.a.
Province: Southern	1.098 (1.04)	1.381*** (3.19)	1.334* (1.96)	1.685*** (3.46)	n.a.	n.a.	n.a.	n.a.
Province: Eastern	0.614*** (3.61)	1.559*** (3.63)	1.116 (0.66)	1.166 (0.82)	n.a.	n.a.	n.a.	n.a.
Province: North Western	1.695*** (5.25)	1.877*** (5.48)	1.158 (1.03)	1.521** (2.30)	n.a.	n.a.	n.a.	n.a.
Province: North Central	2.072*** (5.58)	1.390** (2.12)	1.288 (1.53)	1.805*** (2.95)	n.a.	n.a.	n.a.	n.a.
Province: Uva	2.723*** (9.41)	2.745*** (8.18)	1.694*** (3.28)	1.815*** (3.35)	n.a.	n.a.	n.a.	n.a.
Province: Sabaragamuwa	2.151*** (7.62)	1.634*** (4.14)	1.502** (2.55)	1.255 (1.28)	n.a.	n.a.	n.a.	n.a.
Distance to bus stop	1.042* (1.89)	1.046** (2.00)	1.014 (0.44)	0.967 (1.03)	1.052 (1.00)	1.177** (2.37)	1.046 (0.70)	0.940 (0.81)
Electricity	0.451*** (13.34)	0.558*** (8.09)	0.084*** (23.30)	0.112*** (20.48)	0.599*** (3.97)	0.535*** (3.88)	0.187*** (9.08)	0.125*** (10.38)
Clean water	0.744*** (4.68)	0.774*** (3.16)	0.413*** (8.91)	0.263*** (12.17)	0.863 (1.20)	0.758* (1.83)	0.366*** (6.09)	0.229*** (7.99)
Distance to a bank	1.012 (1.61)	1.011 (1.63)	1.016** (2.01)	1.013 (1.27)	0.986 (1.31)	1.043*** (2.64)	0.989 (0.69)	0.995 (0.29)
Distance to primary school	1.010 (0.62)	1.055*** (2.75)	1.001 (0.05)	0.991 (0.33)	1.081** (2.14)	0.994 (0.12)	1.006 (0.13)	1.051 (0.92)
Distance to a health facility	1.007 (0.82)	1.000 (0.04)	1.021 (1.31)	0.990 (0.67)	0.957* (1.92)	0.980 (0.92)	1.040 (1.43)	0.983 (0.70)
Distance to GN office	1.053*** (2.68)	0.978 (0.98)	1.075** (2.35)	1.053** (2.01)	1.059** (2.09)	0.959 (0.87)	1.065 (1.63)	1.081 (1.53)
Household size	2.256*** (14.82)	2.413*** (14.18)	0.246*** (17.64)	0.278*** (14.95)	1.995*** (5.58)	3.991*** (7.40)	0.275*** (7.66)	0.276*** (7.77)
Household size squared	0.968*** (7.09)	0.963*** (7.27)	1.086*** (11.68)	1.072*** (8.37)	0.969*** (2.99)	0.921*** (5.32)	1.082*** (5.00)	1.072*** (4.95)
Number of dependents	1.200*** (6.55)	1.147*** (4.40)	1.751*** (10.40)	1.710*** (8.91)	1.322*** (4.20)	1.139* (1.78)	1.692*** (4.85)	1.996*** (5.78)
Head's Age	1.012 (1.07)	1.016 (1.14)	1.007 (0.35)	1.031 (1.57)	0.964 (1.19)	1.021 (0.52)	0.929** (2.05)	1.018 (0.44)
Head's age squared	1.000 (0.93)	1.000 (0.80)	1.000 (0.86)	1.000** (2.24)	1.000 (1.21)	1.000 (0.28)	1.001 (1.56)	1.000 (0.67)
Male	0.779*** (3.62)	0.865* (1.80)	1.506*** (4.12)	1.423*** (3.33)	0.842 (1.04)	1.266 (1.28)	1.823*** (2.97)	1.729** (2.50)
Head's ethnicity: Tamil	0.793** (2.19)	0.650*** (4.29)	1.335* (1.95)	1.576*** (3.09)	n.a.	n.a.	n.a.	n.a.
Head's ethnicity: Muslim	0.560*** (5.24)	0.535*** (5.07)	1.377* (1.79)	1.502** (2.45)	n.a.	n.a.	n.a.	n.a.
Head's employment: Private	1.230*** (2.90)	1.202** (2.17)	0.077 (0.61)	1.063 (0.51)	0.785 (1.64)	0.925 (0.45)	0.934 (0.34)	0.881 (0.58)
Head's employment: Employer	0.513*** (2.62)	0.369** (2.34)	0.682 (0.56)	1.104 (0.22)	n.a.	n.a.	n.a.	n.a.

Head's employment:	0.887*	0.867	1.011	1.025	0.601	1.112	1.054	1.764
Self employed	(1.93)	(1.56)	(0.39)	(0.18)	(1.58)	(0.36)	(0.14)	(1.36)
Head's employment:	1.235	0.874	0.752	4.338**	-	3.901	3.669	8.257***
Family worker	(0.32)	(0.27)	(0.32)	(2.39)	-	(0.94)	(1.60)	(4.70)
Secondary jobs	0.900	0.889	1.318**	1.259*	0.856	0.524***	1.053	1.446
	(1.20)	(1.51)	(2.30)	(1.77)	(1.04)	(3.57)	(0.26)	(1.62)
Agriculture land availability	0.822***	0.713***	0.995	1.004***	n.a.	n.a.	n.a.	n.a.
	(5.68)	(4.58)	(1.51)	(2.99)				
Household appliances	8.977***	5.753***	1.150	1.482***	2.592***	3.105***	1.588	2.245**
	(22.61)	(20.04)	(0.92)	(3.04)	(3.55)	(4.56)	(1.16)	(2.45)
Remittances	0.711***	0.815**	0.950	0.868	0.546***	0.811	0.732	0.833
	(3.71)	(2.12)	(0.38)	(1.17)	(2.78)	(0.88)	(1.20)	(0.65)
Chronically ill or disabled	0.954	0.944	2.976***	2.349***	0.917	0.725*	2.97***	2.397***
	(0.80)	(0.88)	(31.13)	(30.25)	(0.63)	(1.80)	(16.48)	(13.48)
Head's education: primary	0.703***	0.782**	0.565***	0.756**	0.592***	0.929	0.444***	0.503***
	(3.92)	(2.48)	(4.96)	(2.29)	(3.32)	(0.37)	(4.00)	(3.02)
Head's education: junior secondary	0.499***	0.535***	0.072***	0.098***	0.433***	0.614**	0.038***	0.051***
	(7.36)	(5.99)	(18.61)	(15.42)	(4.47)	(1.99)	(11.14)	(9.61)
Head's education: O/L	0.253***	0.276**	0.059***	0.047***	0.122***	0.140**	0.051***	0.042***
	(9.56)	(7.44)	(11.08)	(9.63)	(3.67)	(1.99)	(5.42)	(4.37)
Head's education: A/L	0.146***	0.087***	0.077***	0.053***	n.a.	n.a.	n.a.	n.a.
	(7.77)	(6.10)	(7.09)	(5.84)				
Head's education: Tertiary	0.041***	0.119***	-	0.072***	n.a.	n.a.	n.a.	n.a.
	(3.30)	(3.00)	-	(3.38)				
House owner	0.869*	0.990	0.963	0.939	1.298*	1.159	1.507**	1.637**
	(1.71)	(0.10)	(0.32)	(0.48)	(1.84)	(0.89)	(2.03)	(2.37)
Sanitary facilities	0.826***	0.657***	0.210***	0.168***	0.089	0.515***	0.233***	0.149***
	(2.67)	(5.18)	(16.57)	(17.60)	(0.63)	(4.04)	(8.70)	(9.69)
Observations	18544	19958	18124	19958	1672	1695	1676	1681
Pseudo R ²	0.306	0.254	0.555	0.535	0.180	0.215	0.471	0.487
Chi ²	2731.98	2039.59	1964.63	1709.56	303.45	240.41	425.90	349.97
Prob. Chi ²	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Author's estimates using HIES 2006/07 and HIES 2009/10 data, *, **, *** denotes 10%, 5% 1% significant respectively, t statistics are within parentheses, t statistics are based on heteroscedasticity consistent standard errors. Head's employment (employed in the public sector is the reference group), Head's education (No education is the reference group) are categorical variables. n.a.: these variables were excluded from the specifications of the estate regressions due to irrelevance or unavailability of data. The blanks indicated by "-" are due to the omission of the variable by Stata due to the perfect collinearity (all households are not poor). O/L: Ordinary Level, A/L: Advanced Level.

Annex 11: Explained and unexplained components for different variables at estate areas



Source: Author's drawing using HIES 2006/07 and HIES 2009/10 data

Annex 12: Monetary poverty estimates for different indicators of the multidimensional poverty index using HIES 2007 and HIES 2010 data by areas.

a. Monetary poverty estimates for *primary education* indicator (in Education Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of primary education	Urban	8.2*** (3.49)	1.6** (2.56)	0.7** (2.12)	226	13.3*** (3.62)	1.9*** (3.38)	0.4*** (3.27)	269
	Rural	23.5*** (14.59)	5.2*** (11.49)	1.7*** (8.46)	882	10.8*** (8.84)	2.1*** (7.38)	0.6*** (5.50)	796
	Estate	36.3*** (13.18)	7.1*** (10.04)	2.2*** (7.51)	85	16.0*** (7.40)	3.2*** (5.12)	1.1*** (3.33)	109
	Sri Lanka	25.2*** (18.86)	5.4*** (14.62)	1.7*** (10.74)	1,193	11.9*** (11.54)	2.2*** (9.35)	0.6 (0.67)	1,174
	Urban	5.6*** (9.93)	1.0*** (7.40)	0.3*** (5.26)	4,407	3.7 (1.06)	0.8*** (7.51)	0.2 (0.51)	5,004
	Rural	15.4*** (41.43)	2.9*** (32.70)	0.8*** (24.70)	11,307	9.4*** (31.65)	1.7*** (23.69)	0.5* (1.66)	12,153
	Estate	27.8*** (17.18)	5.0*** (14.04)	1.4*** (10.97)	1,637	14.3*** (12.30)	2.3*** (10.53)	0.6*** (8.47)	1,627
	Sri Lanka	14.5*** (44.96)	2.7*** (35.47)	0.8*** (26.71)	17,351	8.7*** (34.75)	1.6*** (26.03)	0.5*** (18.22)	18,784

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

b: Percentage point difference and percentage change of monetary poverty estimates for *primary education* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of primary education	Urban	5.1	61.7	0.3	15.6	-0.3	38.8
	Rural	-12.7	54.2	-3.1	60.2	-1.1	66.7
	Estate	-20.3	55.8	-3.9	55.3	-1.0	48.6
	Sri Lanka	-13.3	52.7	-3.1	58.1	-1.1	62.6
Households not deprived of primary education	Urban	-1.9	34.2	-0.3	26.9	-0.1	19.5
	Rural	-6.1	39.4	-1.2	40.9	-0.3	38.6
	Estate	-13.5	48.5	-2.7	53.5	-0.8	57.0
	Sri Lanka	-5.8	39.8	-1.1	41.0	-0.3	38.8

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squired Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

c: Monetary poverty estimates for *child enrolment* indicator (in Education Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of child enrolment	Urban	38.6*** (2.75)	6.0** (2.14)	1.7 (1.43)	21	n.a	n.a	n.a	n.a
	Rural	39.3 (0.43)	8.4*** (2.76)	3.6** (2.19)	34	18.8** (2.50)	4.4 (1.48)	1.8* (1.64)	31
	Estate	48.1*** (7.11)	13.0*** (5.48)	4.8*** (4.17)	78	35.8*** (2.76)	3.0** (1.98)	0.5 (1.59)	24
	Sri Lanka	43.1*** (8.05)	10.1*** (5.68)	3.9*** (4.25)	133	21.9*** (3.36)	4.0** (2.38)	1.5* (1.76)	59
Households not deprived of child enrolment	Urban	5.6*** (10.09)	1.0*** (7.55)	0.3*** (5.45)	4,112	4.0 (1.12)	0.8*** (8.02)	0.2*** (5.38)	5,269
	Rural	15.9*** (43.65)	3.0*** (34.51)	0.9*** (25.97)	12,155	9.4*** (32.77)	1.7*** (24.67)	0.5*** (17.35)	12,918
	Estate	29.3*** (20.58)	5.3*** (16.46)	1.5*** (12.74)	1,644	14.5*** (14.14)	2.5*** (11.27)	0.7*** (7.62)	1,712
	Sri Lanka	15.1*** (48.00)	2.9*** (37.88)	0.8*** (28.44)	18,411	8.9*** (36.44)	1.6*** (27.45)	0.5*** (19.21)	19,899

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

d: Percentage point difference and percentage change of monetary poverty estimates for *child enrolment* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of child enrolment	Urban	n.a	n.a	n.a	n.a	n.a	n.a
	Rural	-20.5	52.3	-4.0	47.7	-1.8	48.7
	Estate	-12.3	25.6	-10.0	77.1	-4.2	88.8
	Sri Lanka	-21.2	49.2	-6.1	60.5	-2.4	60.7
Households not deprived of child enrolment	Urban	-1.5	27.7	-0.2	23.0	-0.1	19.1
	Rural	-6.5	40.8	-1.3	43.0	-0.4	42.0
	Estate	-14.8	50.5	-2.8	52.1	-0.8	51.1
	Sri Lanka	-6.2	41.2	-1.2	42.9	-0.3	41.7

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

e: Monetary poverty estimates for *ill/disabled* indicator (in Health Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households with ill/disabled member	Urban	5.6*** (8.35)	1.0*** (6.34)	0.3*** (4.34)	1,487	4.5*** (9.52)	0.9*** (6.83)	0.3*** (4.60)	1,692
	Rural	16.5*** (38.41)	3.1*** (30.57)	0.9*** (23.09)	3,904	9.8*** (29.04)	1.8*** (21.73)	0.5*** (15.34)	3,910
	Estate	31.2*** (19.57)	6.1*** (15.63)	1.8*** (12.09)	442	15.6*** (13.29)	2.7*** (10.46)	0.8*** (6.91)	438
	Sri Lanka	15.9*** (42.54)	3.0*** (33.93)	0.9*** (25.58)	5,833	9.4*** (32.47)	1.7*** (24.29)	0.5*** (17.03)	6,040
Households without ill/disabled member	Urban	5.8*** (6.62)	1.2*** (4.87)	0.4*** (3.98)	3,146	3.6*** (6.91)	0.6*** (5.75)	0.2*** (4.50)	3,581
	Rural	16.2*** (24.87)	3.1*** (19.31)	0.9*** (14.45)	8,285	9.5*** (18.13)	1.8*** (13.96)	0.5*** (9.83)	9,039
	Estate	27.4*** (10.50)	4.4*** (8.41)	1.2*** (6.32)	1,280	10.4*** (6.20)	2.0*** (5.13)	0.6*** (4.12)	1,298
	Sri Lanka	15.1*** (27.12)	2.9*** (20.96)	0.9*** (15.71)	12,711	8.6*** (19.41)	1.6*** (15.20)	0.5*** (10.70)	13,918

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squired Poverty Gap Index, N, number of observations.

f: Percentage point difference and percentage change of monetary poverty estimates for *ill/disabled* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households with ill/disabled member	Urban	-2.2	38.1	-0.6	52.1	-0.2	58.1
	Rural	-6.7	41.4	-1.3	42.6	-0.4	42.9
	Estate	-17.0	62.0	-2.4	55.2	-0.6	51.4
	Sri Lanka	-6.5	43.1	-1.3	44.3	-0.4	44.7
Households without ill/disabled member	Urban	-1.1	20.0	-0.1	8.2	0.0	0.2
	Rural	-6.7	40.5	-1.3	42.2	-0.4	39.9
	Estate	-15.6	49.9	-3.4	56.1	-1.0	57.2
	Sri Lanka	-6.5	40.7	-1.3	42.3	-0.4	40.1

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

g: Monetary poverty estimates for *hospitalized* indicator (in Health Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households with hospitalized member	Urban	7.8 [*] (1.69)	0.3 ^{***} (15.64)	0.2 ^{***} (12.08)	32	2.0 (0.98)	0.6 (0.98)	0.2 (0.98)	23
	Rural	13.8 ^{***} (3.02)	3.5 ^{***} (2.75)	1.0 ^{***} (2.25)	87	21.2 ^{***} (3.90)	5.2 ^{***} (2.97)	1.8 ^{***} (2.37)	63
	Estate	26.1 ^{***} (2.71)	6.0 ^{***} (2.07)	1.9 [*] (1.84)	27	3.2 (0.93)	0.2 (0.93)	0.0 (0.93)	8
	Sri Lanka	14.1 ^{***} (3.92)	3.2 ^{***} (3.27)	1.0 ^{***} (2.70)	146	19.0 ^{***} (3.93)	4.7 ^{***} (2.98)	1.6 ^{***} (2.33)	94
Households without hospitalized member	Urban	5.7 ^{***} (10.21)	1.1 ^{***} (7.67)	0.3 ^{***} (5.54)	4,601	4.0 ^{***} (11.14)	0.8 ^{***} (10.02)	0.2 ^{***} (5.37)	5,250
	Rural	16.0 ^{***} (43.72)	3.0 ^{***} (34.49)	0.9 ^{***} (25.91)	12,102	9.4 ^{***} (32.64)	1.7 ^{***} (24.60)	0.5 ^{***} (17.28)	12,886
	Estate	30.1 ^{***} (21.39)	5.6 ^{***} (17.07)	1.6 ^{***} (13.07)	1,695	14.7 ^{***} (14.34)	2.5 ^{***} (11.37)	0.7 ^{***} (7.67)	1,728
	Sri Lanka	15.3 ^{***} (48.31)	2.9 ^{***} (38.10)	0.8 ^{***} (28.60)	18,398	8.9 ^{***} (36.37)	1.6 ^{***} (27.41)	0.5 ^{***} (19.16)	19,864

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

h: Percentage point difference and percentage change of monetary poverty estimates for *hospitalized* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households with hospitalized member	Urban	-5.8	74.4	-2.5	80.7	0.0	5.8
	Rural	7.4	53.6	1.7	49.8	0.8	79.7
	Estate	-22.9	87.9	-5.8	96.5	-1.9	99.3
	Sri Lanka	4.9	34.5	1.4	44.4	0.7	71.5
Households without hospitalized member	Urban	-1.6	28.9	-0.3	24.8	-0.1	21.0
	Rural	-6.6	41.3	-1.3	43.7	-0.4	42.9
	Estate	-15.4	51.1	-3.1	54.5	-0.9	55.0
	Sri Lanka	-6.4	41.9	-1.3	43.9	-0.4	43.1

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

i: Monetary poverty estimates for *electricity* indicator (in Living Standards Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of access to electricity	Urban	26.7*** (6.06)	7.3*** (3.98)	2.9*** (3.15)	287	16.4*** (4.72)	3.6*** (3.81)	1.0*** (3.36)	254
	Rural	34.8*** (32.55)	7.2*** (24.63)	2.3*** (18.00)	2,334	22.2*** (20.39)	4.6*** (15.72)	1.5*** (11.25)	1,791
	Estate	35.8*** (1.61)	7.2*** (12.52)	2.2*** (9.44)	738	22.4*** (9.24)	4.5*** (7.15)	1.4*** (4.50)	479
	Sri Lanka	34.6*** (36.08)	7.2*** (26.97)	2.3*** (19.64)	3,359	22.0*** (22.35)	4.5*** (17.26)	1.4*** (12.31)	2,524
Households not deprived of access to electricity	Urban	14.6*** (28.39)	7.2*** (77.20)	1.7*** (67.52)	4,346	3.4*** (10.19)	0.7*** (7.12)	0.2*** (4.62)	5,019
	Rural	11.6*** (32.33)	2.1*** (65.61)	0.6*** (19.42)	9,855	7.4*** (26.55)	1.3*** (19.53)	0.4*** (13.47)	11,158
	Estate	26.8*** (15.02)	4.7*** (12.02)	1.3*** (9.31)	984	12.5*** (11.26)	2.0*** (8.96)	0.5*** (6.64)	1,257
	Sri Lanka	11.0*** (35.89)	2.0*** (28.63)	0.5*** (21.83)	15,185	7.0*** (29.80)	1.2*** (21.91)	0.3*** (15.04)	17,434

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

j: Percentage point difference and percentage change of monetary poverty estimates for *electricity* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of access to electricity	Urban	-10.3	38.5	-3.8	51.1	-1.9	65.1
	Rural	-12.6	36.1	-2.7	36.9	-0.8	35.3
	Estate	-13.4	37.6	-2.7	38.0	-0.8	34.7
	Sri Lanka	-12.6	36.5	-2.7	37.6	-0.8	36.9
Households not deprived of access to electricity	Urban	-11.1	76.4	-6.5	90.7	-1.5	87.9
	Rural	-4.2	36.0	-0.8	38.0	-0.2	36.1
	Estate	-14.3	53.4	-2.7	57.8	-0.8	59.7
	Sri Lanka	-4.0	36.5	-0.7	37.7	-0.2	35.0

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

k: Monetary poverty estimates for *sanitary facilities* indicator (in Living Standards Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of sanitary facilities	Urban	16.6*** (7.30)	3.8*** (4.81)	1.3*** (3.48)	226	9.3*** (5.90)	1.9*** (4.50)	0.6*** (3.74)	269
	Rural	25.4*** (17.81)	5.3*** (13.70)	1.7*** (10.02)	882	15.3*** (13.30)	3.0*** (10.48)	0.9*** (7.49)	796
	Estate	29.6*** (12.27)	6.0*** (9.57)	1.8*** (7.71)	85	21.8*** (8.94)	4.3*** (7.66)	1.3*** (5.92)	109
	Sri Lanka	24.5*** (22.26)	5.1*** (16.68)	1.6*** (12.36)	1,193	15.0*** (16.55)	3.0*** (13.14)	0.9*** (9.61)	1,174
Households not deprived of sanitary facilities	Urban	14.0*** (27.26)	0.6*** (6.85)	0.2*** (6.23)	4,407	3.2*** (9.62)	0.6*** (6.67)	0.2*** (4.15)	5,004
	Rural	15.0*** (40.28)	2.8*** (31.90)	0.8*** (23.97)	11,307	8.8*** (30.13)	1.6*** (22.50)	0.5*** (15.79)	12,153
	Estate	30.3*** (17.72)	5.4*** (14.39)	1.5*** (10.94)	1,637	12.2*** (11.39)	1.9*** (8.54)	0.5*** (5.17)	1,627
	Sri Lanka	14.1*** (43.42)	2.6*** (34.64)	0.8*** (2.61)	17,351	8.2*** (32.77)	1.5*** (24.37)	0.4*** (16.92)	18,784

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

I: Percentage point difference and percentage change of monetary poverty estimates for *sanitary facilities* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of sanitary facilities	Urban	-7.3	43.8	-1.9	51.1	-0.7	55.7
	Rural	-10.1	39.7	-2.3	43.2	-0.8	46.2
	Estate	-7.8	26.3	-1.7	28.0	-0.5	27.6
	Sri Lanka	-9.5	38.8	-2.2	42.5	-0.7	45.4
Households not deprived of sanitary facilities	Urban	-10.8	77.2	0.0	0.7	0.0	23.7
	Rural	-6.2	41.1	-1.2	43.1	-0.3	41.3
	Estate	-18.1	59.8	-3.5	64.8	-1.0	66.0
	Sri Lanka	-5.9	41.9	-1.1	43.5	-0.3	41.5

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

m: Monetary poverty estimates for *clean drinking water* indicator (in Living Standards Dimension) HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of drinking water	Urban	12.9** (2.38)	1.2 (1.62)	0.2* (1.90)	126	10.1*** (3.32)	1.9*** (3.15)	0.4*** (2.71)	125
	Rural	24.5*** (15.91)	5.2*** (12.75)	1.6*** (9.85)	892	13.1*** (11.32)	2.1*** (8.75)	0.6*** (6.24)	907
	Estate	31.2*** (14.56)	5.6*** (11.99)	1.6*** (9.20)	737	17.1*** (10.00)	3.1*** (6.92)	0.9*** (4.33)	632
	Sri Lanka	26.1*** (21.09)	5.2*** (16.68)	1.5*** (12.70)	1,757	13.8*** (14.39)	2.3*** (11.11)	0.6 (1.00)	1,664
Households not deprived of drinking water	Urban	9.6*** (17.32)	1.0*** (7.59)	0.3*** (5.50)	4,507	3.9*** (10.78)	0.8*** (7.72)	0.2*** (5.23)	5,148
	Rural	15.3*** (41.00)	2.9*** (32.27)	0.8*** (24.13)	11,297	0.9*** (3.09)	1.7*** (23.24)	0.5*** (16.39)	12,042
	Estate	29.1*** (15.97)	5.6*** (12.32)	1.7*** (9.49)	983	13.3*** (10.65)	2.2*** (9.31)	0.6*** (7.35)	1,104
	Sri Lanka	14.2*** (44.09)	2.7*** (34.67)	0.8*** (25.93)	16,787	8.5*** (33.74)	1.6*** (25.39)	0.5*** (17.85)	18,294

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squired Poverty Gap Index, N, number of observations.

n: Percentage point difference and percentage change of monetary poverty estimates for *clean drinking water* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of drinking water	Urban	-2.7	21.3	0.7	52.7	0.2	71.1
	Rural	-11.5	46.8	-3.0	58.5	-1.0	64.0
	Estate	-14.1	45.1	-2.5	45.0	-0.6	40.4
	Sri Lanka	-12.3	47.2	-2.9	55.3	-0.9	58.7
Households not deprived of drinking water	Urban	-5.7	59.2	-0.3	26.2	-0.1	21.8
	Rural	-14.3	94.0	-1.2	40.9	-0.3	38.8
	Estate	-15.8	54.2	-3.4	60.2	-1.1	63.7
	Sri Lanka	-5.7	40.4	-1.1	41.1	-0.3	39.3

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

o: Monetary poverty estimates for *improved floor* indicator (in Living Standards Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of improved floor	Urban	19.7*** (4.25)	4.0*** (3.15)	1.2** (2.34)	145	8.1*** (3.44)	1.8*** (3.22)	0.4*** (3.00)	149
	Rural	37.6*** (29.85)	8.3*** (22.66)	2.7*** (16.80)	1,633	22.4*** (19.46)	4.6*** (14.8)	1.4*** (10.76)	1,548
	Estate	28.4*** (10.59)	5.9*** (8.42)	1.9*** (6.64)	395	21.3*** (7.5)	4.4*** (5.60)	1.5*** (3.55)	297
	Sri Lanka	36.3*** (31.65)	7.9*** (24.03)	2.6*** (17.84)	2,173	21.8*** (20.70)	4.5*** (15.97)	1.4*** (11.41)	1,994
Households not deprived of improved floor	Urban	5.3*** (9.65)	1.0*** (7.17)	0.3*** (5.04)	4,488	3.9*** (10.68)	0.8*** (75.94)	0.2*** (5.12)	5,124
	Rural	12.4*** (34.71)	2.2*** (27.44)	0.6*** (20.59)	10,556	7.6*** (27.21)	1.3*** (20.12)	0.4*** (13.90)	11,401
	Estate	30.6*** (18.83)	5.5*** (14.99)	1.5*** (11.41)	1,327	13.3*** (12.31)	2.1*** (10.12)	0.6*** (7.65)	1,439
	Sri Lanka	12.1*** (39.24)	2.2*** (31.00)	0.6*** (23.20)	16,371	7.3*** (30.85)	1.3*** (22.84)	0.4*** (15.73)	17,964

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

p: Percentage point difference and percentage change of monetary poverty estimates for *improved floor* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of improved floor	Urban	-11.5	58.6	-2.3	56.7	-0.7	62.3
	Rural	-15.3	40.5	-3.7	44.9	-1.3	46.9
	Estate	-7.1	24.9	-1.4	24.2	-0.4	21.5
	Sri Lanka	-14.5	40.0	-3.5	43.6	-1.2	45.8
Households not deprived of improved floor	Urban	-1.4	26.8	-0.2	21.4	0.0	14.3
	Rural	-4.8	38.7	-0.9	39.2	-0.2	35.2
	Estate	-17.2	56.4	-3.4	61.2	-1.0	63.1
	Sri Lanka	-4.8	39.9	-0.9	40.5	-0.2	37.0

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

q: Monetary poverty estimates for *clean cooking fuel* indicator (in Living Standards Dimension) estimated using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of cleaner cooking fuel	Urban	10.5*** (8.55)	2.1*** (6.48)	0.7*** (4.75)	2,119	7.3*** (9.78)	1.5*** (6.75)	0.5*** (4.56)	2,599
	Rural	18.2*** (44.20)	3.5*** (34.74)	1.0*** (26.04)	10,404	10.6*** (32.74)	1.9*** (39.78)	0.6*** (17.31)	11,209
	Estate	30.8*** (21.69)	5.7*** (17.26)	1.7*** (13.23)	1,682	15.0*** (14.37)	2.6*** (11.38)	0.7*** (7.67)	1,689
	Sri Lanka	18.5*** (48.74)	3.5*** (38.25)	1.0*** (28.86)	14,205	10.6*** (36.19)	2.0*** (27.18)	0.6*** (19.00)	15,497
Households not deprived of cleaner cooking fuel	Urban	2.6*** (6.35)	0.4*** (5.07)	0.1*** (4.10)	2,514	1.8*** (5.54)	0.3*** (4.93)	0.1*** (3.83)	2,674
	Rural	1.4*** (4.18)	0.2*** (3.06)	0.0*** (2.20)	1,785	1.6*** (4.38)	0.3*** (0.32)	0.1*** (2.28)	1,740
	Estate	n.a	n.a	n.a	40	n.a	n.a	n.a	47
	Sri Lanka	2.0*** (7.41)	0.3*** (5.71)	0.1*** (4.30)	4,339	1.7*** (6.84)	0.3*** (5.19)	0.1*** (3.58)	4,461

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, N, number of observations.

r: Percentage point difference and percentage change of monetary poverty estimates for *cleaner cooking fuel* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of cleaner cooking fuel	Urban	-3.2	30.1	-0.6	26.8	-0.2	23.6
	Rural	-7.7	42.1	-1.6	44.4	-0.4	43.6
	Estate	-15.8	51.2	-3.1	54.8	-0.9	55.4
	Sri Lanka	-7.9	42.8	-1.6	44.9	-0.5	44.5
Households not deprived of cleaner cooking fuel	Urban	-0.8	31.6	-0.1	23.3	0.0	16.3
	Rural	0.1	9.1	0.1	46.6	0.0	92.6
	Estate	n.a	n.a	n.a	n.a	n.a	n.a
	Sri Lanka	-0.3	14.7	0.0	4.0	0.0	26.3

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

s: Monetary poverty estimates for *assets* indicator (in Living standards Dimension) using HIES 2007 and HIES 2010 data by areas

Sample	Area	2007				2010			
		HCI (%)	PGI (%)	SPGI (%)	N	HCI (%)	PGI (%)	SPGI (%)	N
Households deprived of assets	Urban	n.a	n.a	n.a	333	0.1 (1.00)	0.0 (1.00)	0.0 (1.00)	505
	Rural	0.4 (1.51)	0.0 (1.16)	0.0 (1.13)	646	1.1*** (3.68)	0.1*** (2.57)	0.0** (2.22)	1,140
	Estate	n.a	n.a	n.a	117	n.a	n.a	n.a	127
	Sri Lanka	0.3 (1.51)	0.0 (1.16)	0.1*** (10.55)	996	1.0*** (3.74)	0.1*** (2.61)	0.0** (2.23)	1,622
Households not deprived of assets	Urban	6.1*** (10.32)	1.1*** (7.70)	0.3*** (5.55)	4,300	4.3*** (11.13)	0.9*** (8.01)	0.3*** (5.38)	4,268
	Rural	16.8*** (44.02)	3.2*** (34.69)	0.9*** (26.05)	11,543	10.3*** (32.80)	1.9*** (24.71)	0.6*** (17.36)	11,809
	Estate	30.3*** (21.57)	5.6*** (17.21)	10.6*** (13.20)	1,705	14.8*** (14.35)	2.6*** (11.38)	0.7*** (7.67)	1,709
	Sri Lanka	16.1*** (48.66)	3.1*** (38.34)	0.9** (28.76)	17,548	9.8*** (36.86)	1.8*** (27.50)	0.5*** (19.23)	18,286

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: * Significant at 10% level ** significant at 5% level, *** significant at 1% level, t values are within parentheses. HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squired Poverty Gap Index, N, number of observations.

t: Percentage point difference and percentage change of monetary poverty estimates for *assets* indicator between HIES 2007 and HIES 2010 by areas

Sample	Area	HCI		PGI		SPGI	
		Percentage point difference	Change (%)	Percentage point difference	Change (%)	Percentage point difference	Change (%)
Households deprived of assets	Urban	n.a	n.a	n.a	n.a	n.a	n.a
	Rural	0.7	64.7	0.1	70.6	0.0	81.7
	Estate	n.a	n.a	n.a	n.a	n.a	n.a
	Sri Lanka	0.7	67.3	0.1	72.7	0.0	60.0
Households not deprived of assets	Urban	-1.7	28.5	-0.3	23.5	-0.1	19.4
	Rural	-6.6	39.0	-1.3	41.1	-0.4	40.0
	Estate	-15.5	51.1	-3.1	54.7	-0.9	55.2
	Sri Lanka	-6.3	39.3	-1.3	41.7	-0.4	40.6

Source: Author's estimations using HIES 2006/07 and HIES 2009/10 data. Note: HCI: Headcount Index, PGI: Poverty Gap Index, SPGI, Squared Poverty Gap Index, (-) denotes lesser poverty with HIES 2010.

