Socio-demographic Determinants of Poverty in Nepal

Tika Ram Aryal*

Abstract

This paper investigates the socio-demographic determinants of poverty in Nepal using Nepal Living Standard Survey data. The household size, number of children, child woman ratio and adult dependency ratio were found to be positively associated with poverty whereas literacy status, labour child ratio and family planning user were negatively associated with poverty risk at household level. Literacy and number of children in the households is the main predictors of poverty. The households belong to rural and back-ward regions are most likely to have higher risk of poverty than urban and better-off counter-part, which indicates that poverty of Nepal is enormously rural in character.

Introduction

Poverty is multifaceted phenomenon and it is widespread and pervasive. It is difficult to define and rarely found the universally accepted definition of poverty because it appears differently in different countries even within the nationalities. Income poverty is only one feature of the deprivation, however, as Sen (1999)- education, health including reproductive health, nutrition, and employment, social and political participation are supplementary elements of the deprivation of capability and empowerment. Poverty is worldwide concerns so that world leaders have agreed with the common agenda of social development and fighting against the poverty in the beginning of the twenty-first century. Chen and Ravillion (2001) pointed out that there have been continuous efforts were made for reducing the proportions of people living extreme poverty in the recent decades.

However, developing countries still have not satisfactory achievements in the reduction of extreme poverty. There are several factors active on poverty, these factors associated with household characteristics or their members, and many different approaches can be discussed while studying poverty and affecting factors as emphasized by Coulumbe and Mckay (1996). Adams and Page (2003) argued that the macro-level remittance can help to reduce poverty incidence. Aryal (2006) finds that the economic crisis hosts the growth of poverty and consequently leading to unemployment and social instability in a country. However, ESCAP (2002) noted that the most of the countries have increased their income inequality with rapid economic development.

* Dr. Aryal is an Associate Professor at the Central Department of Statistics, Tribnhuvan University, Kirtipur, Nepal. E-mail: traryal@gmail.com /traryal@rediffmail.com

A number of practices have been made for achieving the goal of poverty reduction by introducing a variety of projects such as the United Nations millennium development goals. The millennium development goals set targets for making progress in several dimensions, which ranges from halving extreme poverty to putting all children into primary school and stemming the spread of infectious diseases all by 2015 (HDR, 2005; UN, 2001). Most of the countries have made a significant progress on these issues during last decade; however, developing countries still have slower progress on it.

Birdsall et al. (2001) concluded that the linkages of population and macroeconomic growth have a variety of effects on development at the household as well as national levels. The demographic transition theory envisaged that the change from high to low mortality and the fertility can generate a *demographic bonus* for the nations as pointed out by Aryal (2006). Mortality declines first and it is followed by fertility declines which in turn increases the proportion of working age population as compared to the younger and the older dependents that automatically generate one–phase opportunity for growth. Bernstein, (2002) finds that the proportion of labour force continues to increase in an earlier phase in the demographic transition in many countries. The younger dependency has found a stronger effect on economic growth than that of the older dependency (ADB, 1997, 2002).

Aassve et al. (2005) argued that the economic growth contributes for fertility decline along with the great improvements in access to family planning. High fertility hosts the absolute levels of poverty by depressing economic growth and supply of consumption against the poor. However, a number of researchers showed that the fertility and its covariates were directly associated with poverty in most of the countries having of poor socio-demographic profiles (Aryal, 2006; Bigsten et al., 2004; Justino and Litchfield, 2001; Keidir and McKay, 2004; Schoumaker, 2004). Further, Aryal (2006) argues that the mothers who have fewer children are most likely to be more capable and willing to join in remunerative work and are much more likely to invest their additional earnings in the health and education of children.

Coulumbe and Mckay (1996) argued that the socio-demographic variables may be influenced by a household's wellbeing in the long run, but in the short run, the direction of influence is likely to be considered as operating from socio-demographic variables to living standards. Bloom et al. (2001) argued that the large number of children needs more amount of resources to their care and education that host to decline economic growth. Merrick (2001) finds that the most of the people are aware about the advantage of small number of children and larger investment in children's education and health whereas the poor people are still unaware about these benefits. The greater effect of declining fertility among higher fertility experienced countries was mainly due to decline in absolute poverty and the rapid decline in fertility was mainly due to the greater acceptance of family planning methods (Aryal, 2005a; Bernstein, 2002).

Nepal is a mountainous Himalayan country, having population density of 158-persons/ square kilometer of area 147,181 km². Nepal is a multi-ethnic and multi-lingual society. It is predominantly rural with only 14 per cent of her population is living in urban areas and

it is one of the least urbanized countries in the world. The basic amenities of life is highly urban-biased and around 80 per cent of all urban household have access to electricity for lighting whereas less than 10 per cent rural household is enjoying with these facilities. Nepal is one of the poorest countries in the world and the annual per capita income is around US$ 240 (HDR, 2005). The economy and employment depends overwhelmingly on agricultural sector. Agriculture is the main source of economic activity where more than 80 per cent of the nation's labour force involved on it. Over 60 per cent of total household income comes from agriculture.

Nepal has five development regions[#]. Each development region includes the three ecological belts[$]. Several development indicators have persistently shown that the *Eastern, Central* and *Western* development regions are relatively better off than the *Mid-western* and *Far-western* development regions (ICIMOD, 1997; NSAC, 1998).

National Planning Commission conducted the National Survey on Employment, Income and Consumption in 1976/77. NPC (1983) reported that about 33 per cent populations were living below the prescribed national poverty lines in 1983 and 41.4 per cent in 1984 (NRB, 1988). Central Bureau of Statistics has conducted two waves of Nepal Living Standard Survey; one in 1996 and another in 2003/004. These survey data revealed that over 42 per cent populations in Nepal were living below the poverty line in 1996, and 31 per cent were living below the poverty line in 2004.

Chhetry (2003) reported that over 95 per cent of total income poor and education poor reside in rural areas, where agriculture is the main source of income and employment. Indeed, agriculture sector remain poor where its per capita GDP growth rate is eight times lower than that of per capita non-agriculture GDP growth rate. Further he finds that the large household size, with large number of children and more illiterate persons in the households is the major socio-demographic features of the poor in Nepal (Chhetry, 2005). Due to low economic performance and high population growth rate, a large proportion of children go to labour markets as wage earners.

The population growth rate increased from 2.1 in 1971 to 2.6 in 1981 and then it declined to 2.1 in 1991. Inter-censual population growth rate again increased to 2.3 in 2001. There have been about 60 per cent increase in population from 11.6 million in 1971 to 18.5 million in 1991 and in last one decade it increased by about 27 per cent from 18.5 million in 1991 to 23.2 million in 2001(CBS, 2001). The economic growth of a country has not improved markedly over time to over take the growth rate of population (Aryal, 2002).

In spite of the country's adverse socio-economic and geographic conditions, the total fertility rate (TFR), infant mortality rate (IMR) and child mortality rate (CMR) and maternal mortality ratio (MMR) have declined slowly over time. TFR has remained constant and persistently high during 1971 to 1981 at 6.3 and then started declining and reached to 5.6 in 1991, to 4.6 in 1996, to 4.1 in 2001 and to 3.1 births per woman in 2006 (Aryal, 2008, MOHP, 2006). Similarly, IMR declined from 172 in 1971 to 117 in 1981 to 97 in 1991 to

---

[#] Eastern, Central, Midwestern, Western and Far-western.
[$] Mountain, Hill and Tarai

64 in 2001 and to 48 per 1000 live births in 2006 (Aryal, 2004; CBS, 2001; NSAC, 1998; MOHP, 2006). Likewise, MMR declined from 830 in 1991 to 539 in 1996 to 415 in 2001 and to 281 per 100000 live births in 2006(Aryal, 2002, 2004; NPC/MOPE, 2003, MOHP, 2006). The life expectancy at birth has increased from 42 years in 1971 to 63 years in 2008 (Aryal, 2008a, 2008b).

Alemayehu et al. (2001) argued that the fertility was negatively associated with poverty whereas household size was positively associated, with it. Several factors contribute high fertility. Some castes/religions provide psychological and social rewards to couples who have many children, in the form of approval, social status, and blessings (Aryal, 2004a, 2008c, 2009; Lehrer, 2004). Children are still viewed as insurance against old age and they are a key source of labour as well as they are the single most source of living arrangement of elderly persons (Aryal, 2005b, 2006). Further, cultural norms and policies are encouraging for high fertility that in turn to achieve desired family sizes are changing very slowly. Early marriage and early motherhood is universal in Nepal and girls are married at an average age of 16, and 52 per cent of them have begun childbearing before the age 20. Nepal exhibits one of the most varied social, cultural, economic and demographic profiles. High fertility and mortality has still been faced as its feature, and there have been slow changes in fertility rates, mortality rates, age structures, urbanization and migration (Aryal, 2005, 2006).

Several attempts have been made for poverty reduction in Nepal though the progress in achieving the reduction of poverty is very slowly. The expectation is to use all available resources to reduce poverty to a minimum level and also to reduce the gap between poor and non-poor. Poverty is complex problem, which is not solving within a short span of time. Cross-cultural, caste/ethnicity, gender, familial status, age, and place of residence are some but not all of the characteristics that enhance the risk of being poor. Existing socio-demographic variables influence the poverty greatly in a country.

In view of these, it needs to investigate the factors affecting household poverty in Nepal. Socio-demographic factors have strong effect on the living standard of the households and their members. Household size, number of children, fertility behaviours, family planning, dependency and residential status of the household were the main socio-demographic variables that are most likely to affect the living standard of the people (Aryal, 2006). This paper attempts to investigate the socio-demographic determinants of poverty at household level by considering household characteristics. Logistic regression analysis has been carried out to investigate the determinants of poverty. Besides, some policy implications and recommendations have also been traced out for the reduction of poverty.

Methods and Materials

The data are taken from the Nepal Living Standard Survey (NLSS-II). The Central Bureau of Statistics (CBS) conducted the first round of the Nepal Living Standard Survey

(NLSS-I) in 1995/96. The second round NLSS-II was carried out in 2003/04. The survey collected data on the varied areas such as consumption pattern, poverty, income, education, health, employment, economic activities including agriculture and other related topics. The NLSS survey was the only source of comprehensive, integrated, nationally representative household data on consumption, incomes and living standards. In NLSS-II, a total of 3912 households were successfully interviewed. On the basis of the survey results, the poverty line for Nepal was derived.

The human resource of the household is embodied in its members. Therefore the characteristics of the members of the household could have greater influence on poverty outcomes. The analysis of the present study is based on household level data because poverty originates from an individual and/or a group of individuals i.e. households. With this assumptions, the present study considers household as the main unit of analysis and the socio-demographic characteristics within each household as the main concern of this paper. The variables are selected and categorized according to household characteristics. The dependent variable is poverty status[*] and it is dichotomized (1 = poor household and 0 = non-poor household). Independent variables are development region (Eastern, Central, Western, Mid-western, and Far-western), ecological belts (Tarai, hills and mountains), rural/urban, household size (HS), family planning (FP), literacy status (LS), child woman ratio (CWR)[**], labour child ratio (LCR)[***], adult dependency ratio (ADR)[****], children aged 0-14 years (CH0-14) in the household, The categories of the independent variables are presented in Table 1.

Results

Table 1 presents the result of bi-variate percentage distribution of poor and non-poor households by household characteristics. About 23 per cent households were found to be poor as a whole. Higher percentage of poor households was found in the Mid-western region (36.84%) followed by Far-western (32.25%), Eastern (24.11%), Central (19.20%) and Western (18.33%) development region. About 27 per cent households were found to be poor in the Mountain belt whereas about 24 and 21 per cent households were in the Hill and Tarai respectively. About 30 per cent households were found to be poor in the rural area whereas only 7 per cent were in the urban areas. The variation in poor and non poor households in the regions may be due to the unequal distribution of development budget, low quality service, low level of literacy, lack of opportunities, rural dominated society, etc. This is indicative that poverty incidence is widespread and pervasive in rural as well as in the Mountain region.

---

[*] A household is considered as poor (non-poor) if per capita household consumption/expenditure of the household members' falls below (above) the poverty line and nationally prescribed poverty line for Nepal are used.

[**] Defined by the ratio of children aged 0 to 4 years to reproductive women aged 15 to 49 years in the household.

[***] Defined by the ratio of productive labour workers to children aged 0 to14 years in the household.

[****] Defined by the ratio of the members of unproductive labour aged 15 + years, to the members aged 15-64 years in the household.

Literacy status of the household showed a large difference between poor and non poor households. The percentage of poor households was found to be decreased with the increases of literacy status. More than 54 per cent poor households were in the illiterate category whereas only 3 per cent were in highly literate category. This suggests that literacy status of the households is strongly associated with the poverty.

The percentage of the poor households was found to be increased with the increases of household size and number of children of age 0-14 years in the household. About 57 per cent households were found to be poor with 6 and more children in the household whereas only 14 per cent households were with at least 2 children. Similarly, about 40 per cent households were found to be poor with family size 8 and more members whereas only 7 per cent households were with family size at least 3 members in the household.

Child woman ratio was found to be increased with the increased percentage of poor household. About 46 per cent poor households were found with child woman ratio 3 and more while 17 per cent were with child woman ratio at least 1 category. Labour child ratio was found to be increased with the decreased percentage of poor household. About 42 per cent poor households were found with labour child ratio at least 1 category whereas 9 per cent were with labour child ratio 3 and more category. About 27 per cent poor households were found with family planning non-users whereas about 18 per cent were with users' category. The adult dependency ratio was found to be increased with the increased percentage of poor household.

These results suggest that the poor households are overwhelmingly varied with household characteristics. The question is that whether these differentials are really exist or not in the populations. To answer this question, we have applied multivariate analysis. To estimate the predictability of socio-demographic determinants on poverty, logistics regression analyses were conducted to examine the effect of each category of variable entering in the model while controlling for the effects of the other variables. Inter-correlations among study variables and variance inflation factors were assumed to determine multi-co-linearity. The correlation coefficients are presented in Table 2.

While applying logistic regression analysis, insignificant variables are excluded. The poverty status variable was found to be significantly correlated with all the explanatory variables included in the analysis. However, within the explanatory variables, the variables such as development region, ecological belt and rural-urban were found to be insignificant. Likewise, adult dependency ratio was found to be insignificant with the development region, ecological belt and family planning variables. Literacy status and child woman ratio variables were also found to be insignificant with ecological belt. Therefore we take different regression models to obtain the best predictors of poverty at household level. We considered four regression models by taking exclusively significant explanatory variables in the model. The first model considers the explanatory variables like household size, number of children age 0-14 years, adult dependency ratio and rural-urban status of the household. Similarly, household size, family planning, development region and child woman ratio variables are considered in the second model. The third model considers the variables

Table 1. Socio-demographic Characteristics of Poor and Non-poor Household

Variables	Categorical Variables	Percentage of Households		
		Poor	Non-poor	Total
Development region	Eastern	23.98 (24.11)	22.71 (75.89)	23.01
	Central	31.82 (19.20)	40.31 (80.80)	38.34
	Western	15.80 (18.33)	21.18 (81.67)	19.94
	Mid-western	18.56 (36.84)	9.58 (63.16)	11.66
	Far-western	9.83 (32.25)	6.22 (67.75)	7.06
Ecological region	Tarai	38.45 (21.32)	42.70 (78.68)	41.72
	Hill	50.06 (23.89)	47.99 (76.11)	48.47
	Mountain	11.49 (27.08)	9.31 (72.92)	9.82
Urban/Rural status	Urban	9.39 (7.30)	35.88 (92.70)	29.75
	Rural	90.61 (29.84)	64.12 (70.16)	70.25
Literacy status of household members	Illiterate	32.15 (39.92)	14.57 (60.08)	18.63
	Up to 25 % literate	20.88 (53.69)	5.42 (46.31)	9.00
	25 to 50 % literate	34.48 (26.33)	29.03 (73.67)	30.29
	50 to 75 % literate	9.50 (13.69)	18.02 (86.31)	16.05
	75 % and all literate	2.98 (2.65)	32.96 (97.35)	26.02
Household size	Up to 3 members	10.06 (9.69)	28.20 (90.31)	24.00
	4 to 5 members	31.38 (19.47)	39.08 (80.53)	37.30
	6 to 7 members	34.03 (31.92)	21.85(68.08)	24.67
	8 and more members	24.53 (40.44)	10.87 (59.56)	14.03
No. of children 0-14 years	Up to 2 children	39.12 (13.60)	74.79 (86.40)	66.54
	3 to 5 children	54.03 (40.72)	23.68 (59.28)	30.70
	6 and more children	6.85 (57.41)	1.53 (42.59)	2.76
Child woman ratio in the household	less than 1	42.66 (16.74)	68.96 (83.26)	62.51
	lies 1 & 2	36.66 (33.84)	23.29 (66.16)	26.57
	lies 2 & 3	18.57 (46.47)	6.95 (53.53)	9.80
	3 & more	2.12 (46.15)	0.80 (53.85)	1.12
Labour child ratio in the household	less than 1	42.32 (41.86)	17.69 (58.14)	23.39
	lies 1 & 2	35.47 (28.23)	27.14 (71.77)	29.06
	lies 2 & 3	8.29 (14.45)	14.77 (85.55)	13.27
	3 & more	13.92 (9.40)	40.41 (90.60)	34.28
Family planning	Non users	65.30 (27.20)	52.61 (72.80)	55.55
	Users	34.70 (18.06)	47.39(81.94)	44.45
Adult dependency ratio	less than 1	55.91 (16.76)	79.65 (83.24)	74.16
	lies 1 & 2	35.69 (39.53)	16.43 (60.47)	20.88
	2 & more	8.40 (39.18)	3.92 (60.82)	4.96

Note: Figures in Parenthesis indicates the row percentage of the household.

like household size, ecological region, number of children age 0-14 years, labour child ratio and family planning status in the household. Likewise, fourth model considers the variables like household size, number of children age 0-14 years, labour child ratio, development region, literacy and family planning status of the household. These variables included in the models have statistically significant correlations with each other. Table 3 displays the estimated regression coefficients, standard errors and relative risks of logistic regression models. A relative risk of 1.000 indicates the base line or reference category for each variable. The relative risk greater (or less) than 1.000, indicates high (or low) risk of being poor in that category than that of the reference category.

Model I displays the β-coefficients for all variable categories included in the model. This model suggests that household size, number of children age 0-14 years, adult dependency ratio and rural/urban status of the households were found positively associated with poverty risk. The increased poverty risk was found with the increased family size of the household. For instance, about three times higher risk of being poor was found with the household of family size six and more members as compared to at least 3 members' category. The increased risk of poverty in the household was found with the increased number of children age 0-14 years. At least three times higher risk of being poor was found with household of six and more children as compared to at least 2 children category. The increased adult dependency ratio was found with the increased risk of poverty in the household. More than four times more risk of being poor was found among rural household

Table 2. Correlation Coefficients

Variables	PS	Eco-R	Dev-R	R/U	Literacy	ADR	CH0-14	CWR	HS	LCR	FP
PS	1.000	.042*	.096*	.244*	-.356*	.230*	.323*	.243*	.247*	-.300*	-.108*
Eco-R		1.000	.052	.021	.026	.006	-.082*	-.001	.089*	.046*	-.046*
Dev-R			1.000	.012	-.097*	.001	.066*	.067*	.078*	-.057*	.056*
R/U				1.000	-.385*	.158*	.180*	.148*	.103*	-.201*	-.150*
Literacy					1.000	-.224*	-.159*	-.420*	.030*	.198*	.276*
ADR						1.000	.517*	.408*	.185*	-.740*	.016
CH0-14							1.000	.323*	.604*	-.677*	.074*
CWR								1.000	.135*	-.451*	-.095*
HS									1.000	-.347*	.194*
LCR										1.000	-.124*
FP											1.000

*Correlation is significant at the 0.01 level (1-tailed). PS=poverty status, Eco-R=Ecological region, Dev-R=Development region, R/U=Rural and Urban, ADR=Adult dependency ratio, Ch0-14=Number of children age 0-14 years, CWR= Child woman ratio, HS= Household size, LCR= Labour child ratio and FP=Family planning.

as compared to the urban.

The results of Model II suggest that family planning users' household was negatively associated with poverty risk. About 54 per cent less risk of being poor was found among family planning users' household as compared to the non-users. Child woman ratio was positively associated with the poverty risk. About three times higher risk of being poor was found among the household of child woman ratio at least two as compared to less than one category. The household belonging in the *Central* and *Western* regions showed a negative association with poverty risk whereas the *Mid-* and *Far-western* regions showed positive association with poverty risk as compared to the household belonging in the *Eastern* development region. For instance, about 25 and 14 per cent less risk of being poor was found for those households belonging in the *Central* and *Western* regions respectively as compared to the *Eastern* development region. Similarly, about two times more risk of being poor was found for those households belonging in the *Far* and *Mid-western* regions as compared to the *Eastern* development region.

Model III suggests that labour child ratio was found to be negatively associated with poverty risk. The decreased risk of being poor was found with the increased labour child ratio in the household. About 31, 64 and 75 per cent less risk of being poor was found for the household of labour child ratio categories of 'lies 1 and 2', 'lies 2 and 3' and '3 and more' respectively as compared to labour child ratio of less than 1 category. About two times higher risk of being poor was found for those household belonging to Hill and Mountain regions as compared to Tarai region. Model IV suggests that the literacy status of the household was found to be negatively associated with poverty risk. An increased level of literacy status of the household members was found with the decreased risk of poverty in that household. For instance, 27, 63, 84 and 96 per cent less risk of being poor was found with the household of literacy categories of 'at least 25 percent literate members', '25 to 50 percent literate members', '50 to 75 percent literate members', and '75 percent and more literate members' respectively as compared to the illiterate category. These results indicate that the larger family size with larger number of children, lower level of educational attainment and residing in rural and remote areas are the main determinants of poverty at household level. However, child woman ratio, adult dependency ratio and labour child ratio are also found the predictors of poverty at household level.

Table 3. Logistic Regression Analysis of Poor and Non-poor Household by Household Characteristics

Variables & Categories	Model I		Model II		Model III		Model IV	
	B Coefficients	Relative risk	B Coefficients	Relative risk	B Coefficients	Relative risk	B Coefficients	Relative risk
Household size (ref.=at least 3 members)								
4-5 members	.496(.143)*	1.643	.972(.167)*	2.642	.481(.142)*	1.618	.904(.154)*	2.470
6-7 members	.795(.151)*	2.215	1.676(.170)*	5.345	1.053(.156)*	2.866	1.481(.174)*	4.398
8 and more	.975(.185)*	2.652	2.030(.179)*	7.614	1.190(.194)*	3.286	1.699(.2160*	5.470
Ecological region (ref.=Tarai)								
Hill					.434(.090)*	1.543		
Mountain					.385(.142)*	1.470		
Number of children age 0-14 years (ref.=up to 2 children)								
3-5 children	.698(.120)*	2.009			.377(.150)*	1.457	.329(.164)**	1.389
6 and more	1.079(.265)*	2.941			.798(.293)*	2.221	.317(.311)	1.372
Labour child ratio (ref.=less than one)								
lies 1 & 2					-.375(.122)*	.687	-.205(.132)	.815
lies 2 & 3					-1.025(.194)*	.359	-.702(.210)*	.496
3 and more					-1.415(.172)*	.243	-.860(.185)*	.423
Family planning methods (ref.=non-users)								
Users			-.769(.088)*	.463	-.886(.087)*	.412	-.450(.097)*	.638
Adult dependency ratio (ref. =less than one)								
lies 1 & 2	.510(.108)*	1.665						
2 and more	.846(.151)*	2.330						
Rural-Urban (ref.=urban)								
Rural	1.473(.124)*	4.363						
Development region (reference category= Eastern)								
Central			-.283(.114)**	.753			-.360(.119)*	.697
Western			-.149(.136)	.861			.139(.141)*	1.149
Mid-western			.727(.140)*	2.069			.700(.147)	2.014
Far-western			.466(.168)*	1.593			.348(.175)**	1.416
Literacy status (ref.= illiterate)								
Up to 25%							-.334(.150)**	.716
25 to 50%							-1.00(.119)*	.368
50 to 75%							-1.821(.160)*	.162
75%& more							-3.305(.223)*	.037
Child woman ratio (ref.=less than one)								
Lies between 1&2			.868(.096)*	2.381				
between 2&3			1.254(.130)*	3.506				
3 and more			.965(.340)*	2.625				
-2 Log likelihood	3584.676		3335.937		3609.675		3146.380	
Model X²	647.246		529.995		622.247		1085.642	
D.f.	8		11		11		17	

* and ** refer significant at 1 and 5 per cent level and ref.=reference category. Parenthesis indicates estimated error.

Finally, the predictability power of the used model has been computed and presented in Table 4. For this purpose, a classification table of correct and incorrect predictions by the model was constructed based on the predicted probability of being poor household and non-poor household. Here we assumed that a probability equal or greater than 0.5 was interpreted as a prediction of household being poor whereas as a probability less than 0.5 was interpreted as a prediction of household being non-poor. The model's sensitivity and specificity rate was defined as the per cent of poor and non-poor households correctly predicted respectively by the model. The sensitivity rate was found to be 46 per cent while the specificity rate was 92 per cent. About 8 per cent households are classified as poor by the model, in fact, these household are non-poor. Similarly 15 per cent are classified as non-poor by the model, in fact, these households are poor. The positive predictive power of the model is 64.6 per cent, which means that 65 per cent of the household predicted poor households are in fact poor. Similarly, the predictive rate is 85 per cent, meaning that 85 per cent of the households predicted non-poor households are in fact non-poor. As a whole, the model correctly predicts 82 per cent of the cases. This indicates that the used model may predict poverty determinants reasonably well for Nepal.

Table 4. Correct and Incorrect Predictions of Poor and Non-poor Households by the Model

Observed and predicted households		Observed number of households		
		Poor	Non-poor	Total
Predicted number of households by the model	Poor	419	230	649
	Non-poor	486	2777	3263
Total		905	3007	3912
Sensitivity of the model			46.30	
Specificity of the model			92.35	
Positive predictive power			64.56	
Negative predictive power			85.11	
False rate for poor in terms of true cases			7.65	
False rate for non-poor in terms of true cases			53.70	
False rate for poor in terms of predicted cases			35.44	
False rate for non-poor in terms of predicted cases			14.89	
Correctly classified power of the model			81.70	

Discussion

This study attempts to investigate the determinants of poverty in Nepal. The socio-demographic determinants of poverty are identified by using multivariate analysis. Such analysis provides the poverty profile by attempting to infer the causality of specific household characteristics on household welfare. It also attempts to answer the question of how a particular covariate affects poverty conditional on the level of other potential determinants of poverty. It goes beyond the poverty profile of evaluating cause and effect association of the household characteristics and poverty status at the household level. It is believed that the results of these exercises should be of particular interest to policy makers since it provides a means to assess the likely impact on the risk of poverty at household level in Nepal of a range of specific government policies/programs aimed at improving the welfare of the people. The determinants of poverty at household level are an important input into the design of economic policy and poverty reduction programs in developing countries (Aryal, 2006; Sahn and Stifel, 2003).

Money metric of utility as measured from income or consumption expenditures is the ideal indicator of poverty and wellbeing of the household members (Coulumbe and Mckay, 1996; Samuelson, 1974; Sahn and Stifel, 2003). However, the aggregate consumption expenditure is usually considered as the measure of living standard in the developing countries while income is generally used as the measure of choice in developed countries. In view of this, the present study considers the former measure of living standard at household level. Within this approach, the determinants of poverty are then identified as those factors, mostly household characteristics, which lead to households having low income level relative to their needs and so that the household consumption is appropriate to measure the living standard at household level. We focus on the socio-demographic correlates of living standards, and consequently poverty.

This study revealed that the larger family sizes in the household are likely to have higher risk of poverty. A large number of potential labour workers in the household are likely to have less risk of poverty. This study supports the fact that the fertility covariates and poverty are positively associated where a number of researchers showed that level of fertility was directly related with poverty in most of the countries (Bigsten et al., 2004; Justino and Litchfield, 2001; Keidir and McKay, 2004; Schoumaker, 2004). A small number of children under age 14 years in the household will have lesser risk of being poor. Child woman ratio is positively associated with poverty.

Majority of the households have had lower labour child ratio, which is negatively associated with poverty risk. The households with very few numbers of labour forces are likely to have less economic activity that host the growth of poverty at the household. These findings are consistent with the finding of Aryal (2006). Economic growth undoubtedly had an important contributing factor for declining fertility along with the improvements in access to family planning (Aassve et al., 2005; Aryal, 2002). The consistent finding of this study is that the contraceptive users are likely to have less poverty risk due to its indirect effect for limiting the family size in the household.

The residential status of the household is overwhelmingly varied in terms of poverty risk. Far and Mid-western, Mountain regions are likely to have a higher risk of poverty where rural households are mostly vulnerable by the acute poverty than urban. Poverty incidence is unexpectedly higher in the rural and remote regions. The rural poverty is widespread and pervasive in Nepal. A study reported that the proportion of the poor in the rural is almost two folds than in the urban, and poverty is entirely land based (Sharma and Sharma, 2004). However, Human Development Index (HDI) of Nepal improved very slowly as from 0.403 in 1996 to 0.471 in 2001. Indeed, the regional HDI is largely varied with very low in the Mountain belt followed by Tarai and Hill belts. Similarly, HDI is very low for the Far and Mid-western regions followed by Eastern, Central and Western development regions (HDR, 2005). This may perhaps be due to socio-political conflicts, geographical complexities and poor performance of the plan on physical linkages to rural and remote areas.

Nepal is hardly alone among the numerous countries worldwide that have allowed both historical and contemporary factors to perpetuate the gaps between its haves and have-nots (HDR, 2005). The economic growth rate is unfavorable to support the reduction of poverty and maintain the better quality of life (Aryal, 2006). Further, macroeconomic policies of Nepal have been largely ineffective in providing pro-poor growth and ensuring equitable income distribution. The income distribution of Nepal is heavily biased and largely centralized in the urban sectors and a large amount of national income goes to few high profiled people that results increased income inequality among poor and rich people (Aryal, 2006). The rural poverty is preoccupied primarily by securing certain activities that resulted environmental degradation (Devkota, 2004). Due to its multiplier effects, the poverty creates conflict, social fragmentation, national crisis, insecurity and high migration rates in the country.

On view of these discussions, this paper concludes that the poverty is likely to be higher among households who have larger family size, larger number of children, larger adult dependency ratio, larger child woman ratio, lower labour child ratio, low practice of family planning, low level of education and residing in rural and backward regions. Such a poverty of the households is termed as demographic poverty trap. This means that without the break out of such demographic poverty trap, it is almost impossible to break out of income poverty in the household. Despite the high population growth, the rigid demographic factor challenges distribution system along with national development strategies and polices. In this premises, poverty does not favor positively with the poverty reduction plan effort.

On view of these, the poverty reduction design should be formulated by considering the core disadvantaged groups those who are living within the demographic poverty trap. The present design is entirely based on the investment approach as investing to the poor especially through two different routes. The first route is investing to the poor households those who are living within the demographic poverty trap. The second route is investing to the rural areas for urbanization. These two routes may be appropriate for the reduction of poverty if these routes are properly implemented. The investment in household level should

be made according to the specific needs of the household and their members. For instance, an investment in the household level helps to educate the members of the household. If they are educated, then they will know the disadvantage of large number of children. They themselves will know the benefit of small family size. They will be motivated to use family planning methods. They are willingly to decide their golden family size. Gender inequality will be reduced and women are willing to participate in income-generating activities. Finally, the economic growth of the household will be grown up. Definitely they will invest to their children for their education and health. The investment at household level should create employment opportunities and public awareness, which have a multiplier effects for poverty reduction.

The second route is investing to the rural areas for urbanization. In this route government should formulate plan to develop the infrastructure at rural areas for urbanization. For instance, investment in roads, transportations, and other services in the rural areas definitely help people to involve in more economic activities. For combining both routes, poverty will be reduced in a country. The present strategic model may be applicable for poverty reduction at household level if it is implemented properly. Thus the government should invest to those people who are living within the demographic poverty trap and to invest in the rural areas for urbanization so that poverty will be reduced.

References

Aassve, A., H. Engelhardt, F. Francavilla, A. Kedir, J. Kim, F. Mealli, L. Mencarini, S. Pundey and A. Prskawetz (2005). *Poverty and Fertility in Less Development Countries: A Comparative Analysis*, Working Paper 05/28, Department of Economics, University of Leicester.

Adams H.J.R. and J. Page (2003). *International Migration, Remittances and Poverty in Developing Countries*, Working Paper 3179, Poverty Reduction Group: World Bank Policy Research.

ADB (1997). *Emerging Asia*, Asian Development Bank, Manila.

ADB (2002). *Key Indicators*, Asian Development Bank, Manila.

Alemayehu, G., N. Jong, G. Mwabu and M.S. Kimenyi (2001). *Determinants of Poverty in Kenya: A Household Level Analysis*, Working paper, ORPAS- Institute of Social Studies, The Netherlands, Hague.

Aryal, T. R. (2002). *Some Demographic Models and their Applications with Reference to Nepal*, Unpublished Ph. D. Dissertation, Banaras Hindu University, India.

Aryal, T.R. (2004). "Age at Menarche: Differentials and Determinants", *Journal of Nepal Medical Association*, 43(152):71-75.

Aryal, T.R. (2004a). "Some Techniques to Estimate Child Mortality in Nepal", *Journal of Institute of Science and Technology*, 13:48-61.

Aryal, T.R. (2005). "Measures of Fertility from Open Birth Interval Statistics and their Projections: Methodological Aspects", *Nepalese Journal of Development and Rural Studies*, 1(2):111-118.

Aryal, T.R. (2005a). "Impact of Family Planning Programs on Fertility: Alternative Methodological Perspectives", *The Economic Journal of Nepal*, 28(1):38-44.

Aryal, T.R. (2005b). "Testing the Suitability of Bongaarts Technique in the Context of Fertility Performance in Nepal", *Vision of ECOSS*, 3(2):19-24.

Aryal, T.R. (2006). "Linkages of Poverty and Socio-demographic Variables in Nepal", *Nepalese Journal of Development and Rural Studies*, 3(1):109-124.

Aryal, T.R. (2008). "Elderly Population of Nepal: Status and Emerging Issues", *Nepalese Journal of Development and Rural Studies*, 5 (2): 88-105.

Aryal, T.R. (2008a). "Ageing Dynamics of Nepal", *Nepalese Journal of Development and Rural Studies*, 5 (1): 102-114.

Aryal, T.R. (2008b). "Mathematical Model for Describing the Distribution of Female Age at Marriage in Nepal", *Nepali Mathematical Sciences Report*, 28 (1&2): 21-30.

Aryal, T.R. (2008c). "An Indirect Technique to Estimate the Duration of Post-partum Amenorrhea", Nepal *Journal of Science and Technology*, 8:137-142.

Aryal, T.R. (2009). "Estimation of the Duration of Post-partum Amenorrhea among Nepalese Mothers: Some Indirect Techniques", *Nepal Journal of Science and Technology, 10*: 137-142.

Bernstein, S. (2002). "Population and Poverty Some Perspective on Asia and the Pacific", *Asia-Pacific Population Journal*, 17(4):31-48.

Bigsten, A., B. Kebede and A. Shimeles (2004). "Growth and Poverty Reduction in Ethiopia: Evidence from Household Panel Survey", *World Development*, 31(1):87-106.

Birdsall, N., A.C. Kelley and S.W. Sinding (2001). *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*, New York, Oxford University Press.

Bloom, D., D. Canning and J. Sevilla (2001). Economic Growth and the Demographic Transition, Working Paper 8685 (http://www.nber.org/papers/w8685) National Bureau of Economic Research, Massachusetts.

CBS (1996). *Nepal Living Standard Survey Report 1996*, Central Bureau of Statistics, Government of Nepal, Kathmandu.

CBS (2001). *Population Census of Nepal 2001: Population Report*, Central Bureau of Statistics, Government of Nepal, Kathmandu.

CBS (2004). *Statistical Pocket Book*, Central Bureau of Statistics, Government of Nepal,

Kathmandu.

Chen, S. and M. Ravallion (2001). *How did the World's Poorest Fare in the 1990s*, Policy Research Working Paper, Washington DC, World Bank, New York.

Chhetry, D. (2003). "Understanding Rural Poverty", *Defining an Agenda for Poverty Reduction: Proceeding of the first Asia and Pacific Forum on poverty*, 1: 293-314.

Chhetry, D. (2005). *Poverty and Reproductive Health: Linkages and Consequences*, Working paper UNFPA, Kathmandu, Nepal.

Coulumbe, H. and A. Mckay (1996). 'Modeling determinants of poverty in Mauritania', *World Development*, 24 (6):1015-1031.

Devkota, F.R. (2004). "Anthropological Knowledge in Solving Rural Problems", *Nepalese Journal of Development and Rural Studies*, 2(1):1-7.

ESCAP (2002). *Policy Issues for the Economic and Social Commission of Asia and the Pacific (ESCAP) Region: Sustainable Social Development in a Period of Rapid Globalization: Challenges, Opportunities and Policy Options*, Note by the secretariat, submitted to the Commission at its fifty-eight session in 2002 (E/ESCAP/I233).

HDR (2005). *Human Development Report 2005*, United Nations, New York.

ICIMOD (1997). *Districts of Nepal-Indicators of Development*, International Centre for Integrated Mountain Development, Kathmandu, Nepal.

Justino, P. and J. Litchfield (2001). *Welfare in Vietnam During the 1990s: Poverty, Inequality and Poverty Dynamics*, Working Paper 8, PRUS.

Keidir, A. and A. McKay (2004). *Chronic Poverty in Urban Ethiopia: Panel Data Evidence*, mimeo. University of Leicester, UK.

Lehrer, E.L. (2004). "Religion as a Determinant of Economic and Demographic Behaviour in the United States", *Population and Development Review*, 30(4).

Merrick, T. (2001). "Population and Poverty in Households: A Review of Reviews", In: N Birdsall, AC Kelley, SW Sinding (eds.) *Population Matters: Demographic Change, Economic Growth, and Poverty in the Developing World*, New York, Oxford University Press.

MOH, New Era and ORC Macro (2002). *Nepal Demographic and Health Survey 2001*, Calverton, Maryland, USA; Family Health Division, Ministry of Health; New Era and ORC Macro.

MOHP, New Era and ORC Macro (2006). *Nepal Demographic and Health Survey Report 2006*, Calverton, Maryland, USA; Family Health Division, Ministry of Health and Population, New Era and ORC Macro.

Nepal South Asia Centre (1998). *Nepal Human Development Report 1998*, Nepal South Asia Centre, Kathmandu.

NPC (1983). *Sixth Plan,* National Planning Commission, Kathmandu.

NPC (1997). *Ninth Plan,* National Planning Commission, Kathmandu.

NPC (2002). *Tenth Plan,* National Planning Commission, Kathmandu.

NPC/MoPE (2003). *Sustainable Development Agenda for Nepal,* National Planning Commission/Ministry of Population and Environment, Kathmandu.

NRB (1988). *Multipurpose Household Budget Survey Report,* Nepal Rastra Bank, Kathmandu.

Sahn, D.E. and D. Stifel. (2003). "Exploring Alternative Measures of Welfare in the Absence of Expenditure Data", *Review of Income and Wealth,* 49(4):463-489.

Samuelson, P.A. (1974). "Complementarity- An Easy on the 40th Anniversary of the Hicks-Allen Revolution in Demand Theory", *Journal of Economic Literature,* 15:24-55.

Schoumaker, B. (2004). *Poverty and Fertility in Sub-Sarahan Africa: Evidence from 25 Countries,* Paper presented at the Population Association of America, Boston.

Sen, A. (1999). *Development as Freedom,* Oxford, Oxford University Press.

Sharma, S. and R.K. Sharma (2004). "Sources of Credit of Rural Nepal", *Nepalese Journal of Development and Rural Studies,* 1(2):82-100.

UN (2001). *Roadmap Towards the Implementation of the United Nations Millennium Declaration: Report of the Secretary-General,* submitted to the General Assembly at its 56th session (A/56/150), United Nations.

UNDP (2004). *Nepal Human Development Report: Empowerment and Poverty Reduction,* United Nations Development Programme, Kathmandu.