Poverty dynamics in Far-western Rural Hills of Nepal: Evidences from panel data

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Abstract

Poverty, being persistent and widespread, still remains core issue to be researched in Nepal. Moreover, there lacks study on dynamic aspects of poverty at the household level. Therefore, this study intends to capture the dynamics of poverty in poverty stricken Far-Western Rural Hill district of Baitadi based on panel data collected through field survey in 2001 and 2007. An empirical analysis is made by employing multinomial logit regression by dividing household into three categories; non-poor, transitory poor, and chronic poor. The results suggest that the incidence of poverty declined sharply between the study period, but is more favored in relatively well-off Village Development Committee (VDC), Patan. Similarly, excessively high proportion of Occupational Caste (OC) households are chronically poor, none of them were non-poor in both surveys. Moreover, the risk of them falling into chronic poverty is significantly higher. Also, female-headed household, and household with higher dependency ratio has significantly higher risk of falling into chronic poverty. However, landholding and irrigation coverage reduce the risk of households to fall into chronic poverty. Further, disaggregation of transitory poverty into move-into and move-out of poverty also shows higher risk of OC households to move-into poverty, mainly due to their limited socio-economic assets. In addition, the occurrence of natural disasters also increases the risk of households to move-into poverty. On the other hand, Increase in schooling years of household's head and landholding help the household to move-out of poverty. Therefore, any poverty reduction program to deal with transitory as well as chronic poverty should focus relatively remote VDCs like Melauli. Similarly, OC households, whose major occupation is either agriculture or laboring, should be targeted. Poverty reduction programs should generate employment opportunities, which help to deal with both chronic as well as transitory poverty through a reduction in the dependency ratio. Similarly, introduction of temporary relief programs during occurrence of natural disasters will be very effective in dealing with transient poverty.

Keywords: Transient poverty, chronic poverty, Baitadi, socioeconomic, multinomial logit.

1. Introduction

Incidence of poverty in Nepal is increasing over time (Joshi, Maharjan, & Piya, 2010;

Lanjouw & Prenusshi, 1999). With continuous effort to tackle poverty since 1956, it is only recently that poverty incidence has been reported to be declining (between 1995/96 and 2003/04) (Central Bureau of Statistics, 2005a; 2005b). Despite such decline, with the poverty incidence of 30.8 percent, Nepal still falls among the countries having the highest incidence of poverty. Thus, poverty remains a critical issue to be analyzed.

A substantial number of literatures can be traced on Nepalese poverty issues, which suggest its common features such as poverty being concentrated in Mid-Western and Far-Western development regions and Hills and Mountains agro-ecological zones (Central Bureau of Statistics, 2005a; 2005b; United Nations Development Programme, 2005). Similarly, the literatures also suggest poverty as purely a rural phenomenon as it hosts around 95.3 percent of Nepal's total poor (Central Bureau of Statistics, 2005b). Besides these geographical divisions, several socio-economic factors also determine the incidence of poverty in Nepal (Maharjan & Joshi, 2011; Joshi & Maharjan, 2008; Food and Agriculture Organization & World Food Programme, 2007; Joshi & Maharjan, 2007; Central Bureau of Statistics, 2005a; 2005b; South Asia Alliance for Poverty Eradication, 2003).

Despite substantial literatures on Nepalese poverty, virtually all of them are based on cross-sectional data that provide information on static poverty, thus fail to differentiate important dimensions of poverty i.e., atemporal dimension of poverty. As differential treatment through different policy would be required to deal with chronic and transient poverty, the temporal dimension of poverty is deemed necessary for a better understanding of poverty. For instance, transient poverty is better tackled by policies that assist with consumption smoothing, whereas chronic poverty may call for income transfer or programs that enhance the poor's earning capacity (Lipton & Ravallion, 1995). Similarly, such differentiation will be crucial for policy makers as those suffering from the chronic poverty are the ones that are most vulnerable and, therefore, need special attention by any poverty related program (Mendola, Busetta, & Aassve, 2009). Therefore, this paper attempts to capture the dynamics of poverty in poverty-ridden Far-Western Rural Hills of Nepal employing two year panel data from household surveys in order to quantify the effect of several socio-economic factors in moving in-and-out of poverty in Far-Western Rural Hills.

2. Temporal dimensions of poverty: Transient and chronic poverty

Poverty analysis based on the cross-sectional data does not provide information on mobility of poor, in-and-out of poverty, over time i.e., poverty dynamics. However, understanding poverty dynamics is crucial in distinguishing chronic and transient poverty. Thus, transient and chronic poverty is two temporal dimensions of poverty. This can be operationalized by utilizing households' poverty status in different years of the panel, where information of the same households is collected over time. Such repeated collection of the information provides valuable information about net changes in poverty i.e. the extent of movements of households in-and-out of poverty. The distinction of poverty into chronic and transient poverty could be helpful for policy purposes, as different policy responses are likely to be effective for chronic and transient poverty differently. There are mainly two methods to distinguish chronic and transient poverty, namely; the 'spells' and 'components' approach (Yaqub, 2000).

The distinction between permanent components of a household's income from its transitory variation is made in "component" approach, which helps to identify the chronic poor, those having permanent component below the poverty line. Inter-temporal average for the household is a common approach to identify the permanent component (Jalan & Ravallion, 1998). Here, a household is deemed to be chronically poor if its inter-temporal average is below the poverty line. In case of transitory poor, inter-temporal average for the household is above the poverty line, but it should fall below the poverty line at least once during the period under consideration. If it never falls below the poverty line, the household is never a poor household (McCulloch & Baulch, 1999). Beside this, Jalan & Ravallion (2000) outline two conditions to be fulfilled by a household in order to be in 'transient poverty'; first, the household must fall below the poverty line at least once during the period under consideration, and second, the household's standard of living must be observed to vary over time within the period under consideration. However, even a household that is found to be poor at all the period under consideration can experience variability in standard of living over the period, and have a transient component of poverty, thus does not correspond to the concept of chronic poverty (McKay & Lawson, 2003; Jalan & Ravallion, 2000; McCulloch & Baulch, 1999; Jalan & Ravallion, 1998). Therefore, the 'component' approach demands good quality data supplemented by several rounds of panel survey

over time and cannot be properly captured using only two waves of panel data (McKay & Lawson, 2003).

'Spell' approach, on the other hand, simply identifies the chronic poor based on the number of spells of poverty they experience during the period under consideration (McKay & Lawson, 2003). This approach can be best applied even in two waves of panel data (Arif & Bilques, 2007). The application of poverty transition matrix can give four categories of changes in poverty between two waves (1st and 2nd waves). The followings are the categories;

i) Always non-poor (non-poor in both waves)

ii) Move-into-poverty (non-poor in 1st wave but poor in 2nd wave)

iii) Move-out-of-poverty (poor in 1st wave but non-poor in 2nd wave), and

iv) Always poor (poor in both wave).

As shown in Table 1, this can be broadly categorized into three categories 'non-poor' (i), 'transitory poor' (ii and iii), and 'chronic poor' (iv).

Table 1. Poverty transition matrix showing categories of changes in poverty

		1st wave	
		Non-poor	**Poor**
2nd wave	**Non-poor**	'Always non-poor' Non-poor	'Move-out-of-poverty' Transitory poor
	Poor	'Move-into-poverty' Transitory poor	'Always poor' Chronic poor

3. Data source and methodology

This sub-section describes the sources of data for the panel data analysis in the study area and the methodology to analyze the data.

3.1 Data source

As deemed necessary to study the dynamics of poverty, the paper is based on the household surveys conducted for the two waves in Baitadi district of Far-Western Rural Hills of Nepal in order to collect panel data. One hundred and twenty households in the first wave from two Village Development Committees (sixty each), namely; Patan and Melauli, were surveyed in the year 2001. However, due to missing of some important information in the first wave, four samples were dropped, all of which were from Melauli. Similarly, due to migration of the few households from the study, the second

wave of surveys conducted in 2007 could only locate fifty six households in Patan and fifty households in Melauli (Table 2). Thus, altogether, 106 panels are considered in this paper.

Table 2. Sample size in two waves

Year	Patan	Melauli	Total
2001	60	56	116
2007	56	50	106
Attrition rate	6.7	10.7	8.6

Migration to market centers is the main reason for the attrition in both VDCs. This shows that migration rate is high in Melauli compared to Patan, which was mainly due to the remoteness of the VDC that push the household to the place having better basic social services like transportation, communication, health, education etc. All the households migrated from Patan were the non-poor in 2001, whereas only two out of six migrated from Melauli were poor in 2001. This suggests a higher tendency of non-poor to move out of the remote village to relatively accessible market centers.

3.2 Data analysis

A poverty line established by the two waves of Nepal Living Standard Survey i.e., NLSS I in 1995/96 and NLSS II in 2003/04, for Rural Western Hills were used to establish the poverty line in this paper. The poverty lines established by NLSS I and NLSS II for Rural Western Hills are NRs 5,403 and NRs 8,901 respectively. Based on the growth rate of poverty line between these periods, poverty line for 2001 was interpolated and for 2007 was extrapolated. These figures are then compared with the poverty line calculated based on consumer price index taking 1996 as the base year. Due to the growth rate being constant, the poverty line based on growth rate follows the linear path whereas the changing consumer price index over time follows a non-linear path. However, as shown in Figure 1, both of the poverty line moves close to each other. Therefore, to capture both aspects, i.e., the rate of poverty line as well as the consumer price index, average of these two poverty lines is used to study the poverty dynamics in this paper (Appendix 1).

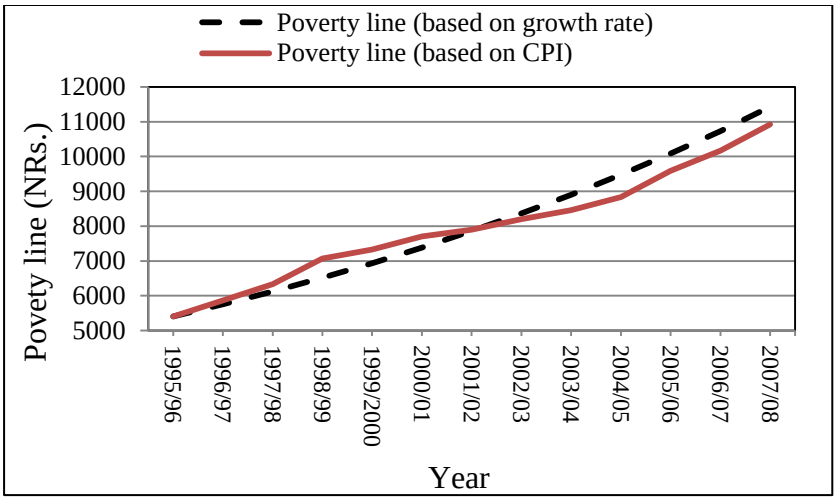

Figure 1. Derivation of poverty line using change rate of the poverty line (between 1996 – 2004) and the consumer price index

Source: Ministry of Finance (2010); Central Bureau of Statistics (2005b)

The use of incidence of poverty for the two periods helps to differentiate households into three categories (Table 1). These categories of poverty are then related to different socio-economic characteristics of particular households as part of the descriptive analysis through cross-tabulations. An empirical analysis is also undertaken in order to establish the empirical relations of poverty with different socio-economic characteristics.

3.3 Empirical model

Multinomial logistic regression provides an appropriate tool when the dependent variable has more than two categories and such categories have no natural ordering (Hamilton, 2009; Wooldridge, 2002). Therefore, the multinomial logistic regression model is applied to make an empirical assessment of how the chronic and transitory poor are different from the non-poor households in terms of various socio-economic characteristics.

The multinomial logistic regression model with '*j*' categories of dependent variables can be expressed as

$$\left[\frac{\Pr(y=i)}{\Pr(y=j)}\right] = e^{X\beta^{(i)}} \quad \text{--- (1)}$$

Where, j = 3 (chronic poor, transitory poor, and non-poor); i^{th} category = chronically

poor or transitory poor, and j^{th} category = non-poor category, which is regarded as a base category; X and $\beta^{(i)}$ are vectors of explanatory variables. If we call the ratio in equation 1 the relative risk and assume that X and β^{i} are vectors equal to ($x_1, x_{2,} \ldots x_k$) and ($\beta_1^{(i)}, \beta_2^{(i)}, \ldots, \beta_k^{(i)}$) respectively, the ratio of the relative risk for a one-unit change in x_n can be denoted as Equation 2.

$$\frac{e^{\beta_1^{(i)} x_{i+} \ldots + \beta_n^{(i)} (x_{n+1}) + \ldots + \beta_k^{(i)} x_k}}{e^{\beta_1^{(i)} x_{i+} \ldots + \beta_n^{(i)} (x_i) + \ldots + \beta_k^{(i)} x_k}} = e^{\beta_n^{(i)}} \quad \text{--- (2)}$$

Thus, the exponential value of a coefficient is the relative-risk ratio for one-unit change in the corresponding variable. Here, risk is measured as the risk of transitory poor or chronic poor relative to non-poor. Since there are three categories of the dependent variable, there will be two non-redundant logits, chronic poor/non-poor and transitory poor/non-poor. The coefficient obtained in multinomial logit regression gives the log of the ratio of two probabilities [$\Pr(chronic\ poor)/\Pr(non-poor)$] or [$\Pr(transitory\ poor)/\Pr(non-poor)$] (as shown in equation 1), for one unit change in the explanatory variable. In simple words, the standard interpretation of the multinomial logit is that for a unit change in the explanatory variable, the logit of chronic poor or transitory poor relative to non-poor is expected to change by its respective parameter estimate (coefficient) given the other variables in the model held constant. The sign of the coefficient here gives the direction of change in probability. For instance, a positive sign indicates an increase in probability to be chronic or transitory poor over non-poor.

When the model is written in an exponentiated form, the explanatory variable of interest is evaluated at $x+\delta$ and at x for transitory or chronic poor relative to non-poor, where δ is change in explanatory variable we are interested in (δ is traditionally set to one i.e., a change in one unit of explanatory variable), while the other variables in the model held constant (Equation 2). Taking their ratios would reduce to the ratio of two probabilities, which can be termed as relative risk. Thus, the relative risk ratio (RRR) can be interpreted as the expected change in relative risk ratio of transitory or chronic poor relative to non-poor for one unit change in the explanatory variable given the other variables in the model held constant. Thus, the RRR value greater than one indicates a

positive association between the explanatory variable and transitory or chronic poor relative to non-poor, while the RRR value less than one shows the negative association.

Explanatory variables used for the empirical analysis are caste, age of household head, gender of household head, family size, dependency ratio, education of household head, occupation of household head, landholding, irrigation coverage, livestock holding, dummy for VDC, involvement in CBOs, number of CBOs involved, extent of participation in CBOs, type of CBOs, and occurrence of destructive natural disaster (either landslides, flood, drought, hailstorm). Observations of all these explanatory variables for 2001 are taken into consideration for the empirical analysis.

4. Results and discussion

4.1 Poverty transition between 2001 and 2007

Poverty transition matrix is an important tool to categorize the sample households into temporal dimensions of poverty, i.e., non-poor, transitorily poor (moving in and out of poverty), and chronically poor. The result shows that 21.7 percent of sample households are chronically poor (Table 3). Significantly higher proportion (thirty two percent) of the households in Melauli suffers chronic poverty compared to that of Patan where only 12.5 percent of the households are suffering from chronic poverty. In contrast, significantly higher proportion (44.7 percent) of households in Patan remains non-poor in both surveys compared to Melauli (twenty percent).

Table 3. Poverty transition matrix in sampled VDCs

	VDC	Poverty	2007		
			Non-poor	**Poor**	**Total**
2001	**Patan**	Non-poor	25 (44.7)	5 (8.9)	30 (53.6)
		Poor	19 (33.9)	7 (12.5)	26 (46.4)
		Total	44 (78.6)	12 (21.4)	56 (100)
	Melauli	Non-poor	10 (20.0)	8 (16.0)	18 (36.0)
		Poor	16 (32.0)	16 (32.0)	32 (64.0)
		Total	26 (52.0)	24 (48.0)	50 (100)
	Overall	Non-poor	35 (33.0)	13 (12.3)	48 (45.3)
		Poor	35 (33.0)	23 (21.7)	58 (54.7)
		Total	70 (66.7)	36 (34.0)	106 (100)

Source: Field survey 2001 and 2007

Note: Figures in parentheses indicate percentage

Thirty three percent of the households managed to move-out-of-poverty between the

survey periods. The proportion is more or less the same for both VDCs. However, the proportion of the household who move into poverty is higher in Melauli. In Melauli, sixteen percent of the households move into poverty whereas in Patan, only 8.9 percent of the households move into poverty (Table 3). Thus, 44.7 percent, 42.8 percent and 12.5 percent of the households in Patan are non-poor, transitory poor and chronic poor respectively. Similarly, twenty percent, forty eight percent and thirty two percent of households in Melauli are non-poor, transitory poor and chronic poor respectively. This suggests that a problem of chronic poverty is severe in Melauli, a relatively remote VDC. In overall, the figures are 33 percent, 45.3 percent and 21.7 percent respectively for non-poor, transitory poor and chronic poor.

4.2 Socio-economic factors associated with poverty dynamism

Nepalese society is divided based on the Hindu caste hierarchy in which the priestly *Brahmins* (*Bahun*) are at the top followed by the *Kshatriya – Chhetri* (kings and warriors), the *Vaishya* (merchants) and the *Sudra* (peasants and laborers). Beneath everyone are Occupational Caste groups, which are considered untouchables and are called *Dalit* (oppressed). Bhattachan, et al., (2004) mention that there are above 200 forms of caste-based discrimination commonly practiced in Nepal. Some of the common practices include limiting the so-called lower castes or OC to socially-sanctioned roles such as forcing them to remove the carcass of dead cattle, refusing to share water sources with them and behaviors intended to avoid any direct bodily contact i.e., the practice of untouchability (Department for International Development and The World Bank, 2006). Such discrimination is more severe in the less developed regions of the country, especially Mid- and Far-Western regions, which was widely observed even during the field survey by the author of this dissertation. Thus, the OC or *Dalit* households have been socially disadvantaged for a long time and are still being disadvantaged. This is the reason why the nature of poverty is significantly associated with caste. Fifty percent of OC households are suffering from chronic poverty (Table 4). This figure is significantly higher if compared with *Bahun* (16.7 percent) and *Chhetri* (17.7 percent). Around twenty one percent of OC households move into poverty. This figure is also significantly higher compared to other caste groups like *Bahun* (6.6 percent) and *Chhetri* (12.9 percent). In contrast to this, none of the OC households were

non-poor in both surveys. Also, only relatively low proportion, 28.6 percent of OC households escaped out of poverty in 2007 compared to other caste groups like *Bahun* (35.5 percent) and *Chhetri* (30 percent). This suggests that both transitory and chronic poverty are more prevalent among OC households. Age of households shows non-significant association with the nature of poverty.

Gender of households is associated with accessibility of important resources to the households. A female-headed household is characterized by the lack of labor to cultivate land, the household owns. Besides, female rarely have legal ownership of assets such as land, livestock and house in their name (Department for International Development and The World Bank, 2006). Thus, limited access to resources consequently limits their access to credit and also limits their involvement in community activities. This consequently increases the risk for female-headed households to fall into poverty. This study finds that gender of household head is significantly related with the nature of poverty. Female-headed households suffer a significantly higher proportion (35.3 percent) of chronic poverty compared to male-headed households (19.1 percent), whereas significantly lower proportion (11.9 percent) of the female-headed households were non-poor for both surveys compared to their male counterpart.

Family size was not significantly different in 2001 among four categories of poverty. However, in 2007, it differs significantly. There is increase in family size among the household who are non-poor and move-out-of-poverty. Thus, family size of the households who are non-poor and move-out-of-poverty were significantly higher compared to the households who were chronically poor and moved into poverty in 2007.

The nature of poverty also significantly differs with occupation of household heads. Only the household with its head engaged in agriculture and laboring are suffering from chronic poverty. A significantly higher proportion of households engaged in salaried job (seventy five percent) and business (fifty percent) are non-poor for both years. All types of occupation that the household heads are engaged have contributed households in moving out of poverty. However, because of the very high proportion of households with their heads engaged in agriculture and laboring are suffering from poverty, higher proportions of households with their heads engaged in agriculture and laboring managed to move out of poverty. This is mainly due to the increase in wage rate of both

agricultural as well as casual laborer. The wage rate has increased from NRs. 70 to NRs. 150 for agricultural, and from NRs. 120 to NRs. 200 for casual laboring between 2001 and 2007 respectively. Increase in wage rate is mainly attributed to reduced supply of labor in the study areas mainly due to greater tendency of youth to migrate to urban areas, India or other countries.

Land is a very important factor of production in the context of rural Nepal where agriculture is the major source of livelihood. Historically, land has formed the principal symbol of social status and the principal source of economic power (Regmi, 1999). Therefore, ownership of land has meant control over a vital factor of production. Thus, landownership is a crucial factor that determines poverty in rural Nepal. Average landholding differs significantly with different categories of households for both years. In both years, average landholding is significantly higher among the households who are non-poor and move-out-of-poverty.

Irrigation coverage differed significantly in 2001, with the non-poor household having significantly higher proportion of irrigation coverage (42.8 percent) followed by household move-out-of-poverty (37.6 percent). With the access of irrigation even by the poor households, irrigation coverage did not differ significantly in 2007. Though households own land, it is not necessary they cultivate the land. There is common practice of land renting in or out. Share cropping and mortgaging land are two most common ways of renting in and renting out land. Under sharecropping, provided all the necessary inputs like seed, fertilizers, and irrigation from the harvest of the main product, the remaining products are distributed equally among the landowner and cultivator. In case of mortgaged land, the land owner receives certain amount of money from the cultivator, for which the cultivator gets the right to cultivate the land. In such case, the landowner does not have claim over the harvest. Such rights rest on the cultivator until the landowner payback the principal amount. Thus, under such arrangement, the profit that cultivator makes from the piece of land is viewed as the interest for the principal amount. This system of renting in and out land makes the difference between the total land a household owns legally and the land a household cultivates (operational land).

Table 4. Socio-economic characteristics of sampled household by nature of poverty

Variables	Nature of poverty				P-value	
	Non-poor	Move-out-of-poverty	Move-into-poverty	Chronic poor	χ^2	*t*-stat
Village Development Committee						
Patan	25 (44.7)	19 (33.9)	5 (8.9)	7 (12.5)	0.014**	-
Melauli	10 (20.0)	16 (32.0)	8 (16.0)	16 (32.0)		
Caste						
Bahun	14 (46.7)	9 (30)	2 (6.6)	5 (16.7)	0.02**	-
Chhetri	21 (33.9)	22 (35.5)	8 (12.9)	11 (17.7)		
OC	0	4 (28.6)	3 (21.4)	7 (50)		
Age of HHH (Years)						
2001	50.5	48.1	52.8	54.6	-	0.30
2007	51.8	50.7	55.8	53.0		0.50
Gender of HHH						
Male	33 (37.1)	28 (31.4)	11 (12.4)	17 (19.1)	0.1*	-
Female	2 (11.85)	7 (41.2)	2 (11.85)	6 (35.3)		
Education of HHH (Years of schooling)						
2001	8.3	4.7	4.1	2.4	-	0.00***
2007	9.7	6.7	3.8	4.5		0.00***
Family size (AE)						
2001	5.8	6.4	5.9	6.4	-	0.74
2007	6.2	7.5	5.4	5.6		0.014**
Occupation of HHH						
Agriculture	13 (20.6)	26 (41.3)	7 (11.1)	17 (27.0)	0.00***	-
Salaried job	18 (75.0)	3 (12.5)	3 (12.5)	-		
Business	3 (50.0)	2 (33.3)	1 (16.7)	-		
Laborer	1 (7.7)	4 (30.8)	2 (15.4)	6 (46.1)		
Landholding (ha.)						
2001	1.9	1.27	0.7	0.68	-	0.04**
2007	2.0	0.96	0.49	0.74		0.05**
Irrigation coverage (%)						
2001	42.8	37.6	24.9	25.5	-	0.02**
2007	44.2	35.5	34.9	34.5		0.5
Operational landholding (ha.)						
2001	1.12	0.83	0.97	0.97	-	0.47
2007	1.78	0.87	0.52	0.75		0.09*
Livestock holding (LSU)						
2001	3.68	4.4	4.2	4.7	-	0.33
2007	3.62	4.6	2.8	3.7		0.02**
Dependency ratio (by age)						
2001	0.36	0.89	0.77	0.98	-	0.00***
2007	0.62	0.62	1.17	0.79		0.01***
Dependency ratio (by economically active family members)						
2001	0.87	1.58	0.77	1.55	-	0.00***
2007	1	0.98	1.39	1.32		0.07*
Participation in CBOs (no.)						
2001	0.51	0.63	0.69	0.47	-	0.71
2007	1.26	1.17	1	1.17		0.72
Level of participation						
2001	1.85	1.71	2.44	1.83	-	0.75
2007	3.43	3.34	3.69	3.3		0.90
Climate related natural disaster						
Yes	18 (25.0)	21 (29.2)	12 (16.6)	21 (29.2)	0.008***	-
No	17 (50.0)	14 (41.2)	1 (2.9)	2 (5.9)		

Source: Field survey, 2001 and 2007

Note: ***, ** and * significant at 0.01, 0.05 and 0.1 level of significance respectively, and figures in parentheses indicate percentage

Operational land was not significantly different among different category of poverty in 2001. However, in 2007, it was highest among the non-poor households followed by the households who moved out of poverty. There is a huge reduction in operational land among the household who moved into poverty, whereas among the chronically poor household such reduction was only a relative. Operational land holding is higher than the total landholding among the households who moved into poverty and are always poor. However, the total landholding size is bigger than the operational landholding size for households who were never-poor and who moved out of poverty. This shows that the chronic poor households and households who move in poverty are the ones who rented in land from the households who moved out of poverty and who were never poor. Since the significant proportion of the main product goes to the landowner under share cropping, which is the common practice for chronically and transitory poor households, higher operational landholding cannot be translated into higher production of agricultural product.

Livestock holding was not significantly different among different nature of poverty in 2001. But in 2007, livestock holding became significantly higher among the households that moved out of poverty. It was lowest among the households who moved into poverty in 2007. Moreover, small livestock like goats serve as an important means to cope with the situation of poverty. Thus, it can be said that whenever a household suffers deficiency in income to meet basic needs, they sell the livestock, which means reduction in size of livestock holding.

Dependency ratio shows the proportion of dependent members to independent one in the household. It can be measured both in terms of economically active age group as well as in the involvement of the members in economic activity. Dependency ratio based on economically active members is higher compared to the dependency ratio based on economically active age groups in all cases. This suggests that not all the economically active age group family members are engaged in economic activities. This reflects the lack of reliable employment opportunities in the study areas. Dependency ratio based on both criteria is significantly lower among the households who are non-poor and who moved into poverty. A lower dependency among the households who moved into poverty is, in fact, due to the distress involvement of many of the household members in any sort of income generating activities regardless of age and gender of the

member. Dependency ratios have increased for the households who moved into poverty.

Participation in CBOs has increased significantly between 2001 and 2007. During 2001, most of the CBOs were non-functional due to the threats posed by the Maoist insurgency. Local government established by the Maoist strongly opposed the function of externally funded CBOs in the study areas. However, after the peace process in 2006, several NGOs and INGOs, and also GOs have established CBOs in the study areas. Farmers' groups and saving and credit groups are the major two types of CBOs established by the GOs, NGOs, and INGOs in the study areas. Farmer' groups were established with the main objective of commercializing agriculture by efficient management of input as well as output through groups. Similarly, saving and credit groups that involve women groups were established in order to empower women through several community activities as well as mobilization of saving and credit. Similarly, 'professional' groups like groups of traditional healers were organized by the Family Planning Association of Nepal (FPAN), in order to disseminate modern knowledge about maternal health among the locale. This is done by providing training to the members of such organizations. These groups were also active in mobilizing saving and credits. Besides, there were already established Community Forestry User's Groups (CFUGs) in the study areas. Therefore, participation in CBOs increased significantly in 2007 compared to 2001. In both years, however, participation in CBOs was not significantly different. The same is true in case of the level of participation of members in the CBOs.

Lastly, relating nature of poverty with occurrence of climate related natural disasters, it shows that significantly higher proportion of households (29.2 percent) who suffered climate related natural disasters falls under chronic poverty. This constitutes 91.3 percent of chronic poor household suffering from climate related natural disasters. Only 5.9 percent of chronic poor household did not suffer any climate related natural disasters. In contrast, significantly higher proportion (fifty percent) of household who didn't suffer climate related natural disasters remain non-poor for both survey periods, but only twenty five percent households who suffered climate related natural disasters remain non-poor for both survey periods. Flood, landslides, and hailstorms are the natural disasters that are frequent in the study areas. Hailstorm and landslide are quite intense in Melauli compared to Patan. In Melauli, 66.1 and 46.4 percent households

suffered from hailstorm and landslide respectively. This has adversely affected standing crops among 86.8 percent households, and cropland degradation among 54.7 percent households. In Patan, the figure is relatively small; only 13.3 and 18.3 percent households suffered hailstorm and landslide respectively. The intensity of flood, however, is higher in Patan with 23.3 percent households affected by flood. These natural disasters have affected standing crops among forty five percent households and land degradation among thirty percent of households. Thus, the occurrence of natural disasters has adversely affected livelihoods of household in the study areas.

4.3 Factors affecting the dynamics of poverty: Results of multinomial logistic regression

As the initial step to run the model, the entire sixteen variables listed in Table 4 including the square of age and family size were included in the initial model. However, after successive dropping and incorporation of the insignificant explanatory variables, the final model was obtained and as presented in Table 5.

Table 5. Factors affecting dynamics of poverty: An outcome of multinomial logistic regression model

Variables	Transitory poor/non-poor			Chronic poor/non-poor		
	Coef.	RRR	P-value	Coef.	RRR	P-value
VDC (dummy for Patan)	-0.3	0.74	0.74	-1.6	0.19	0.10*
Caste (dummy for OC)	22.4	5.2E+09	0.00***	24.0	2.6E+10	0.00***
Gender of HHH (dummy for female)	0.7	2.01	0.56	1.8	6.39	0.1*
Occupation of HHH (dummy for agriculture)	3.0	20.70	0.00***	22.9	8.7E+09	0.00***
Occupation of HHH (dummy for laborer)	1.6	5.06	0.24	21.4	1.9E+09	0.00***
Landholding (ha.)	-1.2	0.31	0.03**	-0.15	0.86	0.09*
Irrigation coverage (%)	-0.01	0.99	0.70	-0.03	0.97	0.1*
Dependency ratio (economically active members)	2.6	13.68	0.00***	2.7	14.76	0.00***
Occurrence of natural disaster (dummy for occurrence)	1.9	6.86	0.02**	0.98	2.66	0.38
Constant	-2.9		0.03	-22.9		0.04
Number of observations	106					
Likelihood ratio $Chi^2(18)$	92.67***					
Log likelihood	-65.62					
McFadden's pseudo R^2	0.41					

Source: Field survey 2001 and 2007

Note: ***, ** and * significant at 0.01, 0.05 and 0.1 level of significance level respectively

Likelihood ratio test shows that the model is significantly not different from the full

model, where each of the variables presented in descriptive table (Table 4) are included. Thus, the outcome of the model presented in Table 5 can represents the best fitted model. The result shows that the relative risk of households in Patan to be chronic poor relative to non-poor is significantly low. However, such risk for households to be transitory poor is non-significant. Caste variable shows a very high risk, which is also highly significant, for OC households to be transitory poor as well as chronically poor in relation to remain non-poor. Similarly, high and significant risk is associated with occupation of household heads, especially in case of chronic poor relative to non-poor. Household with its heads engaged in agriculture and laborer have significantly high risk of being chronically poor. Gender of household heads do not have significant association with transitory poverty relative to remain non-poor, but has mild significance with chronic poor over non-poor. This suggests that female-headed households have higher risk of being chronic poor relative to remain non-poor compared to their male counterpart.

Landholding significantly reduces the relative risk of being chronic or transitory poor over non-poor. This means, with increase in the landholding, a chance of a household to be transitory poor over non-poor will reduce significantly. The significance is relatively weaker for chronic poor over non poor. This is the reason why though there is slight increase in landholding in 2007 among chronic poor households, they were not able to move out of poverty. Irrigation is another important factor for the rural households, which determine their welfare. Irrigation has negative association with the risk of household being chronic or transitory poor. But the association is significant only in the case of chronic poor, i.e., increase in irrigation coverage will reduce the risk of households being chronic poor relative to remain non-poor.

Dependency ratio based on economically active members shows the increased (higher) risk of transitory and chronic poor in relation to the risk of being non-poor. As discussed in earlier section, dependency ratio based on economically active members is higher than the dependency ratio based on age groups. Therefore, any effort to reduce the dependency ratio based on economically active members through employment generation will also reduce the risk of household being chronic poor and transitory poor relative to the risk of being non-poor, thus, will be helpful in reducing chronic as well as transitory poverty.

The occurrence of climate related natural disasters increases the risk of household being transitory poor over household being non-poor. Occurrence of natural disasters such as hailstorms, landslide, and flood push the households into transitory poverty through damage caused on the standing crops, as well as land assets itself. Therefore, this demands a special program such as insurance packages or humanitarian assistance to deal with transitory poverty during the occurrence of the natural disasters.

Within transitory poverty there are two categories of poor; those who moved into poverty and those who moved out of poverty. Thus, consideration of transitory poverty alone cannot capture the direction of poverty movement. Therefore, it is necessary to disaggregate the categories of poverty within. Table 6 gives the outcome of multinomial logistic regression obtained through dropping and incorporation of variables from the full model. The likelihood ratio test result shows that the final model (Table 6) is nested in full model, i.e., the final model and the full model is not significantly different. Table 6 shows the relationship of non-poor and move-out-of-poverty with several socio-economic and environmental factors taking move-into-poverty as reference.

A chance of OC household to fall under non-poor category is zero that is the reason why value of RRR for dummy for OC household is also zero. This is because none of the households from OC are non-poor. Occupational Castes has negative and significant association in terms of relating probability of moving out of poverty in relation to move-into-poverty, which means OC households have significantly lower probability to move out of poverty in relation to their probability to move out of poverty compared to other caste groups. Education of household heads, which is measured in terms of years of schooling, shows positive significant association with non-poor over move-into-poverty. Therefore, with the increase in education of household heads, probability of households remaining non-poor will increase significantly compared to the probability of households to move into poverty. However, the relation of education with move-out-of-poverty in relation to move-into-poverty is non-significant.

Both the occupation and operational landing holding show negative significant association with non-poor over move-into-poverty. This suggests that probability of being non-poor for the household whose head is engaged in agriculture is significantly low. Consequently, households with their heads engaged have significantly higher chance to fall into chronic poverty. The same holds true for the case of operational

landholding as well. It is mostly rich person who rented out their land for cultivation to the poor mostly on share cropping basis. Under such land tenure arrangement, all costs of the variable inputs except labor are covered by the products and remaining products are shared equally among the land owner and cultivator. Therefore, increase in operational land size can be translated into increase in probability of households to move into poverty and decrease in probability to remain non-poor. Landholding shows positive significant association with non-poor as well move-out-of-poverty over move-into-poverty, i.e., with increase in landholding there will increase in probability of households to remain non-poor and also to move-out-of-poverty. Irrigation coverage shows positive significant relation only with non-poor over move-into-poverty but not with move-out-of-poverty over non-poor. Therefore, limited access of households to irrigation (i.e., decrease in irrigation) will increase the probability of households to move into poverty; thereby reducing the probability of remaining non-poor.

Table 6. Multinomial logistic regression for disaggregated transient poverty

Variables	Non-poor/move-into-poverty			Move-out-of-poverty/move-into-poverty		
	Coef.	**RRR**	**P-value**	**Coef.**	**RRR**	**P-value**
Caste (dummy for OC)	-40.59	0.00	1.00	-3.86	0.02	0.04**
Education of HHH (years of schooling)	0.22	1.25	0.09*	0.06	1.06	0.67
Occupation of HHH (dummy for agriculture)	-2.91	0.05	0.01***	-0.75	0.47	0.49
Operational landholding (ha.)	-2.00	0.13	0.05**	-1.28	0.28	0.21
Total landholding (ha.)	4.16	64.03	0.02**	1.57	4.79	0.03**
Irrigation coverage (%)	0.04	1.04	0.07*	0.03	1.03	0.20
Dependency ratio (economically active members)	1.45	4.26	0.17	3.00	20.18	0.00***
Number of CBOs	-2.45	0.09	0.02**	-2.19	0.11	0.04**
Occurrence of natural disaster (dummy for occurrence)	-4.25	0.01	0.02**	-3.75	0.02	0.03**
Constant	4.00		0.119	3.63		0.142
Number of observation	83.00					
Likelihood ratio $Chi^2(18)$	75.95***					
Log likelihood	-46.57					
McFadden's pseudo R^2	0.45					

Note: ***, ** and * significant at 0.01, 0.05 and 0.1 level of significance level respectively

Dependency ratio based on economically active member shows a significant positive association with move-out-of-poverty over move-into-poverty. Here, decrease in dependency ratio is associated with distressed involvement in any sort of income generating opportunity regardless of types of work and age of the household members.

This suggests that most of the poor households have low dependency ratio. However, the income earned is very nominal, which is not enough even to meet their basic needs. This is the reason why increase in dependency ratio results in increased probability of households to move-out-of-poverty over move-into-poverty.

Most of the CBOs established in the study areas are established with the objective to deal with the problem of poverty reduction, therefore target poor households under such programs. Therefore, negative significant association of number of CBOs, the household is engaged in, with non-poor and move-out-of-poverty over move-into-poverty is revealed. This suggests that increase in number of CBOs involved reflect increased probability of household to move-into-poverty over remain non-poor or move-out-of-poverty. However, access of chronic poor households to such CBOs is less (Table 4). Dummy for occurrence of natural disasters also shows negative significant association with non-poor and move-out-of-poverty over move-into-poverty. Therefore, occurrence of natural disasters will increase the probability of the households to fall into poverty in the study areas.

5. Conclusion

Poverty incidence between the study periods declined sharply. With the better access to infrastructure including motorable road, electricity, communication and relatively developed market, the decline in poverty is significantly higher in Patan. Since the higher proportion of households moved out of poverty in Patan, Melauli, a relatively remote VDC, suffers a higher intensity of chronic poverty. Excessively higher proportions of OC households are chronically poor. Risk of falling them into chronic poverty is also significantly higher compared to remain non-poor. Gender of households, though is not significantly related to transitory poverty, the risk of female-headed households to be chronically poor is significantly high. Households with their head engaged in agriculture and laboring have a higher chance of falling into chronic poverty. Landholding and irrigation coverage, however, reduce the risk of households to fall into chronic poverty. The higher dependency ratio in the study areas is also another important factor that pushes households into chronic poverty. Besides, the occurrence of natural disasters will increase the risk of households to be transitorily poor.

Further, disaggregation of transitory poverty into move into and move-out-of-poverty

suggests that OC households have a higher risk to move into poverty due to their limited socio-economic assets. Increase in years of schooling of households' heads and landholding will help the household move out of poverty. Only an increase in operational land holding through sharecropping will not help households to move out of poverty in the study areas. Secured tenancy right that guarantees full claim over the product they produce from the land they cultivate is necessary for them to move out of poverty. Similarly, an increase in the dependency ratio through the involvement of school age children in education and economically active age members to well defined economic activities in terms of minimum wage and regulated working hours will help households to move out of poverty. In case of involvement in a number of CBOs, it is difficult to establish the relation. It is mainly because households were involved in a higher number of CBOs, which itself was non-functional during the first wave to survey and could not have any impact on poverty. However, considering the success of such CBOs in reducing poverty, access of poor to such CBOs will be helpful in dealing with the problem of chronic poverty in the study areas. Besides, it is occurrence of natural disasters that forces households to move into poverty.

Thus, any poverty reduction program to deal with transitory as well as chronic poverty should focus relatively on remote VDCs like Melauli. Similarly, OC households, whose major occupation is either agriculture or laboring, should be targeted by such programs, which would be effective in moving households out of poverty. Generation of employment opportunities that reduce the dependency ratio based on economically active members to the level of dependency ratio based on economically active age group will significantly reduce risk of being transitory (move into poverty) as well as chronic poor relative to non-poor. Thus, generation of employment opportunities will be very crucial to tackle both transient and chronic poverty. The expansion of irrigation will be helpful in reducing chronic poverty. Such programs targeting chronic poor should focus on the households in Melauli, including female-headed households and households with their heads engaged in laboring. The occurrence of natural disasters is increasing the risk of the households being transitory poor, basically through increased risk of households to move into poverty. Therefore, introduction of some temporary relief program during occurrence of such natural disasters will be very effective in dealing with transient poverty. Besides, the introduction of insurance

scheme against the loss of crop or livestock due to natural disasters would be helpful in dealing with the adverse impact caused by natural disasters.

References

Arif, G. M., & Bilques, F. (2007). Chronic and transitory poverty in rural Pakistan: Evidence from longitudinal household survey. *The Pakistan Development Review, 46*(2), 111-127.

Bhattachan, K. B., Tamrakar, T., Kisan, Y. B., Bagchand, R. B., Sunar, P., Paswan, S., . . . Sonar, C. (2004). *Dalits' empowerment and inclusion for integration in the national mainstream; Strategy for influencing policy and institutions.* Kathmandu: Dalit Empowerment and Inclusion Project.

Central Bureau of Statistics. (2005a). *Summary results of poverty analysis from Nepal Living Standard Survey (2003/04).* Kathmandu, Nepal: Central Bureau of Statistics.

Central Bureau of Statistics. (2005b). *Poverty trends in Nepal (1995/96 and 2003-04).* Kathmandu, Nepal: Central Bureau of Statistics.

Department for International Development and The World Bank. (2006). *Unequal citizens: Gender, caste and ethnic exclusion in Nepal (Summary).* Kathmandu: Department for International Development and The World Bank.

Food and Agriculture Organization & World Food Programme. (2007). *FAO/WFP food security assessment mission to Nepal.* Rome: Food and Agriculture Organization & World Food Program.

Food and Agriculture Organization & World Food Programme. (2007). *FAO/WFP food security assessment to Nepal (Special report).* Rome, Italy: Food and Agriculture Organization of the United Nations and World Food Programme.

Hamilton, L. C. (2009). *Statistics with STATA.* California, USA: Brooks/Cole.

Jalan, J., & Ravallion, M. (1998). *Determinants of transient and chronic poverty.* Washington DC, USA: World Bank (Policy Research Working Paper 1936).

Jalan, J., & Ravallion, M. (2000). Is transient poverty different? Evidence for rural China. In B. Baulch, & J. Hoddinott, *Economic mobility and poverty dynamics in developing countries* (pp. 82-99). London, England: Frank Cass Publishers.

Joshi, N. P., & Maharjan, K. L. (2007). Assessment of food self-sufficiency and food security situation in Nepal. *Journal of International Development and Cooperation, 13*(1), 209-230.

Joshi, N. P., & Maharjan, K. L. (2008). A study in rural poverty using inquality decomposition in Western Hills of Nepal: A case of Gulmi district. *Journal of International Development and Cooperation, 14*(2), 1-7.

Joshi, N. P., Maharjan, K. L., & Piya, L. (2010). Poverty and food insecurity in Nepal: A review. *Journal of International Development and Cooperation, 16*(2), 1-19.

Lanjouw, P., & Prenusshi, G. (1999). Poverty overtime in Nepal: What can be learned from survey data? In G. Prennushi, *Nepal: Poverty at the turn of the twenty-first century (Main report and background studies).* Report No. IDP 174. Kathmandu: World Bank.

Lipton, M., & Ravallion, M. (1995). Poverty and policy. In J. Behrman, & T. N. Srinivasan, *Handbook of Development Economics III* (pp. 2551-2657). Amsterdam: North Holland.

Maharjan, K. L., & Joshi, N. P. (2011). Determinants of Household Food Security in Nepal: A Binary Logistic Regression Analysis. *Journal of Mountain Science, 8*, 403-413.

McCulloch, N., & Baulch, B. (1999). *Distinguishing the chronically from the transitorily poor: Evidence from rural Pakistan.* IDS working paper no. 97. Brighton: Institute of Development Studies, University of Sussex.

McKay, A., & Lawson, D. (2003). Assessing the extent and nature of chronic poverty in low income countries: Issues and Evidence. *World Development, 31*(3), 425-439.

Mendola, D., Busetta, A., & Aassve, A. (2009). What keeps young adults in permanent poverty: A comparative analysis using ECHP. *Social Science Research, 38*, 840-857.

Ministry of Finance . (2010). *Economic survey: Fical Year 2009/10 Vol I.* Kathmandu, Nepal: Ministry of Finance.

Regmi, M. C. (1999). *Land ownership in Nepal.* Delhi, India: Adroit Publishers.

Sen, A. (1999). *Development as freedom.* New York, USA: Anchor Books.

South Asia Alliance for Poverty Eradication. (2003). *Poverty in South Asia 2003.* Kathmandu, Nepal: South Asia Alliance for Poverty Eradication (SAAPE).

StataCorp. (2007). *Stata longitudinal/panel-data reference manual: Release 10.* Texas: Stata Corp LP.

United Nations Development Programme. (2005). *Millenium Development Goals (MDGs) progress report, 2005.* Kathmandu, Nepal: United Nations Development Programme.

United Nations Development Programme. (2005). *Millennium Development Goals (MDGs) progress report, 2005.* Kathmandu, Nepal: United Nations Development Programme.

Wooldridge, J. M. (2002). *Econometric Analysis of Cross Section and Panel Data.* Cambridge, USA: MIT Press.

Wooldridge, J. M. (2002). *Econom*tric analysis of cross section and panel data.* London, England: The MIT Press.

Yaqub, S. (2000). *Poverty dynamics in developing countries.* Brighton, England: Institute of Development Studies.

Appendix 1. Poverty line derivation for the study considering poverty line of Rural Western Hills

Year	Poverty line (based on growth rate)	Consumer price index (CPI) (Hills)	Poverty line (based on CPI)	Poverty line (average)
1995/96	**5403.0**	100	**5403.0**	**5403.0**
1996/97	5750.9	108.6	5867.7	5809.3
1997/98	6121.3	117.3	6337.7	6229.5
1998/99	6515.5	130.8	7067.1	6791.3
1999/2000	6935.0	135.6	7326.5	7130.7
2000/01	7380.6	142.6	7704.7	7542.6
2001/02	***7857.0***	146.2	***7899.2***	***7878.1***
2002/03	8362.9	151.8	8201.8	8282.3
2003/04	8901.5	156.6	8461.1	8681.3
2004/05	9474.7	163.5	8833.9	9154.3
2005/06	10084.9	177.5	9590.3	9837.6
2006/07	10734.3	188.2	10168.4	10451.4
2007/08	***11425.6***	202.2	***10924.9***	***11175.2***

Source: Ministry of Finance (2010); and Central Bureau of Statistics (2005b)