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Spatial Variation of Caste/Ethnic Poverty in Mountain Districts of Nepal: An Approximation through Small Area Estimation Technique



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Abstract

Nepal is a multi-ethnic and multi-cultural society where economic condition of various caste/ethnic groups substantially varies. However, adequate attention has not been paid to estimate the level of monetary poverty of various caste/ethnicities and assess how people of the same caste/ethnicity living in different locations (districts) vary in terms of monetary poverty. Focusing only on mountain belt, which is one of the economically poorest areas of the country, this study aims to estimate incidence of monetary poverty for major caste/ethnicities living in the mountain districts with the help of small area estimation (SAE) technique and assess spatial variation in the incidence of monetary poverty of the same caste/ethnic group living along the east-west continuum of the mountain districts. Required data for SAE is derived from Nepal Living Standard Survey (2010/11) and 2011 population census of Nepal. The study shows that, compared to other districts, three eastern mountain districts (Province 1) (Taplejung, Sankhuwasabha, and Solukhumbu) have lowest incidence of poverty for all the caste/ethnicities with much lower incidence in three socioeconomically advanced hill caste groups. Incidence of poverty tends to increase sharply along the east to west continuum of mountain districts with exceptionally high poverty rates for Dalits in the far western mountain districts (Province 7). Some culturally similar caste/ethnic groups follow almost similar pattern of increase in the incidence of poverty along the east-west continuum of the mountain districts and form districts of clusters in each region with similar level of poverty.

Keywords: *Caste/Ethnic Poverty; Small Area Estimation; Mountain Poverty; Poverty in Nepal; Spatial Variation in Poverty*

Introduction

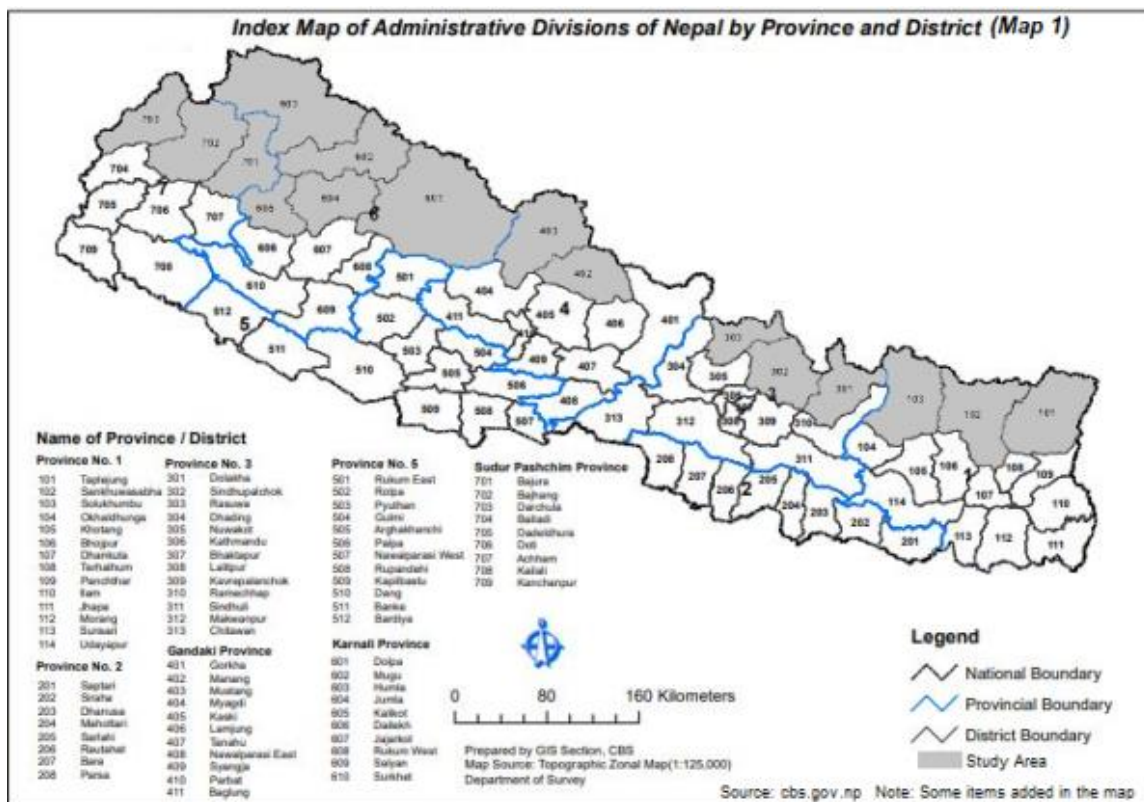
Based on the topographic and climatic conditions, Nepal is divided into three ecological belts - mountain, hills and

Tarai (plain). There are 77 districts in Nepal, of which, 16 districts are in the mountain belt (Map 1). Mountain belt consists of 35 percent (51,817 sq. km.) of the total area of Nepal (147,181 sq.

km.) in which 6.7 percent (or 1,781,792) of the country's population reside. Ecological belts of Nepal are primarily a horizontal divide of the country's land based on the climatic conditions of the districts. The landscape of the mountain belt is composed of rugged terrain with cold mountain climate where pastoral economy still widely prevails.

Mountain belt of Nepal is a multi-ethnic, multi-cultural society. Population census of Nepal 2011 identified 125 caste/ethnic groups in Nepal, of them, 122 are found in the mountain belt (except caste/ethnic groups classified as "Others") (Central Bureau of Statistics [CBS], 2014). The same source shows that 95 percent of the total population residing in the mountain belt is from 20 caste/ethnic

groups. They are: Chhetree, Tamang, Brahman – Hill, Kami, Thakuri, Newar, Limbu, Sherpa, Rai, Damai/Dholi, Sarki, Gurung, Magar, Sanyasi/Dashnami, Thami, Dalit Others, Kulung, Gharti/Bhujel, Lohar, and Yakkha. Chhetree with 36 percent of the total mountain population appears to be the largest caste group in the mountain belt. This is followed by Tamang (12%), Brahman (10%), Kami (7%) and Thakuri (5%). These five caste/ethnic groups accounted for nearly 70 percent of the total mountain population. Although Chhetree caste in mountain belt, like the country as a whole, deserves first position in terms of population size, its relative share in mountain belt (36%) is more than 2 times higher than that of national population (17%).



A classification of caste/ethnic groups by districts shows that highest number of 99 caste/ethnic groups are in Sankhuwasabha district and lowest number of 36 in Dolpa. Not all the caste/ethnic groups found in mountain districts are distinct groups meaning that many caste/ethnic groups found in one district are also found in other districts. For example, caste groups like Brahmin-Hill, Chhetree, Sanyasi/Dasnami, Damai/Dholi, Kami, Sarki are found in almost all the districts. On the other hand, many ethnic groups like

Jirel, Majhi, Yakhha, Bhote, Dolpo are found only in few districts. The population census of Nepal 2011 shows that population size of various caste/ethnic groups greatly varies across the districts. For example, of the 71 caste/ethnic groups found in Taplejung district, 52 have population size of 260 or less, and 37 have population size even less than 10. Nineteen caste/ethnic groups with population size above 260 accounted for 99 percent of the total population in the district. The distribution of population by

caste/ethnic groups in other mountain districts also follow more or less similar pattern.

In terms of population size, there is a predominance of Chhetree population in four of the far western mountain districts - Jumla (60%), Bajura (58%), Bajhang (67%) and Darchula (65%). These four districts accounted for nearly 60 percent of the total Chhetree population (56%) of the mountain belt. Nearly 80 percent of the Tamang population (77%) belongs to 3 districts – Sindhupalchowk (48%), Dolakha (15%) and Rasuwa (14%). Brahman-Hill and Kami population, on the other hand, show more uniform distribution of population across the mountain districts with the highest 17 percent of Brahman in Sindhupalchok and 20 percent of Kami population in Kalikot. Compared to this, 50 percent of the Thakuri population is concentrated in two districts with the highest 39 percent in Kalikot and 11 percent in Humla district.

Caste/Ethnic Poverty in Mountain Districts

Various rounds of Nepal Living Standard Survey (NLSS) conducted by CBS are the main sources of data for estimating poverty level in Nepal. The

first round of the NLSS was conducted in 1995/96, second round in 2002/2003 and third round in 2010/11. Currently, fourth round of the NLSS is underway. Available estimates on poverty indicate that over the years there has been significant decline in the level of poverty in Nepal. It declined from 42 percent in 1995/96 to 31 percent in 2003/2004 (CBS, 2005). The last round of NLSS 2010/11 indicated further decline of incidence of poverty to 25.2 percent (CBS, 2010/11). Considering caste/ethnicities, hill Dalits have the highest rate of poverty (44%) being lowest for Newars (10%).

The estimates of the poverty rates from the NLSS 2010/11 represents percent of the population living below poverty line. This round of NLSS defined population below poverty line in terms of those having annual per capita consumption less than Rs. 19,261 (US\$258 as per August 1, 2010 which approximately represents mid-period of the NLSS 2010/11 survey). Since NLSS estimates of poverty is based on annual consumption data, measures of poverty from the NLSS is generally known as incidence of monetary poverty. It does not include multi-dimensional aspects of poverty and deprivation as measured with multi-dimensional poverty index

(MPI) (United Nations Development Programme [UNDP], 2010; National Planning Commission [NPC], 2018).

The available estimates further indicate that mountain belt continued to be an area with the highest incidence of poverty. In 1995/96, nearly 60 percent of the mountain people (57%) were living below poverty line. Compared to this, other belts (hills & Tarai) had much lower incidence of poverty (around 40%). Although incidence of mountain poverty reduced to 33 percent in 2003/04, it was still higher than that of Tarai (28%) which again increased to 42 percent in 2010/11 being much higher than that of hills (24%) and the Tarai (23%). The reasons for increase in the incidence of mountain poverty during 2003/04-2010/11 is not obvious. However, based on the available information, it may be concluded that incidence of mountain poverty in Nepal, like in other belts, is in declining trend but it is still very high compared to the other belts. Furthermore, mountain belt also demonstrates highest depth as well as severity of poverty (CBS, 2010/11). Despite highest incidence of poverty, mountain belt accounted lowest proportion of the population below poverty line in the country (8-12%). This is mainly because this belt

accounted the lowest proportion of the total population (7-8%).

Human development approach is another way of understanding levels of poverty. Under this approach, three types of measures are generally used to estimate the level of poverty: human development index (HDI), human poverty index (HPI), and multi-dimensional poverty index (MPI). The available estimates on HDI and HPI indicate that mountain belt is experiencing remarkable improvement in the aspect of human development. For example, HDI for mountain belt was 0.386 in 1996 which increased to 0.436 in 2006 (UNDP, 2009). Particularly, eastern and central mountain demonstrates further improvement in the human development with increase in HDI to 0.475 in 2011. Improvement in human development in the mountain belt is reflected upon the corresponding decline in the incidence of poverty. For example, HPI for mountain belt in 2001 was estimated to be 49.8 which fell to 43.3 in 2006 (UNDP, 2009), and to 38.5 in 2011 (UNDP, 2014). Despite these improvements, it is to note that mountain belt, if compared with the hills and Tarai, is still lagging much

behind in terms of human development and poverty.

Multi-dimensional poverty index (MPI) is another measure of poverty which incorporates more number of indicators relating to education, health and standard of living. An estimate of MPI by GoN (2018) for the year 2014 shows that incidence of multi-dimensional poverty in Nepal is 28.6 percent. However, this report does not provide estimates for ecological belts and caste/ethnicities. Based on the NDHS 2011 data, Goli et al. (2019) have estimated MPI of 24 percent for mountain belt which is higher than that of hills and Tarai (0.22 or 22%). They have further concluded that, compared to the hills and Tarai, mountain belt lags far behind in health and standard of living index.

The sources reviewed above are the major sources of data on poverty in Nepal which provide only a macro (national, and by province, region, belts and broad caste/ethnic groups) pictures on poverty from different approaches. These sources indicate that there is substantial variation in incidence of poverty by ecological belt. Evidences also suggest that poverty rate consistently increases when we go from

eastern to western part of the country (21% for eastern region and 45.6% for far western region) (CBS, 2011). Considering such a large variation in the incidence of poverty by regions, it can be easily inferred that incidence of poverty is not the same for various groups of population living in different regions and districts of the country. Despite this, none of the macro level studies provide any indication about how various groups of the population living in different regions and district vary in terms of incidence of poverty. In this context, taking districts of mountain belt as spatial unit and caste/ethnic population within each district as estimation unit for caste/ethnic poverty, the specific objective of this study is to examine inter-district variation of caste/ethnic poverty (termed as spatial variation of caste/ethnic poverty) in mountain belt in which high incidence of poverty is persistent for a long time. By this study, two particular contributions to the study of poverty in Nepal can be underlined. Firstly, this study provides estimates of poverty rates for individual caste/ethnicities living in each district of mountain belt which none of the previous studies have provided. Secondly, this study assumes that poverty of same caste/ethnicity living in different districts tends to vary.

Therefore, this study provides district-specific poverty rates for each caste/ethnicity living in mountain belt. This will help compare incidence of poverty of same caste/ethnic group and identify districts in which a particular caste/ethnic group is economically well or worse off. As noted earlier, direct estimation of poverty by district and caste/ethnicities is not possible from the NLSS data sets due to small sample size. For this, small area estimation (SAE) technique that combines national census, and survey data has been applied to estimate caste/ethnic poverty.

Methods and Materials

This section describes overall process of estimating incidence of poverty with the use of SAE technique. The major issues covered in this section are: caste/ethnicities included in the analysis, estimation units, and SAE techniques.

Caste/Ethnicities Included in the Analysis

For the present analysis, any caste/ethnic groups with more than 500 population have been considered as major caste/ethnic group and included in the analysis. According to this

criterion, a total of 42 caste/ethnic groups qualify to be the major groups. In addition to this, some caste/ethnic groups having less than 500 population have also been included in the analysis in order to facilitate comparison of poverty rates in a broader context. Among these groups, Kami of Manang has the lowest population size of 246. With addition of these groups, total number of caste/ethnic groups included in the analysis is 44 (Figure 1). All the caste/ethnic groups included in the analysis hereafter is called major caste/ethnic groups.

Estimation Units

In this study, spatial units have been represented with districts and each caste/ethnic group within district constitutes one estimation unit (domain). This implies that a particular caste/ethnic group which is identified as a major group in multiple numbers of districts has been treated as separate estimation unit in each district. For example, Kami is identified as a major group in 16 districts and this caste constitutes 16 separate estimation domains, one estimation domain per district. By this principle, there will be a total of 195 estimation units for the present study, although, as noted above,

only 44 distinct caste/ethnic groups qualify to be major groups. This schema of estimation units has been essential for the present study in order to build east-west (west-east) continuum of each caste/ethnic groups based on the location of the spatial units (districts) and facilitate comparison of caste/ethnic poverty of the same group residing in different districts, more specifically along the east-west continuum of the districts.

Small Area Estimation (SAE) Technique

There are different types of SAE techniques which are broadly divided into two categories: design-based (direct) and model-based (indirect) (Australian Bureau of Statistics [ABS], 2006). Model-based technique is used when a higher level of accuracy is required. Considering this, in this study, model-based technique has been used. In its simplest terms, the model-based SAE technique is a statistical technique, more specifically regression technique, that predicts an “outcome” variable through simulation in which representative smaller set of data for an area (under study) containing outcome variable and its predictors are used for modelling purpose and model

coefficients are simulated to a larger set of data of the same area that contains only predictor variables. The larger data (data set) is generally called auxiliary data and use of auxiliary data, according to Ghosh and Rao (1994), provides strength to the smaller data set to find more accurate estimates for the area under study. Tzavidis (2013) has asserted that SAE can work efficiently (precisely) even when domains (small areas) have small or no sample sizes (planned or unplanned). Based on the unit of analysis, the model can be unit or area level model.

Depending on the nature of the outcome variable, various types of model-based SAE technique have been developed (ABS, 2006). According to Chandra et al. (2009), indirect estimators (model-based estimators-added by authors) for small area quantities under generalized linear mixed model (GLMM) are often known as empirical best predictors (EBPs) mainly because, as noted by Robinson (1991), EBP has minimum mean squared error. GLMM is also considered to be the best tool for analyzing non-normal data that involve random effects (Bolker et al., 2008). In this study, unit level model has been used to predict household probabilities of being poor which are converted into

individual probabilities by the use of population weight where family size has been used as population weight.

Among the various regression models, logistic regression is considered to be the appropriate model when outcome variable is binomial variable coded “0” and “1”. It is to note that this study aims to predict proportion of population living below poverty line (poverty rates) using information provided by the NLSS 2010/11 under the “poor” variable (in poverty file). The “poor” variable constitutes an outcome variable which has two categories: “poor” indicating “households living below poverty line” (coded with “1”) and “rich” indicating “households not living below poverty line” (coded with “0”). Considering “poor” variable as a binomial outcome variable, logistic regression has been chosen as an appropriate model for estimating poverty rates. Likewise, in consideration of advantage of EBP model, binomial regression model has been used with logit link function under the hierarchical (multilevel) generalized linear mixed model (GLMM). According to Hofmann et al. (2000), the basic assumption of hierarchical GLMM is that the lower level units are exposed to and influenced by

characteristics and/or processes of the higher-level units. Such an effect is estimated by incorporating random effect terms for i^{th} level (s) in the regression model. The methodology is extensively discussed by Hofmann et al. (2000), Jia et al. (2004), Zhang (2016), Chandra et al. (2009), and Woltman et al. (2012).

According to Zhang (2016), the general procedure of binary logistic regression model for SAE is a four step process in which explanatory model is developed for the estimation of model coefficients using survey data at the first step, model coefficients are applied to auxiliary data to predict individual probabilities at the second step, and estimated probabilities are aggregated (as mean) to the estimation units (here, major caste/ethnic groups) at the third step. The mean for each major caste/ethnic group is an estimate of the proportion of the households living below poverty line. Finally, precision of the estimated proportion is assessed in terms of prediction errors.

Sources of Data

Required information for the present study are obtained from the two sources: NLSS 2010/11 data sets (used

as survey data), and population census 2011 data sets (used as auxiliary data). Conducted by CBS, NLSS and population census in Nepal constitute an important part of official statistics. NLSS household data file provides outcome (“poor” variable) as well as predictor variables whereas census data file contains only predictor variables. As per the requirement of SAE technique, information from the NLSS data sets have been extracted and used to develop explanatory model and estimate model coefficients at the first step and model coefficients are simulated to the household data file of the 2011 population census to estimate household probabilities of being poor at the second step. Table 1 summarizes coverage of 2011 population census and NLSS 2010/11.

Table 1

Coverage of Population Census 2011 and NLSS 2010/11

Particulars	Districts	Enumeration Area (EA)	Total household
Census			
Nepal Total	75	40,659	5,423,297
Mountain belt	16	4973	363,698
NLSS			
Nepal Total	71	499	5,988
Mountain belt	12	34	408

(Extracted from population census 2011 and NLSS 2010/11 datasets)

Developing Explanatory Model and Estimation of Model Coefficients

In multilevel modeling, effects of explanatory variables are decomposed into two different sources: fixed and random effect. In fixed effect model, model parameters are fixed or non-random. These generally include population attributes rather than entities. Random effect model is used when there is a reason to believe that differences across entities have influence on the dependent (outcome) variables (Torres-Reyna, 2007). It is generally assumed that there are different hierarchies of entities in which each lower level entity is nested in higher level of hierarchy. Considering cluster sample design of NLSS, EAs constituted primary sampling units (PSUs) from which a fixed number of entities (households) were selected. In this hierarchical nature of sampling, EAs constitute a higher level of unit within which households are nested. Generally, characteristics of EA are not the same as they come from large and diverse geographical areas of the country and difference in EA has some role to play in determining incidence of household poverty. Therefore, EA has been used as random effect variable in

this exercise. This represents area-specific random effect.

As indicated above, for the present study, logistic regression model with logit link function under GLMM that incorporate fixed and random effects constitute explanatory model for estimating model coefficients. The logit under the GLMM is estimated as linear combination of least square regression model with the following equation

$$\ln\left[\frac{P_{ij}}{(1-P_{ij})}\right] = \beta_{0j} + \beta_{1j}x_{ij} + z_j u_j + e_{ij} \quad (1)$$

where,

i=household

j=groups disaggregated by the categories of the random effect variable, PSU

P_{ij} = Probability of household i being poor in group j.

$\ln\left[\frac{P_{ij}}{(1-P_{ij})}\right]$ = log odd for household i in group j

β_{0j} =intercept for household i in group j who are poor

β_{1j} =regression coefficient associated with fixed variables for the jth group

x_{ij} =fixed effect variables for ith household in group j

z_j =area-specific random effect (intercept) associated with u_j (=PSU)

u_j =jth PSU

e_{ij} =error term

Since the purpose of this study is to estimate probabilities of being each household poor, the above equation is implemented to get logit score for each household. Therefore, the model is a unit level model.

The fixed effect variables (x_{ij}) have been represented with the variables which are present in both NLSS and census data files and having similar definition. Initially, 16 fixed effect variables chosen and incorporated in the model. However, only 7 variables appeared to be statistically significant in explaining poverty (Table 2).

Categorical variables are coded as binary variables with “0” or “1”. Then model coefficients estimated with the help of STATA (ver. 15). It is to note here that developing an explanatory model is an iterative process. Exclusion and inclusion of a predictor variable in the model leads to changes in the explanatory power of the model as well as prediction errors. Hence, utmost care was taken to retain statistically

significant predictors in the model which can predict household probabilities closely to the observed rates for the mountain belt and also yield lowest prediction errors.

Model Validation

An assessment of the predictive power of the model in terms of chi-square indicates that, compared to the constant-only model, predictive power of the model significantly improves with constant and variable model

(Chi2=87.69, Prob>Chi2=0.000) (Table 2). Predictive power of the model can also be assessed in terms of ROC (Receiver Operating Characteristics) curve analysis by seeing the AUC (Area Under the Curve). AUC greater than 80 percent is generally considered highly satisfactory performance of the model (Rana et al., 2015). In this light, the explanatory model used to predict the household probabilities of being poor is found to be highly satisfactory with AUC of 87.31 percent with acceptable level of standard error, i.e. 0.0192.

Table 2

Estimated Model Coefficients From Logit Model Under GLMM

Wald Chi2(7) = 87.69 (Prob>Chi2: 0.000)					
Predictor variables	Coef.	Robust Std. Err.	Z	P>z	Variable description
eastern	-1.126	0.414	-2.72	0.006	Region of residence: eastern region
central	1.472	0.450	3.27	0.001	Region of residence: central region
mobile	-1.509	0.366	-4.13	0.000	Have mobile phone in the household
Brahman	-1.264	0.328	-3.85	0.000	Caste/ethnicity: Brahman caste
popunder18	0.656	0.101	6.52	0.000	Number of family members under 18 years of age
Above primary education	-0.417	0.179	-2.33	0.020	Number of family members with above primary level of education
Literate adults	0.533	0.158	3.37	0.001	Number of literate family members
_cons	-1.396	0.453	-3.08	0.002	
xhpsu					Primary sampling units (PSUs)
var(_cons)	.286	.177			

Prediction of Household Probabilities

Once performance of model is evaluated, the estimated model coefficients have been simulated to the census data file (household file) to estimate logit score using “predict” command in STATA. The logit scores then were converted into household probabilities of being “poor” (with the estimated logistic regression function,

$$\hat{P}_{ij} = \frac{e^{\hat{\alpha} + \hat{\beta}x_{ij} + z_j u_j}}{1 + e^{\hat{\alpha} + \hat{\beta}x_{ij} + z_j u_j}} \quad (2)$$

where, e = exponential (= 2.718281828)

$\hat{\alpha}$ = constant

$\hat{\beta}$ = estimated regression coefficients associated with fixed effect variables, x_{ij}

$\hat{\alpha} + \hat{\beta}x_{ij}$ = predicted logits

Estimation of Mean Probabilities

After prediction of household probabilities, proportion of population below poverty line for different caste/ethnic groups within each district is estimated as a mean of the household level predicted probabilities weighted by family size. The formula for estimating proportion of the population

below poverty line consisting of k number of households of i^{th} caste/ethnic group in each district (h) is estimated as

$$\bar{P}_{ih} = \frac{\sum_{f=1}^k W_{fih} * \hat{P}_{fih}}{\sum_{f=1}^k W_{fih}} \quad (3)$$

where,

\hat{P}_{ih} = Estimated mean proportion of the population below poverty line for caste/ethnic group i of district h

W_{fih} = population weight (family size) for the household f of a caste/ethnic group i of district h

$\sum W_{fih}$ = sum of population weight (family size) for the household f of a caste/ethnic group i of district h

The reference time for the estimated poverty rates is 2010/11 (almost 10 years earlier than now). However, given the slow pace of economic development of the country, it is assumed that incidence of poverty in Nepal as well as mountain belt has not much changed over the period and the estimated poverty rates will provide baseline data for all working on the agenda of social

inclusion including local government. The sample size of 408 in NLSS 2010/11 for the mountain belt is believed to be large enough to capture underlying structure of the data in SAE exercise.

Validation of Results

The model has predicted a poverty rate of 40.67 for the mountain belt as a whole which is less only by 1.6 percentage points when compared with the observed poverty rate (42.27%) estimated from NLSS 2010/11 for the same belt. The overall relative error defined as an average variability of predicted proportion (\bar{P}_p) from the observed proportion (\bar{P}_o), i. e. $[(\bar{P}_p - \bar{P}_o) / \bar{P}_o] * 100$, is estimated to be 3.79 percent. The corresponding estimates for Chhetree caste is 6.5 percent and other than Chhetree is 3 percent.ⁱ A significant test of the difference between overall predicted and observed proportion indicates that Z- score for the difference is -0.5692. Since Z-score for the difference is within -2 and +2, we can conclude that there is no serious problem of under/over fitting of the model (standard error for the estimated probabilities is calculated through

bootstrapping of estimated probabilities). For this, same sample size of 408 used by the NLSS was selected with simple random sampling procedure from the auxiliary data after prediction.

Prediction error, generally defined as standard error of estimated proportion, is calculated by delta method following the guideline provided by Gutierrez and Inlow.ⁱⁱ Average prediction error of the estimated proportion for the mountain belt as a whole is estimated to be 6.57 percent. The highest prediction error is estimated to be 8.07 percent for Darchula district and the lowest for Sankhuwasabha (5.62%). The prediction error for different caste/ethnic groups ranges lowest of 2.31 percent for Brahman-Hill of Sankhuwasabha district to the highest of 9.17 for Byasi/Sankha of Darchula district. Distribution of average prediction error over caste/ethnicity shows that average prediction error does not exceed 8 percent for the 92 percent of the caste/ethnicities. The amount of standard errors as estimated by CBS (2011) for poverty rate of Ilaka using linear models of SAE also show almost at similar level.

Results and Discussions

This section presents results and discussions. Results and discussions are summarized under the two main headings: estimates of poverty rates, and spatial variation. In addition, estimates of total population below poverty line for each caste/ethnic group have also been provided. Appendix at the end provides detail results on the estimate of poverty and standard error of the estimates.

Estimates of Poverty Rates

There is a substantial variation in the incidence of poverty across the mountain districts with the lowest poverty rate of 21.65 in Sankhuwasabha (Province 1) and the highest of 69.31 percent in Bajhang (Province 7) district (Appendix). District level poverty rates tend to sharply increase when we move from eastern to western districts of mountain belt. By caste/ethnicity, poverty rate ranges minimum of 4-7 percent for Brahmin-Hill of three eastern districts (Taplejung, Sankhuwasabha and Solukhumbu – Province 1) and one western district (Mustang, Province 4) to maximum of 88 percent for Dalit (others) of Bajura district (Province 7). For large majority

of the caste/ethnic groups (i.e. 80%), poverty rates are estimated to be higher than national average (i.e. 25.16%). Ranking of caste/ethnic group in each district based on poverty rates indicates that four caste groups namely Brahman-Hill, Chhetree, Sanyasi/Dasnami, and Thakuri stand in 1st, 2nd and 3rd lowest rank in most of the districts. Among the four caste groups, poverty rate for Brahman-Hill is found to be the lowest in the largest number of 11 districts. However, it is to note that there is a substantial variation in the lowest range of poverty rate of the various caste/ethnic groups under study. For example, the lowest range of poverty rate in the three districts of eastern region (Taplejung, Sankhuwasabha and Solukhumbu – Province 1), does not exceed 15 percent while it is estimated to be very high (50-60%) in the mid and far western mountain districts like Bajura, Bajhang and Darchula (Province 7).

Poverty rates further indicate that three Dalit castes - Kami, Damai/Dholi, and Sarki from western district (Manang & Mustang – Province 4), mid-western districts (Dolpa, Jumla, Kalikot, Mugu, Humla districts - Province 6) and far-western district (Bajura, Bajhang, Darchula – Province 7) including one

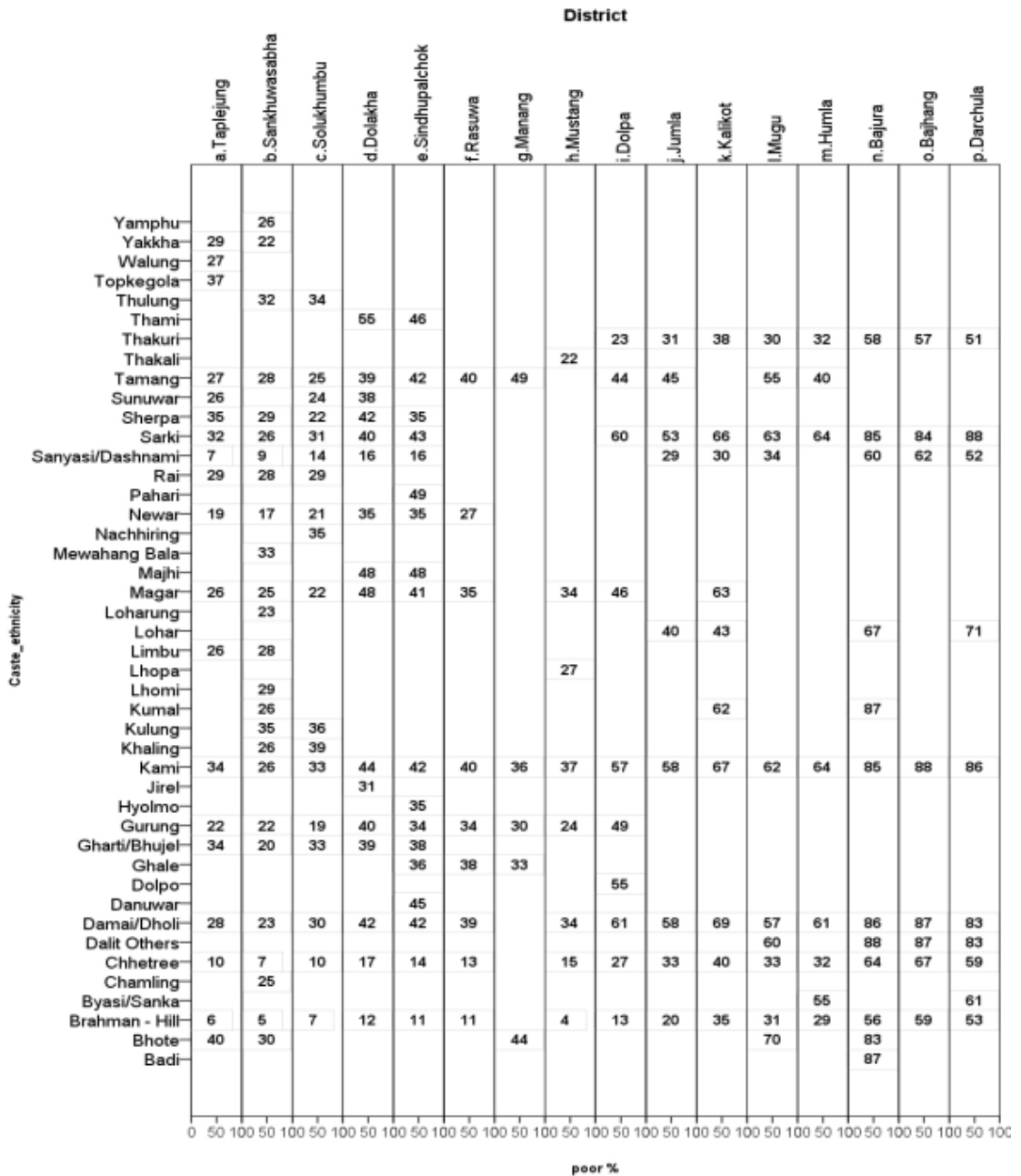
district from central region (Rasuwa, Province 3) stand at the highest rank. These three caste groups have exceptionally high poverty rate in Bajura, Bajhang and Darchula – Province 7) districts (86-88%). Compared to this, poverty rate for these groups is also found to be substantially low (53-69%) when moved to mid-western districts (Dolpa, Jumla, Kalikot, Mugu and Humla – Province 6). It further decreases to 34-40 percent when we move to the western districts (Rasuwa, Manang and Mustang). It is interesting to note that none of the Dalit castes from eastern (Taplejung, Sankhuwasabha, Solukhumbu) – Province 1) and central districts (Dolakha, and Sindhupalchok – Province 3) stand at the highest rank of poverty. In these districts, mix of Janajati groups stand at the highest

rank. However, poverty rate of most of these Janajati groups (32-38%), with the exception in Dolakha, corresponds with the three Dalit groups from Rasuwa (Province 3) (Manang and Mustang – Province 4).

A quintile analysis of estimated poverty rates show that most of the caste/ethnicities belonging to the lowest quintile of the poverty rates are Brahman-Hill, Chhetree, Gurung and Newar (Tabulation not shown). They are mainly from eastern, central and western mountain districts (except Thakuri of Dolpa, Province 6) and Brahman-Hill of Jumla, Province 6). Contrary to this, most of the caste/ethnicities falling in the highest quintile of the poverty rates are Dalits (Sarki, Kami, Damai/Dholi Lohar, Badi, and Dalit others) from the mid and far western districts (Province 6 & 7).

Figure 1

Estimated Poverty Rates for Major Caste/Ethnicities, Mountain Districts



Spatial Variation of Caste/Ethnic Poverty

When compared caste/ethnic poverty along the east-west continuum of the mountain districts, various spatial pattern of poverty distinct to different caste/ethnicities emerges. In general, it can be said that caste/ethnic poverty tends to increase when we move from eastern to the western part of the mountain belt. It is interesting to note that some castes/ethnicities with similar culture follow almost similar spatial pattern of poverty and form a cluster of districts in different regions with almost similar level of poverty rates. Therefore, based on the similarity of the level and spatial pattern of poverty rates, the following nine caste/ethnic groups can be classified into three groups as followings:

- Brahman-Hill, Chhetree, and Sanyasi /Dashnami (BCSD)
- Damai/Dholi, Kami, and Sarki (Dalits)
- Gurung, Tamang, Magar (GTM)

Brahman-Hill, Chhetree, and Sanyasi/Dashnami (BCSD)

Brahmin-Hill, Chhetree and Sanyasi/Dashnami belong to hill caste group and generally known as socio-economically advanced groups. Poverty rates for these

castes in the districts of eastern region (Taplejung, Sankhuwasabha and Solukhumbu – Province 1) is estimated to be the lowest (less than 10%) which increases up to 16 percent in the districts of central region. It further increases to around 30 percent in the four districts of mid-western region (Humla, Mugu, Kalikot and Jumla – Province 6) and to 60 percent with further increase in three districts of far western region (Bajura, Bajhang and Darchula – Province 7). By comparing poverty rates of the BCSD in different clusters of the districts with national average (i.e. 25.16%), four major spatial patterns of poverty rates for the BCSD can be identified:

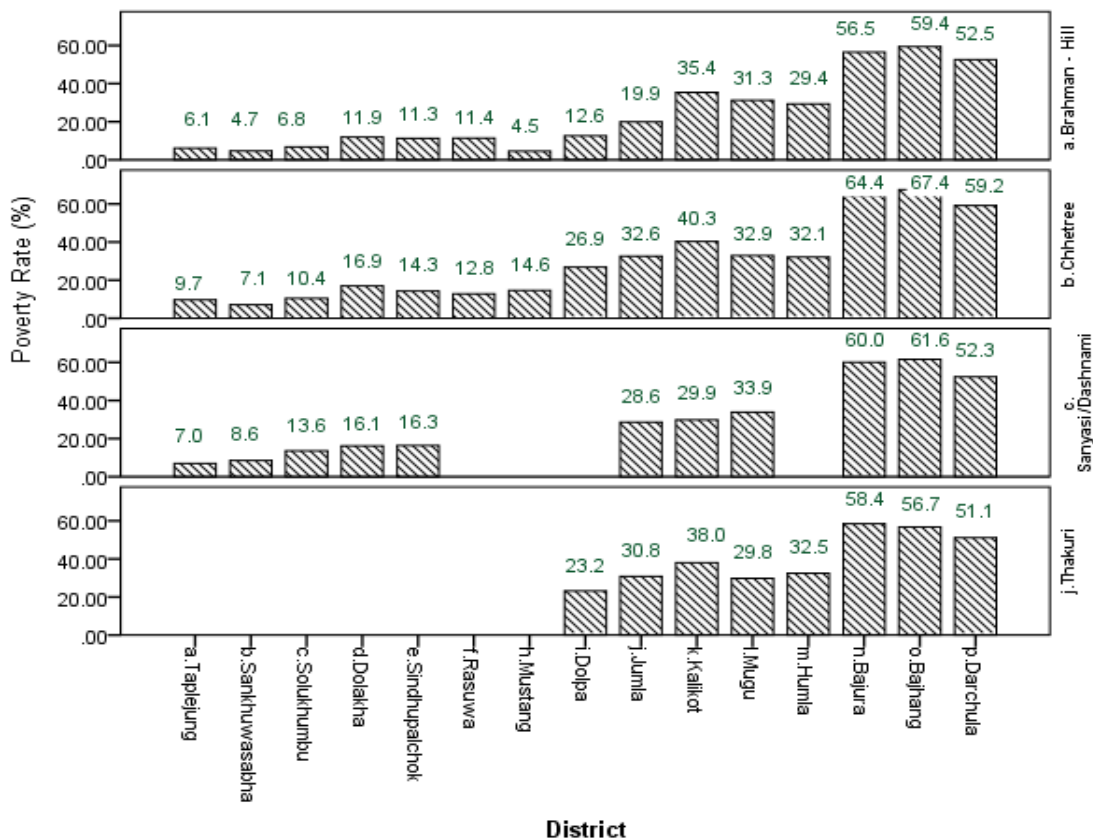
- The three mountain districts (Taplejung, Sankhuwasabha, and Solukhumbu – Province 1) have very low level of poverty rates (<10%) than the national average.
- There is another cluster of districts in central and mid-western region (Dolakha, Sindhupalchok, Rasuwa, Manang and Mustang – Province 3 & 4) with slightly lower poverty rates (up to 20%) than the national average.
- Five mid-western mountain districts form another cluster of districts with moderately high level of poverty

(around 30%) than the national average – Dolpa, Jumla, Kalikot, Mugu, and Humla (all from Province 6).

- Three far western mountain districts (Bajura, Bajhang and Darchula – Province 7) form a cluster of districts with high level of poverty (around 60%) than the national average.

Figure 2

Estimated Poverty Rates for Hill Brahmin, Chhetri, Sanyasi/Dashnami & Thakuri



Damai/Dholi, Kami, and Sarki (Dalits)

Like BCSD, these three groups also belong to Hill caste groups and generally known as Dalits and

socioeconomically backward communities. Like BCSD, Dalits from the three eastern districts (Taplejung, Sankhuwasabha, and Solukhumbu – Province 1) also demonstrate the lowest poverty rates. But poverty rates of

Dalits in these districts are much higher (23-34%) than that of BCSD of the same districts. But it nearly corresponds with the BCSD of central and some western districts (Dolakha, Sindhupalchowk, Rasuwa, Manang and Mustang – Province 3 & 4) (34-40%). It further increases to around 60 percent in some of the mid-western districts (Dolpa, Jumla, Kalikot, Mugu, Humla – Province 6) with exceptionally high poverty rates for the three districts of far western region (Bajura, Bajhang, and Darchula – Province 7). By comparing poverty rates of Dalits in different clusters of districts with national average (i.e. 25.16%), the following major spatial patterns of poverty of Dalits can be identified:

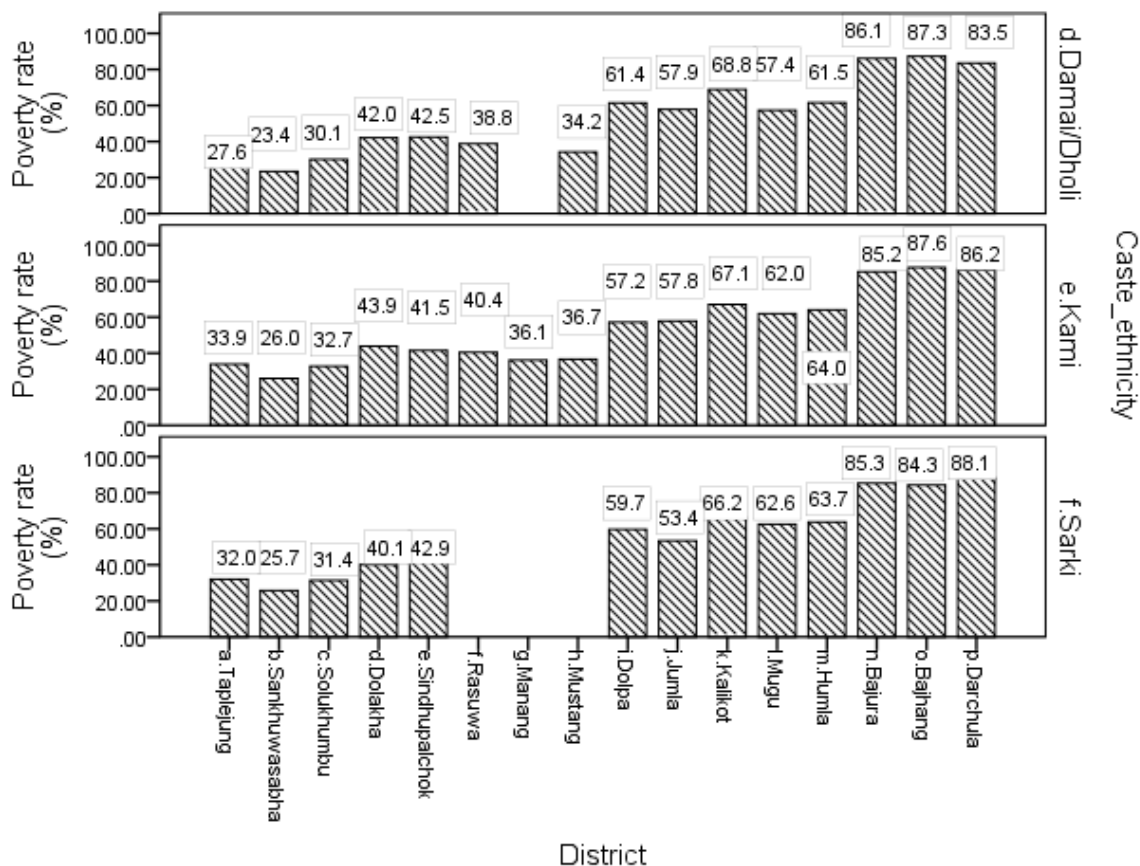
- There is no cluster of districts (except Sankhuwasabha, Province 1) in the case of Damai/Dholi) with poverty rates lower than the national average.
- Like BCSD, Dalits from three districts of eastern regions (Taplejung, Sankhuwasabha and Solukhumbu – Province 1)

demonstrate lowest level of poverty. But poverty rates of Dalits in these districts are not much higher (around 30%) than the national average. But it is much higher than that of BCSD (<10%) of the same districts.

- When we move from eastern to central districts, poverty rates of Dalits increases to around 40 percent. Contrary to the general spatial pattern of poverty, it tends to decrease when we move to western districts (34-38% in Manang and Mustang – Province 4).
- Poverty rates of Dalits further increases in mid-western region (Dolpa, Jumla, Kalikot, Mugu and Humla – Province 6) with around 60% of the population living below poverty line which is much higher incidence of poverty than the national average.
- The incidence of poverty among Dalits further increases to its highest level in the three districts of far western region (Bajura, Bajhang and Darchula – Province 7) with around 85 percent of poverty rate.

Figure 3

Estimated Poverty Rates for Damai/Dholi, Kami & Sarki



Gurung, Magar, Tamang (GMT)

GMT in Nepal are known as three major socioeconomically backward Janajati groups. However, these groups are generally known as more forward than the Dalits. Gurung and Magar each appears to be major groups in 9 mountain districts (out of 16), and Tamang in 11 districts. Figure 4 shows

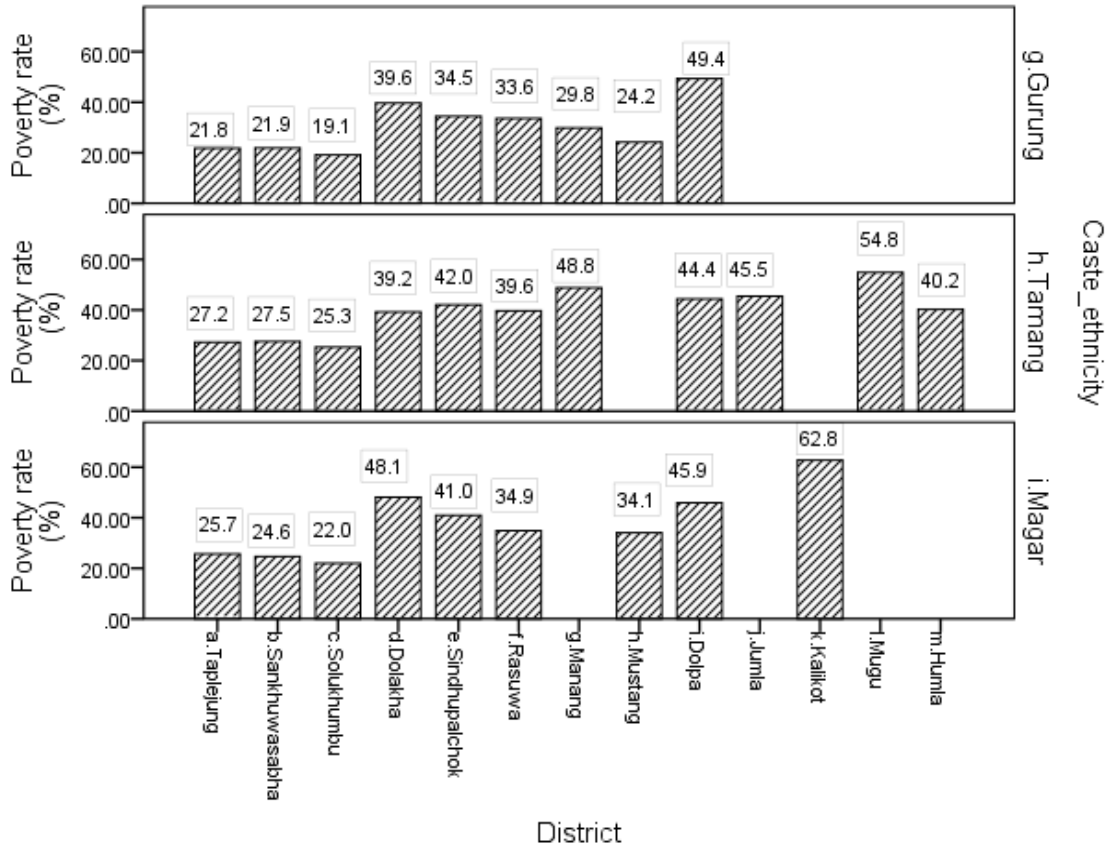
that these groups do not qualify as a major group in the districts of far western region (Province 7). Like BCSD and the Dalits, GMT residing in three eastern mountain districts have the lowest incidence of poverty (around 20% with slightly higher rates for Tamang) which nearly corresponds with the national poverty rates (25.16%). But

GMT in these districts have lower poverty rates than that of Dalits (23-34%), but substantially higher than that of BCSD (<10%). GMT also demonstrates a higher level of poverty rates when we move from eastern to western part of the mountain belt. For example, poverty rates increase to 29-49 percent in most of the districts of central and western region (Province 3 & 4) and further increases to 63 percent in mid-western districts (Province 6). By comparing poverty rates of GMT in different cluster of districts with national average (i.e. 25.16%), the following major spatial patterns of poverty rates of GMT can be identified:

- Unlike Dalits, there is a cluster of three districts in eastern region (Taplejung, Sankhuwasabha, Solukhumbu – Province 1) with poverty rates lower than/equal to the national average. Poverty rates for
- GMT in these districts are much higher than that of BCSD and slightly lower than that of Dalits.
- GMT in the central region form a cluster of districts with remarkably higher poverty rates (34-48%) than the national average. There is another such cluster of districts with mostly 40-63 percent of poverty rates in mid-western mountain (Dolpa, Jumla, Mugu, Kalikot, and Humla – Province 6).
- Contrary to general spatial pattern of poverty, poverty rates of Gurung and Magar tend to be higher for the districts of central (around 40-48%) than the western region (Province 4) (mostly 30-40%). But, in the case of Tamang, it tends to increase from about 40 to 49 percent when we move from central to western region (Province 3 to 4).

Figure 4

Estimated Poverty Rates for Gurung, Tamang & Magar



Other Caste/Ethnic Groups

Thakuri is another caste group included in the analysis from mid and far western mountain districts (Province 6 & 7). Thakuri is known as one of the socioeconomically forward groups in Nepal. Thakuri residing all the districts of mid and far western mountain

(except Dolpa) demonstrates poverty rates higher than the national average. Considering the similarity of poverty rates in different districts, two clusters of districts for Thakuri can be identified – one in mid-western region where poverty rates of Thakuri range in between 23-38 percent and another in

far western region where poverty rate ranges in between 51-58 percent.

The other Janajati groups which appear major groups in the 3-6 districts of eastern and central mountain region (Province 1 & 3) such as Sunuwar, Rai, Newar, Gharti/Bhujel do not differ much in terms of incidence of poverty. Nevertheless, some increase in poverty rates when we move from the districts of eastern to central regions is seen particularly in Sunuwar (26% in Taplejung (Province 1) to 38% in Dolakha (Province 3), Newar (19% in Taplejung to 35% in Dolakha), Gharti/Bhujel (34% in Sankhuwasabha to 38-39% in Sindhupalchowk and Dolakha (all from Province 3). Another case in point is Lohar which appears to be a major Dalit caste in each one district of mid and far western mountain also demonstrates substantial increase in the poverty rates when we move from mid-western (Province 6) (around 40%) to far western districts (Province 7) (around 71%). Kumal appears to be major Janajati group in one of the eastern mountain districts (Sankhuwasabha, Province 1) and each one district of mid-west (Kalikot, Province 6) and far west mountain (Bajura, Province 7). Like other caste/ethnic groups, poverty rate of

Kumal substantially increases when we move from Sankhuwasabha (Province 1) (26%) to the western and far western mountain districts (62% in Kalikot, Province 6 and 87% in Bajura, Province 7). The poverty rate of Bhote Janajati group also substantially increases when considered east to west continuum of the districts (30-40% in Sankhuwasabha – Province 1, Taplejung – Province 1, and 87% in Bajura - Province 7).

Estimates of Population below Poverty Line

The estimates show that the 44 castes/ethnicities accounted for 718 thousands population living below poverty line in mountain belt (Table 3). Of them, Chhetree caste alone accounted for the largest 38 percent (or 270 thousands). This is followed by Tamang (11.23% or 80 thousands) and Kami (10.34% or 74 thousands). Although incidence of poverty among Brahman-Hill is the lowest in most of the districts (Appendix), this caste stands in fourth position in terms of the size of the population below poverty line (6.84% or 49 thousands). Thakuri with 34 thousands population below poverty line deserves fifth position. When castes/ethnicities are classified into three broad groups –

Brahman/Chhetree (includes Thakuri & Sanyasi/Dashnami), Janajatis, and Dalits – Brahman/Chhetree accounted for 50 percent (or 361 thousands) of the total population below poverty line, Janajatis 30 percent (or 218 thousands) and Dalits 19 percent (or 138 thousands).

Considering spatial concentration of five largest caste/ethnicities in terms of the size of population below poverty line, large majority of the Chhetree population living below poverty line (70%) is concentrated in three districts of far western region (Bajura, Bajhang and Darchula – Province 7) (Table 3) where poverty rate is estimated to be the highest for Chhetree (around 60%) (Appendix). Likewise, in the case of Tamang, 82 percent of the population below poverty line comes from three districts of central region (Dolakha, Sindhupalchok and Rawuwa – Province 3). Poverty rate for Tamang in these districts is estimated to be around 40 percent (Appendix). Contrary to Chhetree and Tamang, Kami which deserves third position in terms of the size of population below poverty line shows more uniform distribution of the population below poverty line across different districts with the highest 54 percent in one mid-western district

(Kalikot, Province 6) and two far western districts (Bajura and Bajhang – Province 7). The other 4 mid and far western districts (Humla, Mugu, Jumla and Darchula – Province 6), and two central districts (Dolakha and Sindhupalchok – Province 3) accounted for 4-8 percent of the total Kami population living below poverty line. In the case of Brahman-Hill, 76 percent of the population below poverty line come from one mid-western district (Kalikot, Province 6) and three far western districts (Bajura, Bajhang and Darchula – Province 7). Likewise, large majority of the total Thakuri population living below poverty line (84%) comes from five mid and far western districts (Humla, Kalikot, Bajhang, Bajura and Darchula – Province 6 & 7).

In addition to the above the five caste/ethnic groups, Damai/Dholi and Sarki are other two most common Dalit castes found in the mountain districts. Although these groups demonstrate highest incidence of poverty in most of the districts (Appendix), Sarki stands in sixth and Damai/Dholi in seventh position in terms of the size of population below poverty line. For these two Dalit groups, around 80 percent of the population below poverty line comes from 6 central, mid-western and

far western districts (Dolakha, Sindhupalchok, Kalikot, Jumla, Bajura and Bajhang – Province 3, 6 & 7). In the case of Newar, nearly 90 percent of the population below poverty line are from two central districts (Dolakha and Sindhupalchok – Province 3). On the contrary, Sherpa shows much more uniform distribution of the population below poverty line across the three eastern and two central districts (Sankhuwasabha, Solukhumbu, Taplejung, Dolakha and Sindhupalchok – Province 1 & 3). Percent of Sherpa population below poverty line in these districts range in between 15-24. (Appendix). Ethnic groups like Limbu (85% in Taplejung, Rai (38% in Sankhuwasabha, and 48% in Solukhumbu – all from Province 1) and Thami (80% in Dolakha, Province 3) have high concentration of population below poverty line in one or two districts. Nearly 90 percent of the population below poverty line for Magar comes from two eastern (Solukhumbu and Sankhuwasabha –

Province 1), two central (Dolakha and Sindhupalchok – Province 3) and one mid-western (Dolpa, Province 6) districts. Likewise, nearly 81 percent of the Gurung population below poverty line come from two eastern (Taplejung and Sankhuwasabha – both from Province 1), one central (Sindhupalchok, Province 3), one western (Manang) and one mid-western (Dolpa, Province 6) districts. Sanyasi/Dashnami which is included in the analysis from 11 districts demonstrates 80 percent of its population below poverty line concentrated in one central (Sindhupalchowk, Province 3) and three far western (Bajura, Bajhang and Darchula – Province 7) districts. For the remaining caste/ethnic groups (ranked as 17-44, Table 3) included in the analysis, population below poverty line comes from 1-5 districts (Appendix).

Table 3*Estimated Population Living Below Poverty Line*

SN	Caste/ethnicity	Estimated population below poverty line	Percent	Rank	SN	Caste/ethnicity	Estimated population below poverty line	Percent	Rank
1	Chhetree	270,148	37.62	1	23	Byasi/Sanka	1,965	0.27	23
2	Tamang	80,657	11.23	2	24	Hyolmo	1,694	0.24	24
3	Kami	74,235	10.34	3	25	Yakkha	1,686	0.23	25
4	Brahman – Hill	49,102	6.84	4	26	Danuwar	1,661	0.23	26
5	Thakuri	34,826	4.85	5	27	Badi	1,642	0.23	27
6	Sarki	23,574	3.28	6	28	Jirel	1,429	0.20	28
7	Damai/Dholi	23,530	3.28	7	29	Nachhiring	1,320	0.18	29
8	Newar	19,893	2.77	8	30	Sunuwar	1,148	0.16	30
9	Sherpa	17,260	2.40	9	31	Yamphu	1,118	0.16	31
10	Limbu	16,338	2.28	10	32	Kumal	1,081	0.15	32
11	Dalit Others	15,315	2.13	11	33	Pahari	937	0.13	33
12	Rai	12,714	1.77	12	34	Ghale	762	0.11	34
13	Thami	11,418	1.59	13	35	Mewahang Bala	754	0.11	35
14	Magar	9,104	1.27	14	36	Lhopa	609	0.08	36
15	Gurung	8,016	1.12	15	37	Thakali	591	0.08	37
16	Sanyasi/Dashnami	7,527	1.05	16	38	Thulung	585	0.08	38
17	Kulung	6,806	0.95	17	39	Topkegola	524	0.07	39
18	Lohar	5,436	0.76	18	40	Walung	304	0.04	40
19	Majhi	3,381	0.47	19	41	Lhomi	256	0.04	41
20	Gharti/Bhujel	3,052	0.43	20	42	Khaling	249	0.03	42
21	Bhote	2,838	0.40	21	43	Loharung	222	0.03	43
22	Dolpo	2,244	0.31	22	44	Chamling	84	0.01	44
Total							718,033	100.00	

(Source: Appendix)

Conclusion

Available data from the past studies indicate that mountain belt, as compared to the hills and Tarai, has the highest incidence of poverty implying lowest economic condition of mountain people. This study further shows that, as expected, three socioeconomically advanced caste groups (Brahman, Chhetree and Sanyasi/Dashnami) have

the lowest incidence of poverty in almost all the districts of mountain belt. Despite this, these three caste groups from mid and far western regions have much higher incidence of poverty than that of socioeconomically backward communities like Dalits and Janajatis from eastern and central regions. The three far western districts (Bajura, Bajhang and Darchula – Province 7) form a cluster of districts with very high incidence of poverty for Dalits as well

as Brahman, Chhetree and Sanyasi/Dashnami. In fact, only a small fraction of Dalits in these districts are estimated to be above poverty line. However, the three economically forward caste groups in these districts demonstrate much better economic position than Dalits.

Janajatis, which have high concentration in the districts of eastern, central, and western regions (Province 1, 3 & 4), demonstrate an intermediate position in terms of incidence of poverty without much variation with Dalits. When considered poverty in absolute terms, caste/ethnic groups with larger population size also have larger size of population below poverty line with the largest number of such population in Chhetree caste from three districts of far west. The largest five caste/ethnic groups – Chhetree, Tamang, Kami, Brahman-Hill, Thakuri constitute the largest number of the total population below poverty line. Of them, Chhetree accounted for the largest number of population below poverty line.

This study confirms that with few exceptions incidence of poverty of all the castes/ ethnicities in mountain districts tends to increase along east to

west continuum of the districts. In this continuum, three eastern mountain districts (Taplejung, Sankhuwasabha and Solukhumbu – Province 1) can be designated as the districts with lowest incidence of poverty for almost all the caste/ethnicities and the three far western districts (Bajura, Bajhang and Darchula – Province 7) with highest incidence of poverty. The range of highest and lowest poverty rates between the eastern and far western districts is substantial implying substantial variation in the economic position of the people between these areas. When compared incidence of poverty of same caste/ethnic group along the east-west continuum, some culturally similar groups show almost similar spatial pattern of poverty. The fact that incidence of poverty of these culturally similar groups tends to increase along the east-west continuum forming clusters of districts in each regional belt with almost similar level of poverty levels. This implies that incidence of poverty of culturally similar groups in mountain belt varies in similar ways along the east-west continuum of districts and it does not vary much within the regional cluster of the districts.

Disclosure Statement

The author declares that no potential conflict of interest exists.

Notes

- i. Only the sample size of Chhetree exceeds 100. So, observed rate for Chhetree is calculated separately.
- ii. <https://www.stata.com/support/faqs/statistics/standard-error-predicted-probability/>

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Appendix

Estimates of Total Population, Poverty Rate, Standard Error and Population below Poverty Line

Region	District	Province/ Caste_ethnicity	Estimated total population	Estimated poverty rates (%)	Standard error of poverty rates	Estimated population below poverty line
For districts						
Eastern	Taplejung	Province 1	127,607	23.76	5.94	30318
Eastern	Sankhuwasabha	Province 1	159,672	21.65	5.62	34566
Eastern	Solukhumbu	Province 1	106,083	24.06	6.14	25529
Central	Dolakha	Province 3	186,796	30.40	6.18	56778
Central	Sindhupalchok	Province 3	288,390	31.80	6.47	91694
Central	Rasuwa	Province 3	42,519	34.01	6.79	14461
Western	Manang	Province 4	5,880	32.01	7.72	1882
Western	Mustang	Province 4	11,699	25.63	6.54	2998
Mid western	Dolpa	Province 6	36,459	38.01	6.67	13857
Mid western	Jumla	Province 6	108,480	35.21	6.25	38200
Mid western	Kalikot	Province 6	137,839	46.07	6.65	63497
Mid western	Mugu	Province 6	55,335	39.94	6.45	22103
Mid western	Humla	Province 6	50,391	39.15	6.29	19728
Far western	Bajura	Province 7	135,384	68.39	7.21	92590
Far western	Bajhang	Province 7	196,486	69.31	7.19	136181
Far western	Darchula	Province 7	133,699	60.36	8.07	80706
Total			1,782,719	40.67	6.57	725088
For major caste/ethnicites						
Eastern	a.Taplejung	Brahman - Hill	9949	6.07	2.81	604
Eastern	a.Taplejung	Sanyasi/Dashnami	955	6.96	3.06	66
Eastern	a.Taplejung	Chhetree	15145	9.66	3.87	1462
Eastern	a.Taplejung	Newar	1998	18.89	5.47	377
Eastern	a.Taplejung	Gurung	5850	21.79	5.83	1275
Eastern	a.Taplejung	Magar	1230	25.67	6.50	316
Eastern	a.Taplejung	Limbu	53160	26.08	6.36	13862
Eastern	a.Taplejung	Sunuwar	1380	26.11	6.65	360
Eastern	a.Taplejung	Walung	1144	26.53	7.79	304
Eastern	a.Taplejung	Tamang	5629	27.19	6.53	1531
Eastern	a.Taplejung	Damai/Dholi	1863	27.61	6.90	514
Eastern	a.Taplejung	Rai	6451	28.54	7.03	1841
Eastern	a.Taplejung	Yakkha	271	28.90	7.34	78
Eastern	a.Taplejung	Sarki	1195	32.00	6.97	382
Eastern	a.Taplejung	Gharti/Bhujel	512	33.84	6.97	173
Eastern	a.Taplejung	Kami	5997	33.89	7.24	2032
Eastern	a.Taplejung	Sherpa	12081	34.57	7.19	4177
Eastern	a.Taplejung	Topkegola	1403	37.35	8.22	524
Eastern	a.Taplejung	Bhote	498	40.01	8.20	199
Eastern	b.Sankhuwasabha	Brahman - Hill	8474	4.66	2.31	395
Eastern	b.Sankhuwasabha	Chhetree	29248	7.12	3.14	2082
Eastern	b.Sankhuwasabha	Sanyasi/Dashnami	1062	8.55	3.86	91
Eastern	b.Sankhuwasabha	Newar	7582	16.52	5.01	1253
Eastern	b.Sankhuwasabha	Gharti/Bhujel	855	19.54	5.76	167
Eastern	b.Sankhuwasabha	Gurung	8731	21.89	5.88	1912
Eastern	b.Sankhuwasabha	Yakkha	7295	22.04	5.91	1608
Eastern	b.Sankhuwasabha	Loharung	969	22.91	6.13	222
Eastern	b.Sankhuwasabha	Damai/Dholi	3511	23.40	6.24	822

Region	District	Province/ Caste_ethnicity	Estimated total population	Estimated poverty rates (%)	Standard error of poverty rates	Estimated population below poverty line
Eastern	b.Sankhuwasabha	Magar	5299	24.64	6.29	1306
Eastern	b.Sankhuwasabha	Chamling	337	24.79	6.85	84
Eastern	b.Sankhuwasabha	Sarki	2035	25.68	6.11	523
Eastern	b.Sankhuwasabha	Yamphu	4323	25.85	6.43	1118
Eastern	b.Sankhuwasabha	Kami	7589	25.95	6.61	1970
Eastern	b.Sankhuwasabha	Kumal	900	25.96	6.82	234
Eastern	b.Sankhuwasabha	Khaling	464	26.24	6.62	122
Eastern	b.Sankhuwasabha	Tamang	16666	27.52	6.52	4587
Eastern	b.Sankhuwasabha	Limbu	8752	28.29	6.61	2476
Eastern	b.Sankhuwasabha	Rai	17017	28.32	6.64	4820
Eastern	b.Sankhuwasabha	Sherpa	9356	29.17	6.84	2729
Eastern	b.Sankhuwasabha	Lhomi	876	29.26	7.35	256
Eastern	b.Sankhuwasabha	Bhote	3521	30.18	7.34	1063
Eastern	b.Sankhuwasabha	Thulung	666	32.40	7.16	216
Eastern	b.Sankhuwasabha	Mewahang Bala	2302	32.74	7.48	754
Eastern	b.Sankhuwasabha	Kulung	9807	34.69	7.50	3402
Eastern	c.Solukhumbu	Brahman - Hill	4897	6.79	2.90	333
Eastern	c.Solukhumbu	Chhetree	15890	10.44	3.92	1659
Eastern	c.Solukhumbu	Sanyasi/Dashnami	783	13.59	4.86	106
Eastern	c.Solukhumbu	Gurung	781	19.13	5.65	149
Eastern	c.Solukhumbu	Newar	2585	20.66	5.63	534
Eastern	c.Solukhumbu	Sherpa	17795	21.96	5.92	3908
Eastern	c.Solukhumbu	Magar	5251	21.97	6.36	1154
Eastern	c.Solukhumbu	Sunuwar	317	23.88	6.27	76
Eastern	c.Solukhumbu	Tamang	10480	25.34	6.69	2655
Eastern	c.Solukhumbu	Rai	20812	29.08	6.96	6053
Eastern	c.Solukhumbu	Damai/Dholi	1600	30.15	7.20	482
Eastern	c.Solukhumbu	Sarki	557	31.36	7.36	175
Eastern	c.Solukhumbu	Gharti/Bhujel	1981	32.58	7.32	645
Eastern	c.Solukhumbu	Kami	5941	32.72	7.44	1944
Eastern	c.Solukhumbu	Thulung	1093	33.77	7.51	369
Eastern	c.Solukhumbu	Nachhiring	3737	35.32	7.46	1320
Eastern	c.Solukhumbu	Kulung	9498	35.84	7.67	3404
Eastern	c.Solukhumbu	Khaling	330	38.54	7.30	127
Central	d.Dolakha	Brahman - Hill	17168	11.90	3.95	2043
Central	d.Dolakha	Sanyasi/Dashnami	1342	16.12	4.67	216
Central	d.Dolakha	Chhetree	62428	16.91	4.65	10556
Central	d.Dolakha	Jirel	4559	31.33	6.89	1429
Central	d.Dolakha	Newar	17644	35.20	7.34	6212
Central	d.Dolakha	Sunuwar	1880	37.87	7.47	712
Central	d.Dolakha	Tamang	31416	39.19	7.53	12313
Central	d.Dolakha	Gharti/Bhujel	2703	39.21	7.32	1060
Central	d.Dolakha	Gurung	999	39.65	7.83	396
Central	d.Dolakha	Sarki	4074	40.12	7.38	1635
Central	d.Dolakha	Damai/Dholi	4154	42.04	7.60	1746
Central	d.Dolakha	Sherpa	8958	42.48	7.48	3805
Central	d.Dolakha	Kami	8000	43.91	7.63	3513
Central	d.Dolakha	Magar	2983	48.09	7.72	1435
Central	d.Dolakha	Majhi	435	48.50	7.40	211
Central	d.Dolakha	Thami	16740	54.75	7.61	9164
Central	e.Sindhupalchok	Brahman - Hill	29791	11.27	4.03	3358
Central	e.Sindhupalchok	Chhetree	52239	14.28	4.47	7462
Central	e.Sindhupalchok	Sanyasi/Dashnami	10506	16.34	4.87	1717
Central	e.Sindhupalchok	Gurung	2894	34.46	7.74	997

Region	District	Province/ Caste_ethnicity	Estimated total population	Estimated poverty rates (%)	Standard error of poverty rates	Estimated population below poverty line
Central	e.Sindhupalchok	Hyolmo	4878	34.72	7.07	1694
Central	e.Sindhupalchok	Newar	32193	34.95	7.62	11253
Central	e.Sindhupalchok	Sherpa	7502	35.21	7.27	2641
Central	e.Sindhupalchok	Ghale	651	35.70	7.56	232
Central	e.Sindhupalchok	Gharti/Bhujel	2641	38.11	7.51	1006
Central	e.Sindhupalchok	Magar	4896	40.98	7.68	2007
Central	e.Sindhupalchok	Kami	11241	41.53	7.50	4668
Central	e.Sindhupalchok	Tamang	99181	42.04	7.42	41699
Central	e.Sindhupalchok	Damai/Dholi	5483	42.49	7.52	2330
Central	e.Sindhupalchok	Sarki	4411	42.85	7.51	1890
Central	e.Sindhupalchok	Danuwar	3651	45.49	7.29	1661
Central	e.Sindhupalchok	Thami	4907	45.93	7.90	2254
Central	e.Sindhupalchok	Majhi	6613	47.94	7.65	3170
Central	e.Sindhupalchok	Pahari	1899	49.32	7.54	937
Central	f.Rasuwa	Brahman - Hill	6458	11.42	3.78	738
Central	f.Rasuwa	Chhetree	851	12.78	3.87	109
Central	f.Rasuwa	Newar	982	26.93	6.85	264
Central	f.Rasuwa	Gurung	1327	33.63	7.96	446
Central	f.Rasuwa	Magar	510	34.89	8.49	178
Central	f.Rasuwa	Ghale	1023	37.86	7.23	387
Central	f.Rasuwa	Damai/Dholi	441	38.81	7.78	171
Central	f.Rasuwa	Tamang	29600	39.63	7.41	11730
Central	f.Rasuwa	Kami	802	40.44	7.45	324
Western	g.Manang	Gurung	3362	29.79	8.02	1001
Western	g.Manang	Ghale	438	32.56	7.97	143
Western	g.Manang	Kami	217	36.11	8.19	78
Western	g.Manang	Bhote	409	43.53	7.82	178
Western	g.Manang	Tamang	732	48.77	8.23	357
Western	h.Mustang	Brahman - Hill	344	4.49	3.09	15
Western	h.Mustang	Chhetree	727	14.55	4.42	106
Western	h.Mustang	Thakali	2699	21.89	6.75	591
Western	h.Mustang	Gurung	2314	24.20	6.52	560
Western	h.Mustang	Lhopa	2259	26.95	6.28	609
Western	h.Mustang	Magar	875	34.07	7.77	298
Western	h.Mustang	Damai/Dholi	511	34.19	6.77	175
Western	h.Mustang	Kami	1022	36.70	7.62	375
Mid-western	i.Dolpa	Brahman - Hill	575	12.55	5.65	72
Mid-western	i.Dolpa	Thakuri	2354	23.22	5.86	547
Mid-western	i.Dolpa	Chhetree	16437	26.86	5.87	4415
Mid-western	i.Dolpa	Tamang	425	44.37	7.71	188
Mid-western	i.Dolpa	Magar	4561	45.91	7.39	2094
Mid-western	i.Dolpa	Gurung	2592	49.38	7.59	1280
Mid-western	i.Dolpa	Dolpo	4095	54.79	7.83	2244
Mid-western	i.Dolpa	Kami	3342	57.17	7.66	1911
Mid-western	i.Dolpa	Sarki	1011	59.68	7.60	604
Mid-western	i.Dolpa	Damai/Dholi	571	61.42	6.96	351
Mid-western	j.Jumla	Brahman - Hill	11889	19.91	5.17	2367
Mid-western	j.Jumla	Sanyasi/Dashnami	1218	28.62	6.12	349
Mid-western	j.Jumla	Thakuri	7978	30.85	6.19	2461
Mid-western	j.Jumla	Chhetree	65536	32.56	6.05	21336
Mid-western	j.Jumla	Lohar	1011	39.83	6.44	403
Mid-western	j.Jumla	Tamang	1216	45.45	7.62	553
Mid-western	j.Jumla	Sarki	7732	53.42	7.50	4131
Mid-western	j.Jumla	Kami	7989	57.78	7.58	4616

Region	District	Province/ Caste_ethnicity	Estimated total population	Estimated poverty rates (%)	Standard error of poverty rates	Estimated population below poverty line
Mid-western	j.Jumla	Damai/Dholi	2768	57.88	7.53	1602
Mid-western	k.Kalikot	Sanyasi/Dashnami	1364	29.87	6.14	407
Mid-western	k.Kalikot	Brahman - Hill	23620	35.44	6.55	8371
Mid-western	k.Kalikot	Thakuri	34672	38.02	6.47	13181
Mid-western	k.Kalikot	Chhetree	39714	40.33	6.52	16016
Mid-western	k.Kalikot	Lohar	722	42.69	6.97	308
Mid-western	k.Kalikot	Kumal	753	61.62	7.67	464
Mid-western	k.Kalikot	Magar	506	62.78	7.75	317
Mid-western	k.Kalikot	Sarki	4475	66.24	7.03	2964
Mid-western	k.Kalikot	Kami	24411	67.07	7.06	16373
Mid-western	k.Kalikot	Damai/Dholi	7001	68.84	6.90	4819
Mid-western	l.Mugu	Thakuri	8524	29.76	6.12	2537
Mid-western	l.Mugu	Brahman - Hill	2852	31.28	5.63	892
Mid-western	l.Mugu	Chhetree	27057	32.88	6.02	8895
Mid-western	l.Mugu	Sanyasi/Dashnami	701	33.86	5.63	237
Mid-western	l.Mugu	Tamang	4383	54.84	7.57	2403
Mid-western	l.Mugu	Damai/Dholi	1768	57.36	7.85	1014
Mid-western	l.Mugu	Dalit Others	3258	60.25	7.30	1963
Mid-western	l.Mugu	Kami	5268	61.97	7.51	3265
Mid-western	l.Mugu	Sarki	473	62.63	7.40	296
Mid-western	l.Mugu	Bhote	348	69.83	7.06	243
Mid-western	m.Humla	Brahman - Hill	3235	29.36	5.52	950
Mid-western	m.Humla	Chhetree	19608	32.08	5.68	6291
Mid-western	m.Humla	Thakuri	9995	32.46	5.92	3244
Mid-western	m.Humla	Tamang	6569	40.21	7.55	2641
Mid-western	m.Humla	Byasi/Sanka	2479	55.50	7.55	1375
Mid-western	m.Humla	Damai/Dholi	1787	61.50	7.00	1099
Mid-western	m.Humla	Sarki	1140	63.69	7.29	726
Mid-western	m.Humla	Kami	4950	64.01	7.16	3168
Far-western	n.Bajura	Brahman - Hill	9432	56.46	8.42	5325
Far-western	n.Bajura	Thakuri	7026	58.44	8.06	4106
Far-western	n.Bajura	Sanyasi/Dashnami	3252	59.99	8.22	1951
Far-western	n.Bajura	Chhetree	78292	64.42	7.69	50437
Far-western	n.Bajura	Lohar	5219	67.16	7.68	3506
Far-western	n.Bajura	Bhote	1397	82.71	5.95	1155
Far-western	n.Bajura	Kami	13202	85.23	5.27	11252
Far-western	n.Bajura	Sarki	6772	85.30	5.32	5776
Far-western	n.Bajura	Damai/Dholi	5744	86.12	5.12	4947
Far-western	n.Bajura	Badi	1896	86.58	5.12	1642
Far-western	n.Bajura	Kumal	441	86.97	4.79	384
Far-western	n.Bajura	Dalit Others	1233	88.23	4.57	1088
Far-western	o.Bajhang	Thakuri	9552	56.75	8.51	5420
Far-western	o.Bajhang	Brahman - Hill	20002	59.41	8.36	11884
Far-western	o.Bajhang	Sanyasi/Dashnami	2447	61.64	7.91	1508
Far-western	o.Bajhang	Chhetree	130815	67.43	7.50	88215
Far-western	o.Bajhang	Sarki	4363	84.29	5.57	3677
Far-western	o.Bajhang	Damai/Dholi	3029	87.33	4.81	2645
Far-western	o.Bajhang	Dalit Others	10020	87.44	4.67	8762
Far-western	o.Bajhang	Kami	14438	87.58	4.69	12645
Far-western	p.Darchula	Thakuri	6515	51.10	8.65	3329
Far-western	p.Darchula	Sanyasi/Dashnami	1677	52.34	9.03	878
Far-western	p.Darchula	Brahman - Hill	22379	52.53	8.70	11756
Far-western	p.Darchula	Chhetree	86377	59.17	8.28	51106
Far-western	p.Darchula	Byasi/Sanka	965	61.15	9.17	590

Region	District	Province/ Caste_ethnicity	Estimated total population	Estimated poverty rates (%)	Standard error of poverty rates	Estimated population below poverty line
Far-western	p.Darchula	Lohar	1727	70.63	7.23	1220
Far-western	p.Darchula	Dalit Others	4199	83.42	5.65	3503
Far-western	p.Darchula	Damai/Dholi	974	83.49	5.81	813
Far-western	p.Darchula	Kami	7078	86.20	5.03	6102
Far-western	p.Darchula	Sarki	902	88.10	4.57	795
Total						718,033

Note: aggregate of caste/ethnicities within each district does not match to district total because of exclusion of small caste/ethnic groups.

Author Biosketch

Bhim Raj Suwal, PhD, is an Associate Professor at the Central Department of Population Studies, Tribhuvan University, Kathmandu. Dr. Suwal specializes in demographic techniques, human migration, scientific sample design and estimation, planning and execution of large-scale surveys, and quantitative data analysis. He has received a two-month intensive training on scientific sample design from the University of Michigan, USA and working as sampling expert and statistician in various research projects supported by the Government of Nepal and development partners. He has published a number research articles in national and international journals. He also served as Assistant Dean (PhD Coordinator) and Acting Dean under the Faculty of Humanities and Social Sciences, Tribhuvan University.

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