

# THE RELATIONSHIP BETWEEN THE TRANSITION OF INCOME POVERTY AND ASSET BASE OF A HOUSEHOLD: A MULTINOMIAL LOGISTIC REGRESSION ANALYSIS

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## **Abstract**

*This paper examines the relationship between the transition of income poverty and development of asset base of a household using the data from a randomly selected sample of 170 beneficiaries of the Samurdhi (prosperity) Development Programme (SDP) in the Ratnapura District of Sri Lanka during the period from 1995 to 2009. The study was conducted categorising households into “poverty levels” and “poverty groups” in order to examine how and to what extent the development of five capital assets (namely natural, physical, human, financial and social capital ameliorated by the SDP) were related to the dynamic nature of the income poverty level of a household. Multinomial logistic regression analysis was used to understand the relationship between the transition of income poverty and development of asset base of a household. Results confirm that those who were unable to develop natural, physical and human capital assets were more likely to remain in vulnerable poverty for a long period, and the mean probability of a household falling into this category was as high as 0.68. The study concludes that strengthening the asset base of beneficiaries of SDP is pivotal to alleviate their poverty.*

**Keywords:** Transition of income poverty, Asset base, SDP, Multinomial logistic regression, Ratnapura District, Sri Lanka

**JEL Codes:** C00, C25, I32, I38

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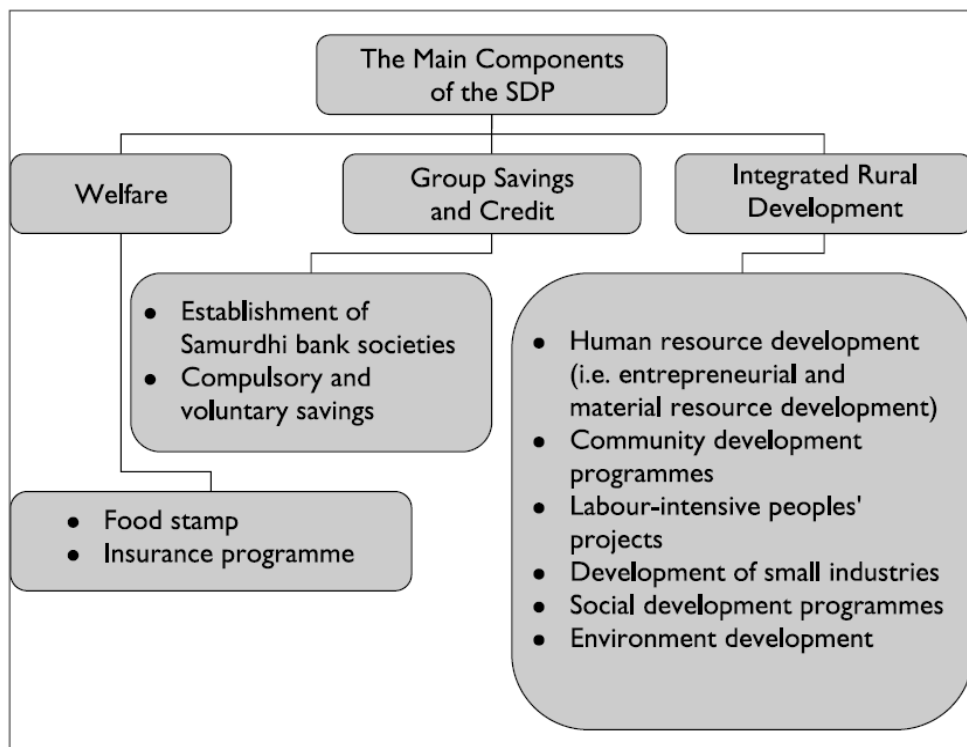
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## INTRODUCTION

Alleviation of poverty has been a main focus the world over for a long period of time and numerous ways of intervention have been developed and implemented with this objective. The Samurdhi Development Programme (SDP) was one such attempt in Sri Lanka, implemented in 1995 by the People's Alliance Government.

The SDP has both 'protection' and 'promotion' objectives. The programmes implemented with protection objectives mainly focused on assisting the poor in the face of adverse shocks. The other programmes such as group-savings, the credit component and human resource development have focused on long-term poverty reduction goals through empowering and enhancing the asset base of the poor to achieve promotional objectives (Salih 2000). These key objectives work towards the eradication of poverty through ensuring participation of beneficiaries of the SDP in the rural farm and non-farm production processes. Since this is a national programme covering about 1.2 million poor families, the government of Sri Lanka provides the required funds to implement its strategies and activities in view of achieving its key objectives.

**Figure 1: Programmes and Main components of the SDP**



Source: Salih (2000).

This paper summarises the findings of a study conducted to estimate the relationship between transition of income poverty and development of asset base of a household using data on the Samurdhi Development Programme (SDP) currently in operation. The main components of SDP are summarised in Figure 1.

## **BACKGROUND AND CONCEPTS**

The dimensions of poverty are wide and complex, and the face of poverty and its impacts vary between regions, countries, communities and individuals (Cahn, 2002). Though it seems very difficult to provide an exact definition for poverty, the definition made in Hengsdijk et al., (2005, p 9) that “poverty is the extent to which households or individuals have sufficient resources or abilities to meet their needs” was used for the purposes of this study. The main reasons for the use of this definition were (a) the close relationship existing between stock of assets (i.e. human, physical, natural, social and financial) and an individual’s ability to meet his or her needs, and (b) the framework it provides to measure poverty, including its complex web of interconnections between socio-economic, cultural, political and environmental factors.

A number of studies pertaining to rural poverty and relevant to the present exercise could be found in literature, among which those conducted by Deshingkar, et al. (2008), Ellis (2001) and Ellis and Bahiigwa (2001) and Akter, et al., (2008), are worth special reference.

Deshingkar, et al. (2008) investigated the role of livestock in rural livelihoods and its potential to assist people in escaping poverty in the Indian States of Andhra Pradesh (AP) and Madhya Pradesh (MP), using a combination of quantitative and qualitative methods. They used stratified random sampling method to select 720 households from both States. Basic information pertaining to occupation structures, caste, annual income, and asset ownership of sampled households was obtained from a census survey in 2002. In addition to this, they used focus group discussions and participant observation method to collect information on qualitative aspects of the data. The quantitative techniques included ‘tabular analysis’ and the use of an ordinary least squares (OLS) regression model. The objective of the use of OLS was to identify how livestock, land, education, assets and livelihood diversification would determine household incomes. The livelihood diversification was represented by an index whose value ranged from 1 to 6 livelihood activities. According to the results of their OLS regression, the assets, land, education and diversification were identified as important determinants of household income. The results of the qualitative study confirmed that the households sold their livestock in order to meet expenses on emergencies and agricultural needs. Thus, Deshingkar, et al. (2008, p.22) identified “livestock as an important liquid asset

which could be used to mobilise cash in emergency situations”, and found that money-lenders accept livestock as an important assets in providing loans for poor households.

Ellis (2001) and Ellis and Bahiigwa (2001) investigated rural livelihoods, governance and rural poverty reduction in three rural districts in Uganda. Employing both quantitative and qualitative methods, the study found that the lack of land and livestock, as well as the un-sustainability of non-farm alternatives to reduce farm-based activities were the root causes of their rural poverty.

Akter, et al., (2008) investigated poverty dynamics in relation to livelihood pathways and the role of livestock in alleviating poverty in a panel data study (a cross section of 320 households for 2001/02 and 2006/07) in the Indian State of Andhra Pradesh. They defined different poverty levels according to a subjective range of income differences relative to the poverty line of rural Andhra Pradesh. Poverty levels included the extreme poor, vulnerable, viable and sustainable households. The poverty dynamics of those four groups were compared according to a selected set of livelihood pathways (i.e. agriculture, livestock, non-farm, commuting, migration and diversification) for 2001/02 and 2006/07. They employed a multinomial logistic model and found that poverty was proportionately higher among the scheduled tribes (an indigenous people officially regarded as socially disadvantaged) and backward castes and among those who were landless and marginal farmers. Further, the results indicated that there appeared to be a negative association between land ownership and the probability of becoming unsuccessful or struggling.

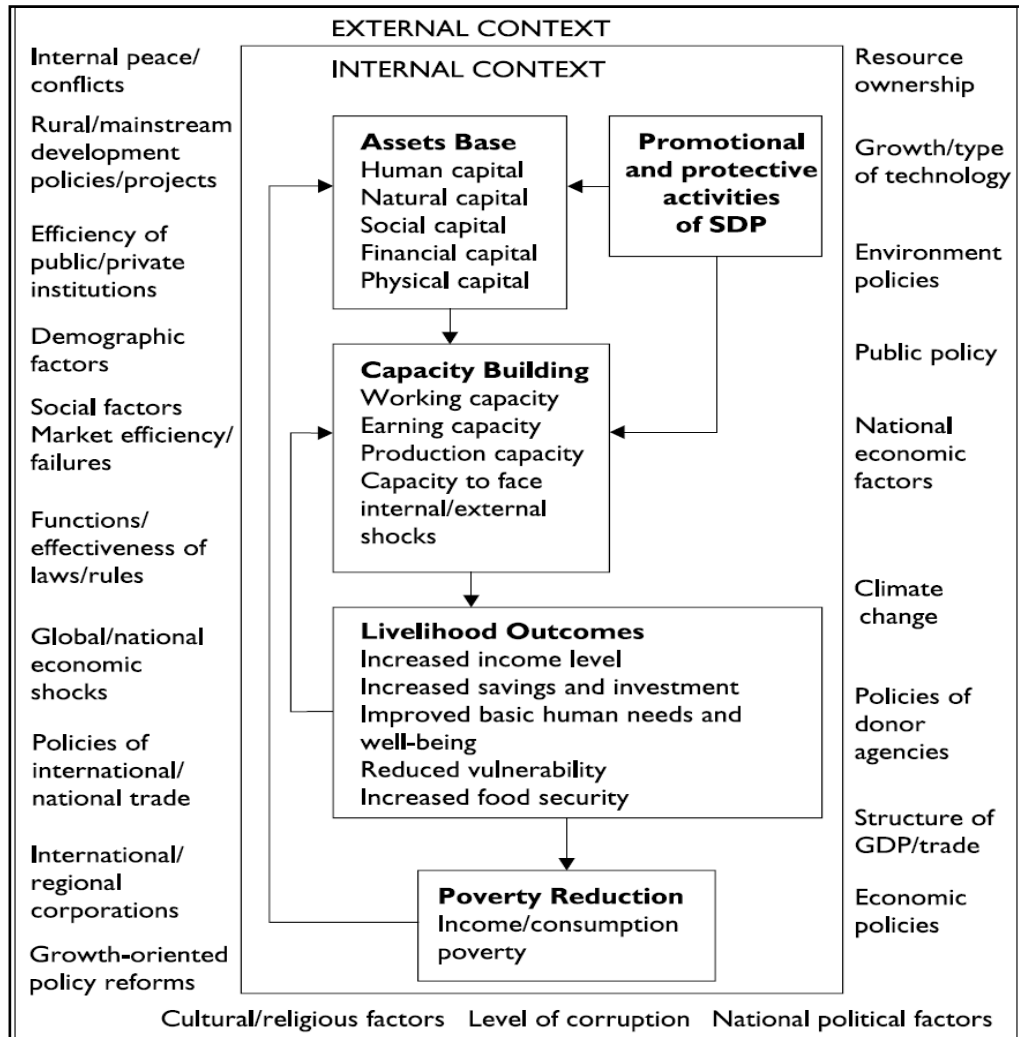
The present study adopted this basic methodology developed by Akter et al.(2008), but with several new techniques added on to it such as (i) the use of dummy variables to identify whether a household was able to develop its asset base or not, and (ii) the assessment of the probabilities of each household falling within each of the four household poverty groups, categorised based on the direction of the transition of income poverty positions.

## **THEORETICAL FRAMEWORK AND HYPOTHESIS**

The theoretical framework used in the study (Figure 2) assumed that the livelihoods of the beneficiaries of the SDP were mainly affected from the on-going activities of the project within the internal context. This carried an implicit assumption that the development of livelihoods of the beneficiaries of the SDP is mainly affected by activities of the SDP, even though there could be various other factors in the external environment directly or indirectly affecting the livelihoods of people. Also, the study hypothesised that promotional and protective activities of the SDP could directly and indirectly affect the livelihoods of its beneficiaries through two channels, namely (a) the “asset base” consisting of human, natural, social, financial and physical capital assets,

and (b) the direct influence the protective activities of the SDP had on the capacity building, and then on the level of poverty.

**Figure 2: Links between the external environment, asset base, activities of the SDP, and Poverty**



Source: Developed by the author

In this theoretical framework, there exists a cyclical impact between livelihood outcomes and poverty. On the one hand, positive livelihood outcomes could strengthen the capacity of poor people. For example, a continuous increase in the income level of poor people could help educate their children, get more inputs for production, and diversify their sources of income in order to reduce the risk of loss of income. A high

poverty level, on the other hand, could cause deterioration in the asset base of the poor as they tend to overuse the existing assets in order to maintain their lives, bearing a negative impact on capacity building and livelihood outcomes, thus further exacerbating the level of poverty. Breaking this “poverty circle” therefore requires an external influence. As noted earlier, this could be achieved through the promotional and protective activities of the SDP, which directly or indirectly intervenes in improving the asset base of households and their capacity building, respectively.

The hypothesis derived from the foregoing theoretical framework was based on two assumptions. First, livelihoods of the beneficiaries of the SDP were purely determined within the internal context of the theoretical framework. Hence, it was assumed that the impact of the external context on the livelihoods of the beneficiaries would be negligible. Second, only one direction of the bi-directional transmission impact cycle (or two-way causation) in the theoretical framework, namely the impact of the development of capital assets on the level of poverty of households of the SDP and not the reverse flow, was subject to analysis in this study.

Among the activities mainly focusing on eradicating poverty in beneficiary populations of the SDP, those which increase the asset base could actually reduce the poverty level of households. This implies that an increase in the asset base of a beneficiary household during the period 1995–2009 should lead to a reduction in the level of poverty (income) of that household. Thus, the hypothesis tested in this study was that the SDP has been successful in its poverty alleviation process through the development of the asset base of its beneficiaries during the period from 1995 to 2009.

## **METHODOLOGY**

The study focused on the Ratnapura District of Sri Lanka, and considered the period from 1995 to 2009. Though the initial plan was to obtain baseline data on randomly selected beneficiaries of the SDP from the Chief Secretary’s Office in the Ratnapura (CSOR) district, the so called ‘memory recall’ method used in the social science research, as discussed by Phillimore and Goodson (2004), was deployed in this analysis to obtain the baseline information as such data had not been maintained by the CSOR. In this methodology, the respondents themselves were requested to recall from their memories about their past living conditions (that is, about housing status, income, livelihood assets, etc.) when they were admitted to the SDP in 1995. The fallibility of human memory and the resultant possibility of the error of recall with respect to the history the respondents are needed to remember, one of the main criticisms against this method, was addressed in this study by structuring the questionnaire in a specific rather than in a general way in order to prompt accurate memories, and concentrated questions

only on self-evaluation, meaning the history of a household's living conditions (Phillimore and Goodson 2004: 249).<sup>1</sup>

The issues considered in the study (that is, development of social or human capital) were qualitative in nature. Therefore, most of the data obtained were non-measurable (that is, skills and talents developed, development of social networks, improving confidence, etc) rather than measurable. Since the application of quantitative methods requires numeric data, the current study used a set of subjective-based criteria to convert non-measurable data into measurable data.

### ***The sample and data***

The study employed a random sampling method to collect data from a cross section of 170 households living in all 17 Divisional Secretariats (DS) divisions in the Ratnapura district, Sri Lanka. The main criterion in selecting the households was that they had to have been beneficiaries of the SDP since 1995. The use of random sampling implied that each beneficiary of the SDP would have an equal probability of being selected in the sample. The standard method of random sampling technique was difficult to apply in the current study as the distribution of the sample units was very large. Thus, a list of all DS divisions in the Ratnapura district was obtained in the first place, and one village from each such DS Division was randomly selected for the survey. Ten beneficiaries were thereafter randomly selected from a list of names of beneficiaries of the SDP in each village.

Accordingly, data were collected from 170 beneficiaries from 17 such villages in the Ratnapura district.

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<sup>1</sup>Phillimore and Goodson (2004: 249) indicate that the memory recall method can be used to collect both quantitative and qualitative data of a household's past behaviour. The memory recall method (or life story method) is used as a research tool in the social sciences due to its 'strengths and qualities' (Phillimore and Goodson 2004: 240). Phillimore and Goodson (2004: 240) further highlight that 'by exploring the past, life story analysis provides valuable information about the present'. However, memory recall method has some criticisms such as 'the bias, the credibility of the data and the doubts of scientific validity' (Phillimore and Goodson 2004: 243). One of the main criticisms is the methodology applied in the collection of data as human memory is fallible. The error of recall can be larger depending on the history the respondent is needed to remember (Phillimore and Goodson 2004: 243). However, in order to reduce the possible errors of the memory recall method, we used the following strategies. We structured questions in the questionnaire in a specific rather than in a general way in order to prompt accurate memories and concentrated questions only on the history of a household's living conditions (self-evaluation) (Phillimore and Goodson 2004: 249).

## THE MODEL

### *Dependent variable*

Following the method used by Akter et al (2008: p 3), the beneficiaries of the SDP were categorised into extreme poor, vulnerable, viable and sustainable households for both 1995 and 2009. This was done based on a “subjective range of income difference relative to poverty line” of the Ratnapura district. Akter et al (2008: p 3) justified their method by indicating that, “conceptually, the extremely poor are likely to stay poor in the longer term, vulnerable households are likely to move ups and downs around the poverty line, viable households are likely to stay non-poor, sustainable households may never be vulnerable and non-poor”.

The Department of Census and Statistics of Government of Sri Lanka (2004) defined the official poverty line as the per-capita expenditure of a person able to meet the minimum living standards, reflecting the ability of a person to buy a consumption bundle including both food and non-food items which would satisfy both minimum nutritional requirements (nutritional anchor of 2030 kilocalories) and other basic needs.

Therefore, using poverty line data for the Ratnapura district for 1995 and 2009, it was possible to categorise the respondent households into the following four groups:

*Category 01: Extreme poor = those who have per capita monthly income (PCMI) half or less than half the official poverty line*

*Category 02: Vulnerable households = those who have PCMI above the PCMI level of extreme poor up to double the official poverty line*

*Category 03: Viable households = those who have PCMI above the PCMI level of vulnerable households up to triple the official poverty line*

*Category 04: Sustainable households = those who have PCMI above the PCMI level of viable households*

**Table 1: Categorisation of income poverty groups for 1995 and 2009**

| Household Category | Official poverty line for Ratnapura district in 1995 = 833 LKR | Official poverty line for Ratnapura district in 2009 = 2907 LKR |
|--------------------|----------------------------------------------------------------|-----------------------------------------------------------------|
|                    | Formula                                                        | Formula                                                         |
| Extreme poor       | $PCMI \leq 416 \text{ LKR}$                                    | $PCMI \leq 1453 \text{ LKR}$                                    |
| Vulnerable         | $416 \text{ LKR} \leq PCMI \leq 1666 \text{ LKR}$              | $1453 \text{ LKR} \leq PCMI \leq 5814 \text{ LKR}$              |
| Viable             | $1666 \text{ LKR} \leq PCMI \leq 2499 \text{ LKR}$             | $5814 \text{ LKR} \leq PCMI \leq 8720 \text{ LKR}$              |
| Sustainable        | $PCMI \geq 2499 \text{ LKR}$                                   | $PCMI \geq 8720 \text{ LKR}$                                    |

Source: Department of Census and Statistics of Sri Lanka (2004)



Table 1 shows how these four groups were categorised based on the two official poverty lines for 1995 and 2009. Average official poverty line for 1995 was 833 Sri Lankan rupees (LKR) per month while it was 2907 LKR per month in 2009.

Upon calculations obtained for Table 1, the beneficiaries of the SDP were again categorised into unsuccessful, struggling, successful and most successful groups (Table 2) based on the direction of the transition (“economic mobility”) of poverty groups from 1995 to 2009 between extreme poverty, vulnerability, viability and .

**Table 2: Categorisation of households groups based on the direction of the transition between income poverty categories, 1995-2009, Ratnapura district, Sri Lanka**

| Households Group | Direction of the transition                                                                                                                           |
|------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Unsuccessful     | <b>From</b> viable/sustainable <b>To</b> Vulnerable<br><b>From</b> vulnerable/viable <b>To</b> extreme poor<br><b>Or, remained</b> in extreme poverty |
| Struggling       | <b>Remained</b> in vulnerable                                                                                                                         |
| Successful       | <b>From</b> extreme poverty <b>To</b> vulnerable/viable<br><b>Or, from</b> vulnerable <b>To</b> viable                                                |
| Most successful  | <b>From</b> extreme/vulnerable/viable <b>To</b> sustainable<br><b>Or, remained</b> in viable/sustainable                                              |

Source: Akter, et al., (2008: p 4)

The objective of such categorisation was to capture the ‘dynamic form’ of the poverty level and to examine how and to what extent these poverty positions were related to the development of the five capital assets, where the dynamic form of the poverty level reflected how living conditions of households changed from 1995 to 2009.

### ***Independent variables***

As the data obtained for the development of capital assets (financial, natural, physical, human and social capital) of households were qualitative, we used dummy (categorical) variables to capture the development of each capital asset, subject to criterion that had to be fulfilled by each household in order to identify that household as being able to develop its respective capital assets. The following section explains how each of the five dummy variables was operationalised.

The dummy variable to capture the development of natural capital:

$$D_{NC} = \begin{matrix} 1 & (\text{Those who had been able to develop natural capital assets}) \\ 0 & (\text{Those who had not been able to develop natural capital assets}) \end{matrix}$$

Criterion (subjective judgments):

The following criteria, or a combination of criteria, were to be satisfied by a beneficiary of the SDP in order to fall into  $D_{NC} = 1$  : **A or B or C or D** or any other combinations including **A B C D**.

- A:** “The SDP helped me to purchase a land for farming activities (i.e. tea cultivation)/ business activities (i.e. opening a retail shop)”
- B:** “The SDP helped me to acquire new livestock (i.e. poultry farming, purchasing a cow for drinking milk/selling milk/making dairy products etc) or to expand the existing livestock in numbers and/or in quality”
- C:** “The SDP helped me to continue/expand the activities on existing land (i.e. tea cultivation, vegetable and fruits cultivation etc)”
- D:** “The SDP assured me the security of and the sustainable use of water sources for both survival and livelihood needs”

Accordingly, the same method with appropriate criteria was applied to develop four dummy variables for physical, human, financial and social capital assets (Gunasinghe 2010, p 262-265). The dummy variable for the development of financial capital was excluded from the model due to high correlation between this variable and the dummy variable used to capture the development of physical capital.

The meaning of the development of capital assets is explained below (Gunasinghe 2009: p 20-35):

*The development of natural capital:*

The development of natural capital assets of a household means an increase of that household’s earning capacity due to (i) a household having land (purchased, hired or its own land) where there is at least one kind of cultivation (i.e. tea) done with the assistance of a loan from the SDP or from the free services rendered under the SDP (ii) a household having a livestock farm (i.e. cows, goats, pigs, poultry etc) with the help of the SDP to improve earning capacity, (iii) a household being assured of the sustainability of water sources for survival needs and for the sustainability of water based livelihood activities.

*The development of physical capital:*

The development of physical capital assets of a household means the increase of that household's earning capacity by developing the infrastructure (rural road network, telephone facility and electricity ) of a village; a household can benefit by reducing production costs and improving the efficiency of productions, i.e. a household can reduce the cost associated with daily travels to the nearest city, transportation of crops (i.e. tea) and products (i.e. prepared vegetable) and transportation of inputs needed for such production. This then would help that household to save some money that could be used to develop its existing livelihood activity to generate income or could be used for new livelihood activities. If the SDP were helpful in the development of infrastructure of a village by rendering free services or deploying indigenous knowledge, it could have direct and indirect positive impacts on the increase in income capacity of households. Furthermore, a household could build up earning capacity through acquisition of moveable and immovable physical capital assets through loan facilities provided by the SDP. Examples for movable capital assets could be the acquisition of sewing machines, equipment to prepare spices, a refrigerator to make ice packets or preserve prepared vegetables etc. An example for an immovable capital asset would be an acquisition of a building (temporary/permanent) to open a retail shop or clothes shop.

*The development of human capital:*

The development of human capital assets of a household means an increase of that household's earning capacity by maintaining working capacity through reducing hunger from the welfare component of the SDP; by developing talents and skills on how to run (or initiate) a business (livelihood activity) effectively through training programmes of the SDP; by improving 'confidence' in working hard in the current livelihood activity; or by reducing financial burdens through supporting the education of children in a household.

*The development of financial capital:*

The development of financial capital of a household means the increase of its earning capacity due to the SDP motivating a household to change from a culture of consumption to one of saving where there would be more opportunities to initiate new livelihood activities or to expand the existing livelihood activity through increased access for loans and higher financial discipline. Even if a household does not have a good saving culture, it could obtain a loan from the SDP to initiate a livelihood activity or expand (or diversify) the existing activity in order to earn a stable monthly income. By maintaining a good repayment capacity, a household could have the chance to access higher loans to develop the livelihood activity further and avoid financial shocks that disturb its earning capacity.

*The development of social capital:*

The development of social capital in a household means an increase of earning capacity due to being able to secure benefits through social networks by receiving prompt assistance in face of adverse shocks and by sharing expertise in the formation of other capital assets. Such social networks could help a household to build up its capacity to participate in economically rewarding activities and maintain its well-being in the face of socio-economic shocks. Furthermore, having a developed social network could help build infrastructure of the village with higher tendency for rendering free services and that in turn would help a household with its living conditions. The reduction of the gap between the community and the local government authority could also help motivate a household to function well in the livelihood activity it engages in. This could happen, on one hand, due to the continuous supervision by the government officials at the village (as village households have much respect for government officials, they would not like to report negative results of the progress of the livelihood activity and therefore would try their best to have positive outcomes), and on the other, due to increased ability to have access to correct information at the right time.

***Multinomial Logistic Regression***

To estimate the models, the current study employed the Multinomial Logistic Regression (MNL), which is an extension to the binomial logistic regression when the dependent variable has more than two (unordered) categories (Asgary et al 2007: Chan 2005: Cramer 2003: p 113). Unlike the binomial logistic regression, MNL uses one category of the dependent variable as the reference category in order to simultaneously estimate binomial logistic regressions for each outcome category in the dependent variable. In MNL, independent variables could take numerical, categorical or both forms. If the dependent variable of a model has  $m$  outcome categories,  $m-1$  MNL regressions are estimated for each outcome category in the dependent variable using one outcome category (or a level) as the reference category (Asgary et al :2007, Chan : 2005, Cramer : 2003 p 113).

Assuming that the log odds of each outcome category in the model were linearly related to its independent variables, a multinomial logistic regression with logit link could be expressed as follows:

$$\text{Log} \left( \frac{P(Y_i = m)}{P(Y_i = 4)} \right) = f(D_{NC_i}, D_{PC_i}, D_{HC_i}, D_{SC_i}, Edu_i, Age_i, Ndepend_i, D_{Gender_i}, \varepsilon_i) \quad (1)$$

The equation (1) above shows the log of the ratio of the probability for the  $i^{th}$  household being in the outcome category ( $Y_i = m$ ) over the probability of being in the reference category ( $Y_i = 4$ ). The equation (1) is a function of capital assets developed by the

relevant household, education level of chief of the relevant household, age level, number of dependents in the household, gender and an error term. The error term ( $\varepsilon_i$ ) reflects unexplained variations of each outcome category of the dependent variable. As noted earlier, three (4-1) multinomial equations would be estimated with the same independent variables, one for each category relative to the reference category. This means that a MNLR would not be estimated for the reference category. Parameters ( $\beta$ ) in equation 1 would be estimated using the maximum likelihood estimation method. The other method of explaining the effect of independent variables on the probability for the  $i^{th}$  household being in the outcome category  $m$  compared to the reference category would be to use predicted probabilities (Gunasinghe 2009: p 35).

The second equation would be constructed only for the significant variables identified in the first equation.

$$\text{Log} \left( \frac{P(Y_i = m)}{P(Y_i = 4)} \right) = f(D_{NC_i}, D_{PC_i}, D_{HC_i}, Edu_i, \varepsilon_i) \quad (2)$$

Therefore, the dependent variable of the above two equations has four categories.

Category 01: Unsuccessful households, Category 02: Struggling households

Category 03: Successful households, Category 04: Most successful households

Reference category: Most successful households (Category 04)

### **Independent variables of the model:**

$D_i = 1$  (Those who had been able to develop the respective capital asset)

0 (Those who had not been able to develop the respective capital asset)

where  $i = NC$  (natural capital),  $i = PC$  (physical capital),

$i = HC$  (human capital), and  $i = SC$  (Social capital).

$Edu$  = Years of education (this variable was not included in HC as it would not be affected by the promotional or protective activities of the SDP)

$Age$  = Age level

$Ndepend$  = number of dependents in the family

$D_{gender} = 0$  Female household head

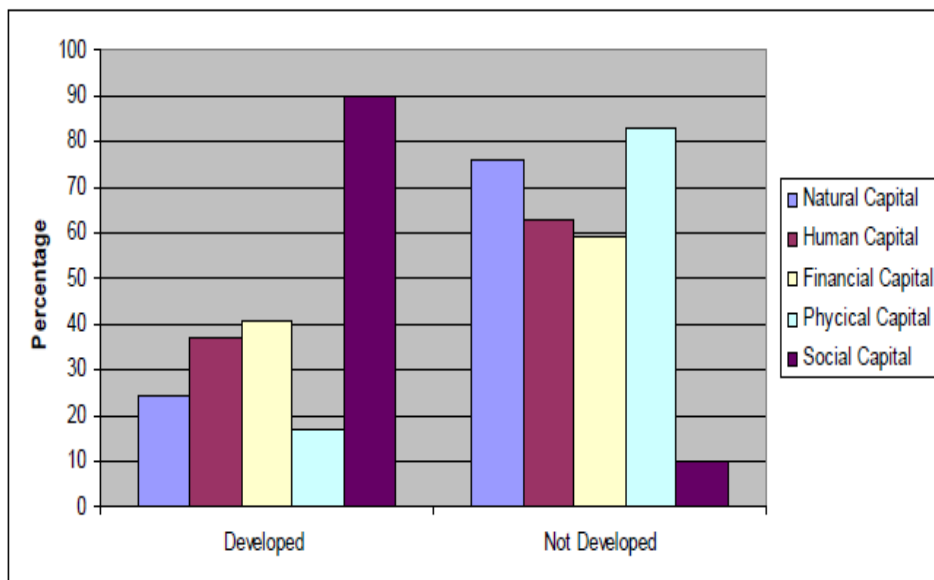
1 Male household head

$\varepsilon_i$  = Error term

## RESULTS AND ANALYSIS

Figure 3 shows the percentage of beneficiaries who were able to develop their capital assets during the period 1995 to 2009. Around 90 percent of households in the sample have been able to develop social capital while around 24 percent, 37 percent and 41 percent of households have been able to develop natural, human and financial capital assets respectively. 17 percent were able to develop physical capital.

**Figure 3: Development of asset base of beneficiaries of the SDP as at 2009**



Source: Field survey on the beneficiaries of the SDP in the Ratnapura district, Sri Lanka (09.02.2009 -20.03.2009)

With the exception of the social capital component, around 30 percent of households in the sample were able to develop their capital assets during the period of study. On the other hand, it also would mean that approximately 70 percent of households within the sample were unable to accumulate natural, human, financial and physical capital assets, implying that the SDP has failed to implement appropriate programmes directed towards the development of natural, human, financial and physical capital assets over the period from 1995 to 2009.

As per the categorisation of households into four groups as discussed before and summarised in the Table 3, 68 percent of households were still struggling to get out of poverty while 8 percent of households have been 'unsuccessful' in their attempts to achieve higher living standards. However, around 20 percent and 4 percent of households have been 'most successful' and 'successful' respectively, in their poverty alleviation attempts. As the sum of the percentages of successful (4) and most

successful households (24) exceeds the percentage of unsuccessful households (8) in the study, there is a possibility of claiming that the SDP has managed to achieve positive progress in its poverty alleviation efforts over the 14 year period from 1995 to 2009. However, the large percentage of households (68) still ‘struggling’ to become ‘successful’ or ‘most successful’ would make it difficult to confidently argue that, on the whole, the SDP has been successful in implementing its strategies/policies to alleviate poverty in the Ratnapura district during its implementation period.

**Table 3: Household groups by direction of movements of poverty status (1995-2009)**

| Households Group | Direction of the Transition                                                                                                                                    | Households in 2009 |            |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|------------|
|                  |                                                                                                                                                                | Number             | Percentage |
| Unsuccessful     | <b>From</b> viable/sustainable <b>to</b> vulnerable <b>or</b><br><b>from</b> vulnerable/viable <b>to</b> extreme poor <b>or</b><br>remained in extreme poverty | 14                 | 8          |
| Struggling       | Remained in vulnerable                                                                                                                                         | 116                | 68         |
| Successful       | <b>From</b> extreme poverty <b>to</b> vulnerable/viable<br><b>or</b><br><b>from</b> vulnerable <b>to</b> viable                                                | 6                  | 4          |
| Most successful  | <b>From</b> extreme/vulnerable/viable <b>to</b><br>sustainable <b>or</b><br>remained in viable/sustainable                                                     | 34                 | 24         |
| Total            |                                                                                                                                                                | 170                | 100        |

Source: Field survey on the beneficiaries of the SDP in the Ratnapura District, Sri Lanka (09.02.2009-20.03.2009).

It is also important to discuss how the transition of poverty status appears to differ according to the type of employment of households. Table 4 provides data on the relationship between the type of employment and poverty transition. Accordingly, 93 households out of 116 vulnerable households were labourers, while others were employed as tea farmers, sellers, etc. As revealed from the survey, the main reasons for those households being in vulnerable poverty could be (i) their not having land other than that available for their housing for cultivation purposes; (ii) being heavily dependent on one livelihood option; and (iii) the poor productivity of existing livelihood activities as households do not aim at getting out of the SDP.

**Table 4: The type of employment and the transition of poverty**

| Type of employment          | Transition of poverty <sup>a</sup> |     |   |   |   |   |   |    |   |    | Total |
|-----------------------------|------------------------------------|-----|---|---|---|---|---|----|---|----|-------|
|                             | 1                                  | 2   | 3 | 4 | 5 | 6 | 7 | 8  | 9 | 10 |       |
| Conducting a beauty salon   | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Broom making                | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Businessmen                 | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Carpenter                   | 0                                  | 0   | 0 | 1 | 0 | 1 | 0 | 1  | 0 | 0  | 3     |
| Electrician                 | 0                                  | 0   | 0 | 0 | 0 | 0 | 0 | 1  | 0 | 0  | 1     |
| Selling embellishments      | 0                                  | 0   | 0 | 0 | 1 | 0 | 0 | 0  | 0 | 0  | 1     |
| Making flower pots          | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Hair cutting                | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Iron works                  | 0                                  | 0   | 0 | 0 | 0 | 0 | 0 | 1  | 0 | 0  | 1     |
| Iron moulding               | 0                                  | 0   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 1  | 1     |
| Jiggery selling             | 0                                  | 0   | 0 | 0 | 0 | 0 | 1 | 0  | 0 | 0  | 1     |
| Labour                      | 0                                  | 93  | 1 | 0 | 1 | 1 | 0 | 0  | 1 | 1  | 98    |
| Masonry                     | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Owner of a poultry farm     | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Selling prepared vegetables | 0                                  | 0   | 0 | 0 | 0 | 0 | 0 | 1  | 0 | 0  | 1     |
| Owner of a retail shop      | 0                                  | 1   | 0 | 0 | 0 | 0 | 1 | 0  | 0 | 0  | 2     |
| Sawyer                      | 0                                  | 0   | 0 | 0 | 0 | 0 | 1 | 0  | 0 | 0  | 1     |
| Spices making and selling   | 0                                  | 1   | 0 | 0 | 1 | 0 | 0 | 0  | 0 | 0  | 2     |
| Selling string hoppers      | 0                                  | 0   | 0 | 0 | 0 | 0 | 0 | 1  | 0 | 0  | 1     |
| Sweets making and selling   | 0                                  | 1   | 2 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 3     |
| Tailoring                   | 0                                  | 0   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 1  | 1     |
| Tea farming                 | 0                                  | 8   | 1 | 2 | 2 | 6 | 0 | 8  | 0 | 0  | 27    |
| Owner of a tea shop         | 0                                  | 1   | 0 | 0 | 0 | 0 | 0 | 0  | 0 | 0  | 1     |
| Owner of a textile shop     | 0                                  | 1   | 0 | 5 | 0 | 0 | 0 | 0  | 0 | 0  | 6     |
| Vegetable farming           | 0                                  | 1   | 2 | 0 | 0 | 0 | 0 | 0  | 0 | 1  | 4     |
| Vegetable selling           | 0                                  | 2   | 0 | 0 | 1 | 0 | 0 | 0  | 0 | 0  | 3     |
| Not a job                   | 1                                  | 0   | 0 | 0 | 1 | 1 | 0 | 1  | 0 | 1  | 5     |
| Total                       | 1                                  | 116 | 6 | 8 | 7 | 9 | 3 | 14 | 1 | 5  | 170   |

Source: Field survey on the beneficiaries of the SDP in the Ratnapura District, Sri Lanka (09.02.2009-20.03.2009).

- |                                          |                                   |
|------------------------------------------|-----------------------------------|
| a. 1 from vulnerable to extreme poverty: | 2 remains in vulnerable poverty:  |
| 3 from vulnerable to viable:             | 4 from vulnerable to sustainable: |
| 5 from viable to vulnerable:             | 6 remains in viable:              |
| 7 from viable to sustainable:            | 8 remains in sustainable:         |
| 9 from sustainable to vulnerable,        | 10 from sustainable to viable     |



Table 4 indicates that there were 14 households who continued to remain in sustainable poverty. Out of these, 8 households were tea farmers while others were employed as carpenters, electrician, and salesmen, etc. The reason for eight tea farmers being in vulnerable poverty and another eight tea farmers being in sustainable category could be differences in average land holding (ALH) among these two groups, with the ALH for tea cultivation of the latter group being higher (1.36 acres) than the former (0.42 acres).

The other very interesting point revealed in the survey was that those households who have had a supplementary livelihood activity (i.e. tea cultivation) other than their main employment (i.e. selling vegetable), were in the “sustainable” category, likely because their capacity to earn an additional income was high compared to those who had one activity. ALH of those who had additional livelihood activities was around 0.37 in acres, which is a considerable value compared to those who held one livelihood activity (of whom ALH was around 0.20 in acres) (Gunasinghe 2009: p 51).

Table 5 given below shows the results of the second equation of the model. This equation was estimated using only the significant variables identified in the first equation. The main objective of estimating this equation was to examine the different probabilities of a household falling into each of the four household poverty groups according to their capital developments. Though the predictive power of this equation has declined somewhat from 52% to 46% (based on the Pseudo R-squared), it is clear that the significance of those variables for the ‘struggling’ position has improved with the exclusion of the non-significant variables from the first equation.

The results in Table 5 also indicate that only the coefficient attached to the development of human capital in the regression for ‘unsuccessful’ household group is statistically significant. The odds ratio for those who were unable to develop human capital is 5.46. This implies that the probability of falling into the unsuccessful poverty position is five times the probability of being most successful in improving their poverty position in those households who have been unable to develop human capital asset compared to those who managed to do it. On the other hand, the odds ratio for those who had developed human capital is 0.18, meaning that the probability of being unsuccessful is one sixth the probability of being successful in moving out of poverty for those households who had developed human capital assets. Once again this indicates the importance of developing human capital in eradicating poverty. However, the coefficients attached to other capital assets in the regression for the ‘unsuccessful’ household group bear theoretically expected signs although they appear to not be statistically significant at any levels.

Moreover, the results in Table 5 indicate that the parameter estimates pertaining to the development of natural, physical and human capital assets are strongly significant in explaining variations in the ‘struggling’ poverty position. All significant coefficients

attached to capital assets for the regression of the ‘struggling’ group bear theoretically expected signs. However, the coefficients attached to natural capital, physical capital and social capital in the regression for ‘successful’ poverty position appear neither to be significant, nor to bear the expected signs.

**Table 5: Parameters estimated for the second equation.**

| Poverty Status(a)   | Explanatory variable                                  | Estimates<br>( $\hat{\beta}_{mk}$ ) | Significance of estimates<br>(Prob. value) | Odds ratio<br>$\text{Exp}(\hat{\beta}_{mk})$ |
|---------------------|-------------------------------------------------------|-------------------------------------|--------------------------------------------|----------------------------------------------|
| <b>Unsuccessful</b> | Intercept                                             | -3.726                              | .057                                       |                                              |
|                     | [DNC=.00]<br>[DNC=1.00]                               | 1.291                               | 0.122                                      | 3.635                                        |
|                     | [DPC=.00]<br>[DPC=1.00]                               | 0.642                               | 0.467                                      | 1.900                                        |
|                     | <b>[DHC=.00]<br/>[DHC=1.00]</b>                       | <b>1.697</b>                        | <b>0.065</b>                               | <b>5.459</b>                                 |
|                     | Edu                                                   | 0.153                               | 0.374                                      | 1.165                                        |
| <b>Struggling</b>   | <i>Intercept</i>                                      | -0.833                              | 0.494                                      |                                              |
|                     | <b>[D<sub>NC</sub>=.00]<br/>[D<sub>NC</sub>=1.00]</b> | <b>1.928</b>                        | <b>0.004</b>                               | <b>6.876</b>                                 |
|                     | <b>[D<sub>PC</sub>=.00]<br/>[D<sub>PC</sub>=1.00]</b> | <b>1.668</b>                        | <b>0.024</b>                               | <b>5.302</b>                                 |
|                     | <b>[D<sub>HC</sub>=.00]<br/>[D<sub>HC</sub>=1.00]</b> | <b>2.631</b>                        | <b>0.000</b>                               | <b>13.892</b>                                |
|                     | <b>Edu</b>                                            | <b>-0.213</b>                       | <b>0.047</b>                               | <b>0.808</b>                                 |
| <b>Successful</b>   | Intercept                                             | 0.653                               | 0.711                                      |                                              |
|                     | [D <sub>NC</sub> =.00]<br>[D <sub>NC</sub> =1.00]     | -1.661                              | 0.200                                      | 0.190                                        |
|                     | [D <sub>PC</sub> =.00]<br>[D <sub>PC</sub> =1.00]     | -0.475                              | 0.653                                      | 0.622                                        |
|                     | [D <sub>HC</sub> =.00]<br>[D <sub>HC</sub> =1.00]     | 1.176                               | 0.376                                      | 3.240                                        |
|                     | Edu                                                   | -0.223                              | 0.200                                      | 0.800                                        |

a The reference category is “Most successful”. Average Pseudo R-Square is 0.46

The odds ratio attached to the development of natural capital for the ‘struggling’ poverty group is 6.87, meaning that the probability of falling in the struggling poverty position is more than six times larger than the probability of being in the ‘most successful’ poverty position for a household which could not develop its natural capital

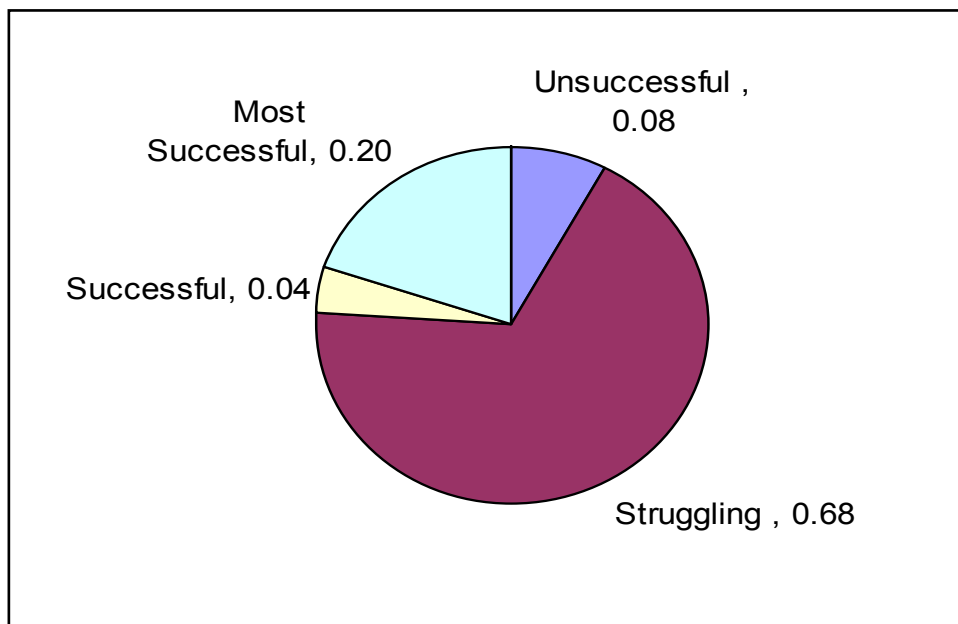
asset compared to one which did. The odds ratio attached to the development of human capital is 13.89, meaning that the probability of falling in the ‘struggling’ poverty position is thirteen times larger than the probability of being in the ‘most successful’ poverty position for a household failing to develop its human capital asset. This, once again, confirms that the development of human capital in the form of building confidence of households is important in the SDP’s poverty reduction process.

However, this also shows how the human capital asset factor would have made households stay in the ‘struggling poverty position’ and in the ‘unsuccessful poverty position’. The acquired human development appears insufficient for households to move out of poverty (i.e. to become at least successful households).

This interpretation holds valid for households who developed natural and physical capital assets as well. The estimator attached to the development of social capital (Table 5) is insignificant in the three poverty positions concerned.

The coefficient attached to the level of education for the ‘struggling’ poverty group is significant, meaning that a household having an additional year of schooling would have a lesser probability of being in this poverty category than being in the most successful poverty group.

**Figure 4: The mean probability of households falling into certain poverty positions**

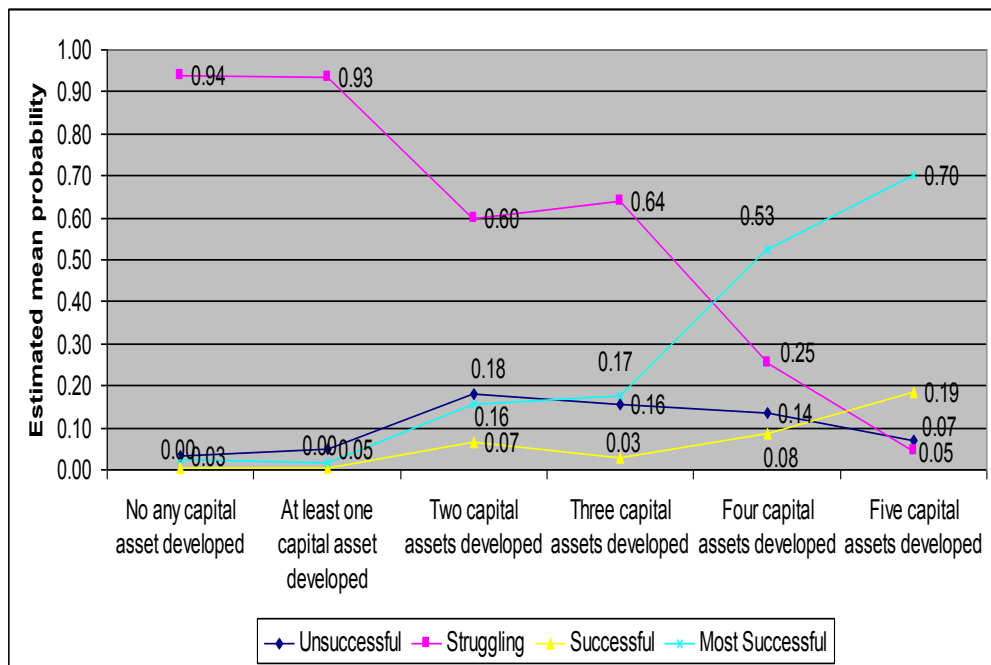


Source: Author’s calculations based on the ‘estimated response probabilities’ of the second MNLR equation

The Figure 4 shows the mean probability of each household falling into one of the four poverty household groups, where it is clear that the probability of a household falling into the ‘struggling’ poverty position is very high (0.68). Furthermore, the mean probability of a household falling into the successful or most successful poverty positions is 0.04 and 0.20 respectively. This means that there is a chance that 68 out of each 100 households fall in to the “struggling” position.

Figure 5 depicts the relationship between the developments of a household’s capital assets and the mean probability of falling into a poverty group. Accordingly, the more the households’ ability to develop additional capital assets, lesser the probability of those households regressing in terms of achieving higher living conditions. On the other hand, the households who developed more than three capital assets have reported a speedy positive progress to become most successful households.

**Figure 5: The relationship between the development of capital assets and the mean probability of a household falling into a poverty household group**



Source: Author’s calculations based on the ‘estimated response probabilities’ of the second MNLR equation

## CONCLUDING REMARKS AND LIMITATIONS OF THE STUDY

Having appraised the impact of the Samurdhi Development Programme on poverty alleviation by estimating the relationship between the transition of income poverty and development of asset base of households using the data obtained from a randomly selected sample of 170 beneficiaries of the Samurdhi development programme in the Ratnapura District of Sri Lanka, the study produced evidence to confirm that the development of natural, physical and human capital assets have significantly influenced the poverty standing of beneficiaries. Those who were unable to develop these capital assets were more likely to fall into 'struggling poverty position' (being in vulnerable poverty for a long period). The mean probability of falling into this category being 0.68, it is evidenced that the probability of any household in the SDP in Ratnapura district remaining in vulnerable poverty for a long time is very high.

Also, the study found that around 28 percent of households who had developed up to four capital assets through the SDP are likely to be 'most successful', and nearly three-fourths fail to get into that category. Further, approximately two-thirds of the households who had developed up to three capital assets or less through the SDP were at high risk (over 0.64 probability) to 'stay in vulnerable poverty' (struggling position) over a long period, while only few could be expected to become 'successful' (3%) or 'most successful' (17%).

Based on these findings, it could be concluded that the SDP has not been effective wherever it has developed four capital assets or below in the beneficiary households. However, as the percentage of households below this level of achievement appear nearly three times more than the percentage of households above it, the study prompts to recommend that the SDP should reassess and reformulate its policies and strategies to further strengthen the asset base of its beneficiaries in order to effectively alleviate poverty.

However, the study is not without its constraints and limitations. The sample size of the study was small (170 households in the quantitative study and 17 respondents in the qualitative study) compared to the beneficiary population of the SDP in the Ratnapura district, and therefore the accuracy of findings could be limited vis-à-vis their generalisation. The study assumed that the external environment did not affect the poverty level of households and that their poverty levels were purely determined within the internal context of the theoretical framework. This is an oversimplification of the poverty dynamics of a household which could well be influenced by various external factors such as inflation, economic growth, droughts, etc. Furthermore, the study took into consideration only one direction of the bi-directional causation between poverty and livelihood developments. The study built five dummy (categorical) variables to capture the development of natural, physical, human, financial and social capital assets.

As most of the data obtained were qualitative, a set of criterions had to be introduced for each capital asset in order to convert the qualitative information into measurable data, which also could not fully and perfectly capture real development of these assets of households. In the structured interview, households were asked about their income levels in 1995 and 2009. The responses could not be depended upon as sources of accurate data regarding their income levels as they would fear exclusion from the SDP. However, notwithstanding these limitations, the present study constitutes an important step in future research aimed at investigating poverty alleviation strategies in Sri Lanka.

## REFERENCES

- Akter S, Farrington J, Deshingkar P and Freeman A (2008): '*Livestock, vulnerability, and poverty dynamics in India*', Findings from the ODI Livelihood Options Project Panel Survey. Discussion Paper No. 10. Targeting and Innovation. ILRI (International Livestock Research Institute), Nairobi, Kenya.
- Asgary M.P, Jahandideh S, Abdolmaleki P, and Kazemnejad A (2007): 'Analysis and identification of b-turn types using multinomial logistic regression and artificial neural network', *Bioinformatics*, Vol. 23 (23), pp 3125–3130.
- Cahn, M (2002): 'Sustainable Livelihoods Approach: Concept and Practice', 3<sup>rd</sup> Biennial Conference of the International Development Studies Network of Aotearoa, New Zealand. Massey University, 5– 7December 2002.
- Chan Y H (2005): 'Biostatistics 305: Multinomial logistic regression', *Singapore Med J*, Vol. 46(6), pp 259-267.
- Cramer J.S (2003): *Logit models from economics and other fields*, Cambridge University Press, UK.
- Gunasinghe, C (2009): 'A Review of a Poverty Alleviation Programme in a Developing Country: The relationship between Capital Assets and Levels of Poverty', VDM Verlag, Germany.
- Gunasinghe, C (2010): 'The significance of capital assets in moving out of poverty: A case study of Sri Lanka', *South Asia Economic Journal*, Vol11 (2), pp. 245 –285. Available at <http://sae.sagepub.com/content/11/2/245>
- Deshingkar P, Farrington J, Rao L, Akter S, Sharma P, Freeman A and Reddy J (2008): '*Livestock and poverty reduction in India: Findings from the ODI Livelihood Options Project*', Discussion Paper No. 8. Targeting and Innovation. ILRI (International Livestock Research Institute), Nairobi, Kenya.

- Ellis F (2001): 'Livelihoods, Governance and Rural Poverty Reduction in Uganda', Governness, Institutions and Public Sector Reform: Creating a supportive environment for sustainable livelihoods, Handout prepared for the DFID Sustainable Livelihoods Seminar 19<sup>th</sup> October 2001.
- Ellis, F and Bahiigwa G. (2001): 'Rural Livelihoods and Poverty Reduction in Uganda', *LADDER Working Paper*, No.5, Overseas Development Group, UK.
- Hengsdijk H., Meijerink G.W., Tonneijck F and Bindraban P.S. (2005): 'An analytical framework for linking biodiversity to poverty', Report 106, Plant Research International B.V., Wageningen, Netherlands.
- Phillimore, J. and L. Goodson (2004), *Qualitative Research in Truism: Ontologies, Epistemologies and Methodologies*. London: Routledge.
- Salih R (2000): 'The Samurdhi Poverty Alleviation Scheme', (a draft paper prepared for the Social Security Division of the ILO), Geneva.
- URL: [http://www.devnet.org.nz/conf2002/papers/Cahn\\_Miranda.pdf](http://www.devnet.org.nz/conf2002/papers/Cahn_Miranda.pdf) (Accessed 02 April 2008)