

Synergies Among Monetary, Multidimensional and Subjective Poverty: Evidence from Nepal

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Abstract In this paper we construct a Nepal specific multidimensional poverty index using the Nepal Longitudinal Sample Survey (NLSS) for the period 1995–2010. The indicators for Nepal Multidimensional Poverty Index (NMP) have been chosen using the goals set by the Government of Nepal and the perceptions of adequacy as reported by households. In doing so this study combines multidimensional and subjective methods of measuring wellbeing. The subjective data is used to guide the choice of dimensions for the multidimensional analysis. Our findings show that Nepal has had a dramatic fall in multidimensional poverty along with the observed fall in consumption poverty in this period. Comparing the extent to which consumption poverty accurately identifies the multidimensionally poor, we find the error has reduced over time but remains large in proportion to the poverty rate implying the need for a multidimensional measure. For the different ethnic groups and regions the patterns of reduction in poverty are not homogenous and are different from those of consumption poverty with the NMP outperforming the consumption poverty in tracking targeted policy actions.

Keywords Multidimensional poverty · Subjective well-being · Shapley value decomposition

1 Introduction

The idea that poverty is intrinsically multidimensional has been widely accepted but there is no consensus on what constitute the dimensions of poverty (see Alkire and Foster 2011; Ravallion 2011; Ferreira and Lugo 2012). When choosing dimensions the aim is to make an informed decision that represents the choices of the people. Asking the individuals directly about their choices by way of a survey is one option, but it is also not free from

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debate (Kahneman and Krueger 2006; Kapteyn et al. 1988; Ravallion and Lokshin 2001). Any such survey would be highly dependent on the framing of the questions and the answers could be drastically different using different survey modules. However the idea of using people's perception about their deprivation status is not new. *Voices of the Poor* (one of the largest surveys conducted about the perceptions of poverty) asked 40,000 men and women about what they think about poverty provided useful insights (see Narayan et al. 2000). Pradhan and Ravallion (2000) use subjective well-being, namely a question about adequacy of food, to estimate the subjective poverty line for Nepal (using NLSS1).

The divergence between consumption poverty and subjective notions of poverty has been noted by several authors. Palomar Lever (2004) finds statically significant differences in subjective well-being in relation to the socio-economic conditions of the people. Kingdon and Knight (2006) conclude, "it is possible to view subjective well-being as an encompassing concept, which permits us to quantify the relevance and importance of the other approaches and of their component variables. Any attempt to define poverty involves a value judgement as to what constitutes a good quality of life or a bad one. We argue that an approach which examines the individual's own perception of well-being is less imperfect, or more quantifiable, or both, as a guide to forming that value judgement than are the other potential approaches." A survey on the debate about money and happiness or more broadly well-being can found in Diener and Biswas-Diener (2002).

Nepal has reduced consumption poverty dramatically over the past 15 years from 1995–1996 to 2010–2011.¹ This paper studies whether this reduction has been accompanied by reduction in deprivation among other dimensions. Having the monetary means necessary to pay for certain goods and services do not necessarily imply that individual actually has access to these goods and services. These problems are more acute in areas which are remote or have difficult terrain. Large parts of Nepal are mountainous and therefore access to facilities for healthcare and education is difficult with people having to walk several miles to the nearest motorable road. Therefore, deprivation in these dimensions is not always highly correlated with consumption poverty. Table 1 shows that the correlations between consumption poverty and deprivation in eight indicators is not high with all correlation coefficients for being <0.4 .

Among the few available studies of multidimensional poverty in Nepal, the UNDP's Multidimensional Poverty Index (MPI) uses a specific set of indicators for analyzing poverty at the international level (Alkire and Santos 2010). However, given the unique nature of countries such as Nepal where the terrain is very different the use of country-specific indicators that directly address core issues of deprivation can be more fruitful. Such an exercise is complementary to the international multidimensional poverty index similar to the idea of national poverty lines and the international \$1.25 a day poverty line.

Nepal is uniquely located in the Himalayas and bordered on the north by the China and on the south, east and west by India. There is a dramatic difference in elevation found in Nepal and this affects the needs of the people in these areas. The predominant religious group in Nepal is Hindus and they are divided into over 100 subgroups called castes. These groups have made differential progress economically. This is compounded by the

¹ Nepal uses the Cost of Basic needs approach (CBN) to measure poverty. According to this approach the poverty line is defined by the minimum amount of expenditure that needs to be incurred to ensure an individual can fulfill her basic food and non-food needs. This basic minimum is decided based on the minimum caloric intake that is necessary for subsistence. For details of the Nepalese official poverty estimation see *Poverty in Nepal 2010–2011*, Central Bureau of Statistics, Nepal.

Table 1 Correlation between consumption poverty and deprivation in the other indicators

Year	Child out of school	Time to primary school	Delivery by health professional	Under nourishment	Sanitation	Electricity	Cooking medium	Access to phones
1995–1996	0.3454	0.1365	0.1808	0.1	0.2998	0.2774	0.24	0.116
2010–2011	0.1892	−0.0611	0.2055	0.1057	0.2769	0.2617	0.236	0.3696

difference in terrain that is faced by the people living in the various regions.² There have been several studies that have focused on specific parts of the country, like Baland et al. (2010) and Blaikie et al. (2002), to study the issues that arise in these areas. Wagle (2005), to the best of our knowledge, is the only paper that has studied Nepal multidimensional poverty but the analysis is restricted to Kathmandu. In this paper we undertake a study of Nepal incorporating a multidimensional aspect to poverty.

To find the set of indicators and dimensions which would be best suited for Nepal as a first cut, we use the Three Year Interim Plan 2007/08–2010/11 to guide our preliminary choice of indicators. The indicators in the Interim Plan document broadly relate to the dimensions of material deprivation, education, health and housing. They set out objectives to be achieved by the Government of Nepal. Second cut is the use of the subjective poverty data to find the indicators that are relevant for Nepal. We use data from three waves of the Nepal Longitudinal Sample Survey (NLSS) round I, II and III which span a time period of 15 years corresponding to the years 1995–1996, 2004–2005 and 2010–2011. Along with the standard consumption expenditure module Nepal has a detailed subjective well-being module which provides information on not only adequacy of food but also on other dimensions of well-being including housing, access to health and access to education. We use the NLSS to extract “importance” weights for these indicators by obtaining regression weights from specifications in which the dependent variables are subjective survey measures of “adequacy of housing”, “adequacy of education” and “adequacy of health”. These weights are used to narrow the set of indicators used in the proposed index.

Broadly speaking, the analysis gives us indicators that are similar to those in the MPI with some key exceptions. First, the monetary poverty is important for all forms of subjective poverty and so we think it should be a dimension by itself (rather than as an indicator in the broad standard of living dimension, as in the MPI). Secondly, drinking water and type of floor did not come out as being relevant for Nepal using the subjective analysis, though they are part of the MPI. This may be explained by the specific terrain in Nepal where mud floors are more acceptable in the hills, where temperatures can fall sharply in winter.

Our analysis gives us nine indicators that can be broadly classified into four dimensions and using these we construct the Nepal Multidimensional Poverty Index (NMP).³ There is some overlap between the NMP indicators and the MPI indicators but there are several that are not common. We compare the results obtained here with those of the MPI and consumption poverty estimates of the Government of Nepal.

Our main results are that there has been a large decline in multidimensional poverty over the period along with the witnessed decline in consumption poverty. However the

² Do and Iyer (2010) show the importance of geography and poverty in explain conflict intensity in Nepal.

³ See Alkire and Foster (2011a) for the details of the methodology used here to construct the index and see CONEVAL(2007) for one of the first county specific multidimensional poverty index constructed for Mexico.

groups of people that are identified as poor by these two measures are not the same. The sub-national analysis shows that regions and ethnic groups that have witnessed the most improvements are not the same by the two measures. Muslims have made remarkable improvements in reduction of consumption poverty but this has not translated to reductions in deprivation on other dimensions implying that NMP for them has not fallen as much. Further the far western and mid-western regions have not seen large decline in consumption poverty but they have seen large improvement in NMP. This could be a direct consequence of direct policy action which has been taken to improve access to facilities in these areas. Therefore, the NMP is better suited to track improvements which can then be potentially directly linked to targeted policy actions in these regions and which would escape a standard unidimensional poverty analysis.

The rest of the paper is organized as follows: Sect. 2 describes the method used to choose the indicators for the multidimensional index. Section 3 has the main results collected in it including the sub-national analysis. Section 4 provides a summary and some concluding remarks.

2 Choice of Dimensions and Indicators

2.1 Data

The data used in this paper is from the Nepal Living Standards Survey (NLSS) that is conducted by the Central Bureau of Statistics, Nepal (CBS). Three waves of this survey have been conducted so far, the first in 1995/96, the second in 2003/04 and the third wave in 2010/11. The main objective of the NLSS is to collect data from Nepalese households and provide information to the government to monitor progress in national living standards and to evaluate the impact of various policies and programs on the living conditions of the population. The sample size for the NLSS was 3,388 households in Round I and increased to 5,988 households Round III. Further, this sample is divided into four strata based on the geographic regions of the country: mountains, urban hills, rural hills and terai. Therefore, the sample is nationally representative and the main survey questionnaire is in Nepali.⁴

As a first step towards choosing dimensions and indicators we use the Three Year Interim Plan document of the Government of Nepal to ensure the multidimensional analysis is consistent with the broad policy framework set out by the government. From the goals set in this document we find the ones which have indicators that can be measured using the NLSS data. We have restricted ourselves to the NLSS data as this is also the source of the official unidimensional poverty estimates of the Government of Nepal. The indicators that we have from this exercise can be broadly classified into three groups or dimensions: (i) access to facilities, (ii) education and (iii) child and maternal health.⁵

⁴ The NLSS has a sub-sample that is longitudinal with the same households being interviewed over all three rounds. However, the sample size though representative at the national level, does not allow for the subnational analysis that is conducted in this study. In this paper we use only the cross-section component of the survey. The above sample sizes correspond to the cross-section sample only.

⁵ The importance of these dimensions to overall improvements in wellbeing have been emphasized by organizations like UNDP and WHO (UNDP 1999, 2011a, b; WHO/UNICEF, 2012).

2.2 Methodology

We have a two-step methodology to choose the dimensions for the Nepal multidimensional poverty index. First step requires running three regressions to estimate the relevant variables for each of the three dimensions of well-being. For each of the three broad dimensions we have a subjective question in the NLSS which can provide information on the preferences of the people. The subjective questions ask if the family has adequate means for health services, food, education, etc. The particulars are given in Table 9 in the “Appendix”. The empirical model we use is the following Probit model:

$$P(y_i = 1|X_i, Z_i) = \Phi(\beta_0 + \beta X_i + \delta Z_i)$$

where Y_i is the subjective well-being variable, X_i is a vector of the subjective indicators of poverty and Z_i is the vector of control variables for gender of head of household, ethnicity of head of household and size of the household. Of course all regressions also include the objective poverty status of the household.

To gain information on the relative importance of each indicator, in the second step we use the Shapley decomposition technique. This technique has been used to decompose the sources of variations in several papers (see Israeli 2007; Shorrocks 1999; Hoyos and Narayan 2010). The methodology decomposes the contribution of each indicator to the total explained variation of the regression (or the pseudo-R squared). The sum of the contributions by each indicator adds to 100 % of the total explained variation. The idea is to find the total explained variation that would occur if we added a given variable to a set of pre-existing variables. Since the indicators are all correlated, the contribution of an indicator depends on the set of pre-existing indicators to which we add the indicator of interest. Therefore, to identify the contribution of any specific indicator we consider the addition of this indicator will make to the total explained variation for *all* possible subsets of the rest of the indicator. Once we have these specific contributions we take the weighted average of them to get the *overall contribution* of an indicator to total explained variation.

2.3 The Dimensions

Table 10 (in the “Appendix”) shows the regression results for the third round of the NLSS for each of the dimensions of subjective well-being.⁶ We see that for the adequacy in housing the variables that the people perceive to be the most salient are consumption poverty status, material of roof and walls, access to electricity, clean cooking fuel and phones. For the adequacy in access to education the variables that are significant in the Probit regression are whether any member of the household has received at least a primary education and enrollment rate. For the adequacy in the dimension of health the variables that are significant are whether the deliveries in the household were assisted by a medical practitioner and stunting among children. However the regressions analysis is not able to provide the relative contribution of each of the indicators.

For the purpose of gauging the relative importance of the dimensions we use the Shapley value decomposition. Table 2 below provides the percentage contributions of the various indicators to the respective subjective indicators. We find that objective poverty is an important factor in explaining people’s perceptions of deprivation in each of the

⁶ We have also run similar regressions for the other two rounds. The results are collected in the “appendix”. We find similar results on all three rounds of the NLSS. The subjective questions used for each of the regressions are given in Table 9.

Table 2 Percentage contributions of the indicators to explain the subjective measure of adequacy

	NLSS1	NLSS2	NLSS3
Housing			
Overcrowding	15.44	10.12	−0.59
Roof and wall material	6.64	1.43	0.87
Piped water	7.63	0.58	1.05
Sanitation	10.69	12.73	9.98
Electricity	24.98	32.53	30.59
Cooking fuel	13.33	18.34	24.14
Phone	7.15	12.9	21.87
Access to road	3.99	0.51	2.09
Consumption poverty	10.14	10.84	9.99
Education			
Enrolled	28.45	63.64	22.02
Time to primary school	−6.45	14.03	43.38
Time to motorable road	32.92	0.87	0.04
Consumption poverty	45.08	21.45	34.57
Health			
Stunting in children	0.32		3.37
Underweight for children	0.51		1.12
Child mortality	10.54	20.81	34.53
Assisted delivery	17.5	13.4	16.04
Access to birth control methods	4.95	17.91	2.33
Consumption poverty	66.18	47.88	42.61

particular dimensions.⁷ For the dimension of health, the most salient contributors are delivery using health professionals and incidence of child mortality in the household. For the dimension of education, the largest marginal effect to the explained variation comes from enrollment and time taken to reach primary school. Access to sanitation, electricity, cooking medium and phones have the largest marginal contribution to explaining the variations in reported adequacy of housing.

Based on these results we see that objective poverty itself is an important contributor to the perceptions of adequacy in all dimensions. This suggests that it would be natural to construct an index using four rather than three dimensions with consumption expenditure being one of the dimensions and the three others being health, education and living conditions. However, another point to note is that though the results of the decomposition analysis provide us with some information on what the people think to be most relevant, the weights themselves are not stable. The weights may be unstable due to a variety of factors (framing of questions, effect of public campaigns that effect the general mood of the people), not all of which are in the control of the investigator and so this gives use further reason why the above analysis (or in fact any empirical weighting analysis) should only be used as a way to guide the choice of dimensions and not to pick the weights.⁸

⁷ We have also conducted a similar analysis using the earlier two rounds. The results are similar.

⁸ World Bank Report on West Bank and Gaza (World Bank 2011) uses regression weights in the multi-dimensional poverty analysis.

Table 3 Nepal Multidimensional Poverty Index (NMP): dimensions and indicators

Dimension	Indicator
Consumption poverty	Monthly per capita consumption expenditure
Access to facilities	Sanitation
	Electricity
	Cooking medium
	Phone
Education	School enrollment
	Time to primary school
Child and maternal health	Child mortality
	Assisted delivery

Following the MPI weighting schemes, we have used nested weights with equal weights to the dimensions and equal weights to indicators within dimensions. Table 3 has the final list of indicators and dimensions that have been chosen using the regressions and the decompositions. Therefore, we have four dimensions with 25 % weight each and nine indicators with equal weights within each dimension. For an individual to be considered multidimensionally poor we use the cutoff of 40 %; therefore an individual has to be deprived in at least 40 % of weighted indicators to be considered poor. Alternative cutoff values were also tested and a different weighting scheme using equal weights to all indicators was also constructed as a robustness check. The results for these alternative specifications are collected in the “[Appendix](#)”.

3 Trends in poverty

3.1 Nepal’s Multidimensional Poverty

We have two indicators for the dimension of child and maternal health. There has been a remarkable improvement in maternal health with more births being assisted by health professions and a sharp fall in child mortality (see Table 4). In the dimension of access to facilities there have been improvements made between 2004 and 2010. This is concurrent with the end of the Maoist revolution and the start of the rebuilding of regions affected by the conflict. Reductions in deprivations in access to adequate facilities for sanitation, phone and electricity have followed a similar pattern.

In the dimension of education we have a mixed picture. For the indicator school enrollment, there has been a 14 % point decline in deprivation. Travel time to primary school had reduced substantially for an average household: in 1995, more than 74 % of households were situated over 30 min away from a primary school. The same number for 2010 was 29 %.

Table 5 shows the incidence of deprivation among the consumption poor households. Not surprisingly the reduction in deprivation in all indicators has been lesser for the poor than it has for the nation as a whole. In fact for one indicator (time to primary school) we find that between 2004 and 2010 there was a large rise in incidence among the poor. However there have been major improvements in access to telephone even among the poor.

Table 4 Incidence of deprivation per dimension

Dimension	NLSS1 (%)	NLSS2 (%)	NLSS3 (%)
Consumption poverty	64	31	25
Assisted delivery	48	32	21
Child Mortality	31	24	19
Main cooking medium	94	87	47
Sanitation facilities	80	63	31
Electricity	86	64	36
Phone	99	93	27
Time to primary school	74	11	16
School enrollment	55	36	34

Table 5 Incidence of deprivation among the consumption poor

Dimension	NLSS1 (%)	NLSS2 (%)	NLSS3 (%)
Assisted delivery	55	50	36
Child mortality	36	30	25
Main cooking medium	99	99	71
Sanitation facilities	89	86	52
Electricity	94	88	65
Phone	100	100	26
Time to primary school	80	15	29
School enrollment	68	59	54

In 2004 no poor household had a phone (either a landline or mobile phone) but by 2010 more than 70 % of poor households have access to a phone.

Next we look at the trends using the multidimensional index constructed here. For the NMP (using the second cutoff of 40 %). Figure 1 shows a remarkable decline in the headcount of multidimensional poverty in Nepal between 1995 and 2010. In 1995, 80 % of the population was identified as being multidimensionally poor but by 2010 less than 30 % of the population was multidimensionally deprived. Therefore, more than 50 % of the population had moved out of poverty in 15 years. Nepal halved the incidence in the first nine years and then between 2004 and 2010 reduced the incidence even further from 43 to 27 %.⁹

Looking at the multidimensional poverty estimates, we find that between 1995 and 2004 the NMP reduced to less than half its 1995 value of (0.59) to 0.27. Further, in the next 6 years between 2004 and 2010 the NMP registered a similar decline. The fall in headcount taken together with the fall in NMP suggests that the average intensity of deprivation has also fallen in this period, though not as dramatically.

The Alkire–Foster class of indices has the property that it allows us to decompose the aggregate index into its components to see which dimensions and indicator contribute most to poverty. Figure 2 demonstrates such a decomposition. We see that between 1995 and 2004 the contributions of consumption poverty and the health dimension have been similar. However, the contribution of education dimension has reduced: this is mainly driven by the

⁹ Using the MPI measure (instead of the NMP) we still find significant reduction in the headcount but the progress has been less with overall reduction being less than half of the initial level.

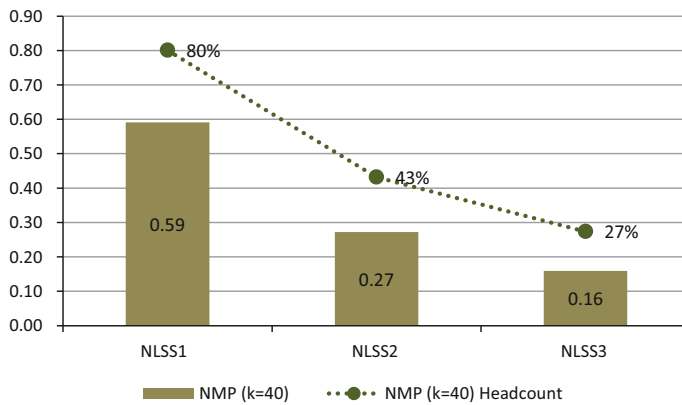


Fig. 1 Multidimensional poverty over the 15-year period

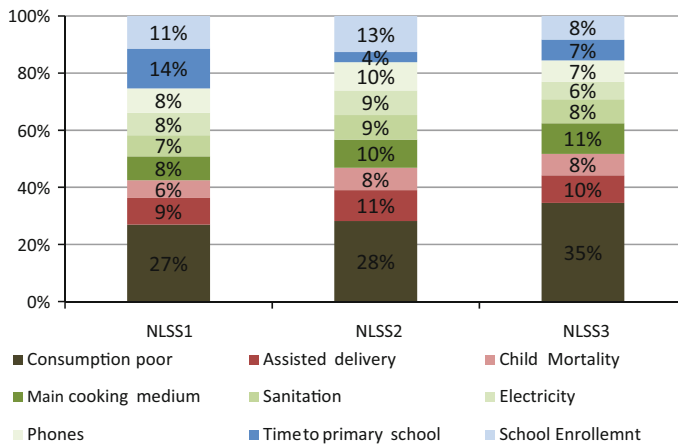


Fig. 2 Decomposition of multidimensional poverty over the period. (Color figure online)

reduction in time taken to reach a primary school. Between 2004 and 2010, we see an increase in the contribution of consumption poverty to overall multidimensional poverty.

3.2 Overlaps with the Consumption Poor

We chose the NLSS over other available surveys that have more detailed information on health and other dimensions of wellbeing to allow for a direct comparison of the poverty incidence based on consumption poverty and that based on the multidimensional index (which uses the consumption poverty as one of its dimensions).

One of the key questions that such an exercise would like to address is the extent of overlap between the two measures. If those households identified as poor by the two measures are identical, then consumption poverty can be viewed as a good proxy for overall wellbeing. In practice, however, this is rarely the case, and a country like Nepal

where access to goods and services has the additional challenge of the mountainous terrain is no exception.

There are two ways in which those identified as poor by the two methods may be different. First, there could be those households that are identified as multidimensionally poor by our criteria but are overlooked by the consumption poverty measure. We call the percentage of such households the ‘exclusion error’; they are the people who are *excluded* by the consumption poverty method. The second group of households is those who are not multidimensionally poor but are consumption poor, that is, those households that are *included* in the consumption poverty measure though their overall wellbeing is sufficiently high so as to go over the multidimensional criteria. We refer to the percentage of such household as the ‘inclusive error’. Given these definitions, the relation between the headcounts of poverty and the inclusion and exclusion error can be written as the following:

$$\text{Consumption headcount} = \text{poor by both measures} + \text{inclusion error}$$

$$\text{Multidimensional headcount} = \text{poor by both measures} + \text{exclusion error}$$

In cases when the multidimensional poverty measure includes the consumption poverty as one of the indicators, the relation between the exclusion error and inclusion error is monotonically decreasing. The maximum exclusion error is achieved when the union approach to multidimensional poverty is used and it is equal to the multidimensional headcount minus the consumption poverty headcount. Further, the maximum inclusion error is achieved using the intersection approach to multidimensional poverty and it is equal to the consumption poverty rate minus the multidimensional headcount. Figure 3 shows the typical shape of the relation between the two errors in the case where consumption poverty is one of the indicators used in the multidimensional analysis using NLSS 3.

Next we focus on the NMP headcount that uses the second Alkire and Foster cutoff of 40 % and the consumption poverty headcount and track how the magnitudes of the two errors have changed over time. Recall that since consumption poverty has 25 % weight in the NMP and the poverty cutoff is set at 40 % we will not have a large inclusion error. Even so, the magnitudes of the inclusion errors are small for all 3 years and have increased

Fig. 3 Relation between inclusion error and exclusion error using NLSS 3

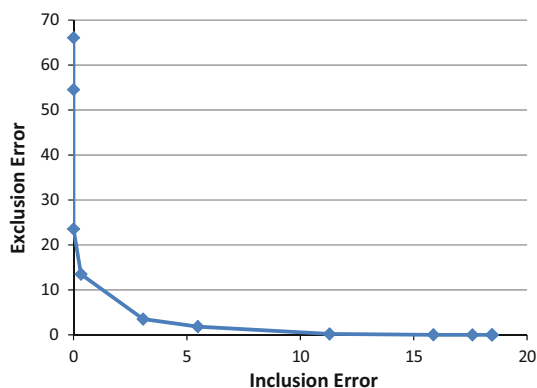


Table 6 Exclusion and inclusion errors for the NMP measure

	NMP poor		
	Non poor	Poor	Total
<i>Consumption poor</i>			
NLSS3			
Non poor	77.97	3.51	81.48
Poor	3.07	15.5	18.52
Total	81.05	19	100
NLSS2			
Non poor	67.31	9.56	76.87
Poor	0.23	22.9	23.13
Total	67.54	32.5	100
NLSS1			
Non poor	34.34	13.3	47.66
Poor	0.3	52.1	52.34
Total	34.64	65.4	100

over time from 0.3 % in 1995 to 3.07 % in 2010. This shows that consumption poverty is an important aspect of the multidimensional nature of poverty.

The exclusion error has, on the other hand, fallen in the period implying that as poverty has declined in Nepal the consumption poverty measure has become more accurate at measuring overall wellbeing. In 1996, the exclusion error was over 13 % that is 13 % of the population would have been left out if we used only consumption poverty to identify the poor. By 2010 this number has fallen to <4 % implying that in 2010 we would capture most of those deprived multidimensionally even if we just used the consumption poverty measure (see Table 6).

It is worth emphasizing that in any given period, there is a tradeoff between the inclusion error and exclusion error. As we increase the value of the second cutoff we increase the exclusion error and reduce the inclusion error. Both these errors are best avoided and one way to go about choosing the k may be to actually fix one error at an acceptable level. But this would add the additional arbitrary decision of the acceptable level of any one error.

Another approach is the following: if we pick a value of the second cutoff such that the headcount of poverty is equal by the two measures, then we have that the inclusion error is equal to the exclusion error. An alternative way of doing this could also be to change the consumption poverty line to match the NMP headcount. However, this is less desirable since the consumption poverty line has the advantage of relating to a standard basic need criterion. For 1995, the headcounts roughly match when we set the second cutoff at 57 % and then the headcounts are equal to 23 % for consumption poverty and 29 % for NMP poverty and the errors are 7.3 and 1.4 %. For 2010 we are able to get the closest match of headcounts, with the two headcounts roughly equal to 18 %. This happened with the second cutoff value of 43 % and at this level the inclusion and exclusion errors are both roughly 3 % (see Table 7).

Table 7 Exclusion and inclusion errors when the headcounts of poverty are matched

	NMP poor		
	Non poor	Poor	Total
<i>Consumption poor</i>			
NLSS3 NMP with K = 43 %			
Non poor	77.97	3.51	81.48
Poor	3.07	15.45	18.52
Total	81.05	18.95	100
NLSS2 NMP with K = 50 %			
Non poor	69.56	7.31	76.87
Poor	1.38	21.75	23.13
Total	70.94	29.06	100
NLSS1 NMP with K = 57 %			
Non poor	43.8	3.86	47.66
Poor	7.62	44.72	52.34
Total	51.42	48.58	100

3.3 Sub-national Analysis

The observed fall in NMP over time has not occurred similarly for all regions or all segments of the population. Therefore, we do a sub-national analysis where we first see the differences in rates of poverty reduction for different ethnic groups; next, we divide the population based on the geographical area in two distinct ways- the type of terrain they inhabit (mountain, hill and Terai) and the official division into the five geographical regions (Eastern, Central, Western, Mid-western and Far-western).

There are a large number of ethnic groups in Nepal.¹⁰ Such is the scale of the diversity that the sample size of the survey does not allow us to do a complete ethnic profiling for Nepal. We are however able to divide the population of Nepal into six broad ethnic groups, namely, Brahmin/Chhetri, Newar, Terai janajatis, Hill janajatis, Muslims and TMC/Dalits/ other minorities. Among these Brahmin/Chhetri and Newar are the upper caste Hindu ethnicities and the Terai janajatis and the Hill janajatis are the indigenous tribal populations of the Nepal.

As one expects the upper-caste Hindu groups have had the lowest incidence of both consumption poverty and multidimensional poverty in all 3 years. There has been a convergence in poverty rates over the period for the different groups when using NMP and consumption poverty measures (see Figs. 4, 5). There has been a steady decline in NMP poverty in the period for all groups though at differential rates. However, for consumption poverty, there was a sharp decline between 1995 and 2004 with the decline tapering off in the later period.

The Newars had the slowest rate of poverty reduction for the period whereas the Brahmin/Chhetri groups had a steep fall in consumption poverty between 1995 and 2004 and practically no change in headcount between 2004 and 2010, this resulted in the gap between them and the Newars increasing slightly in 2010 as compared to 2004 (when it was the smallest). Among the other groups, the Hill janajatis have had the most steady but

¹⁰ The NLSS3 lists over one hundred different ethnic groups.

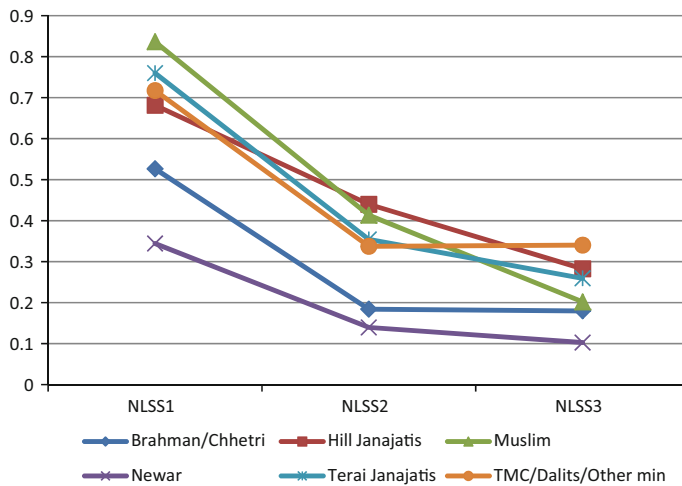


Fig. 4 Consumption poverty for the different ethnic groups

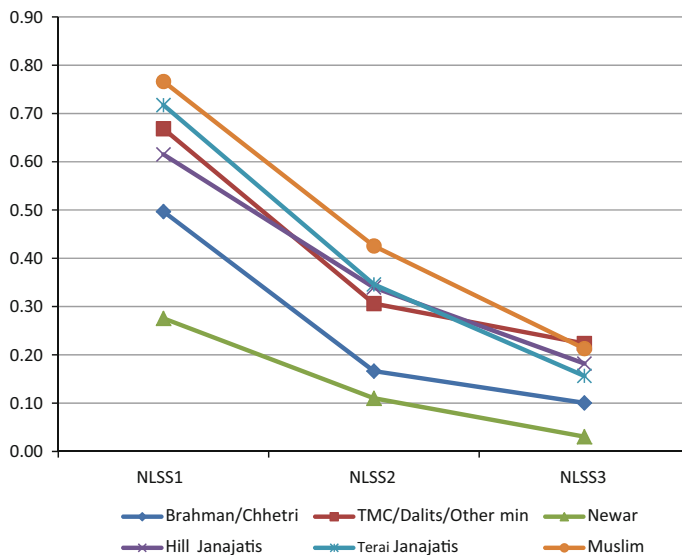


Fig. 5 Multidimensional poverty across ethnic groups

slowest rate of poverty reduction. They were the least poor of the 4 other groups in 1995 and the most poor (of the four) in 2004 since all the other groups had sharper declines in poverty in this period. On the other hand, the Muslims have had the most remarkable experience in the reduction of poverty. They had the highest incidence of consumption poverty in 1995 of all groups; however in 2010 their consumption poverty rate was similar to that of the Brahmin/Chhetri group (the second lowest). TMC/Dalits/other minorities

registered an increase in their incidence of consumption poverty between 2004 and 2010 offsetting some of the gains made in the earlier period (see Fig. 4).

All groups saw large declines in poverty based on the NMP between 1995 and 2004 but the Newar population had one of the slowest declines implying that the gap between the poverty rates of Newars and the Brahmin/Chhetri groups reduced between these periods (see Fig. 5). Unlike consumption poverty, for the NMP no group had a reversal in the achieved poverty reduction between 2004 and 2010. However for most groups the pace of reduction slowed in the second period. Muslims have seen a remarkable fall in consumption poverty but this is not the case with the NMP where they remain one of the most disadvantaged groups. On the other hand, the Terai janajatis have had largest fall in NMP making them the third least poor in 2010 (after Brahmin/Chhetri and the Newars). For the TMC/Dalits/other minorities though there was no reversal in poverty trend between 2004 and 2010 as with consumption poverty but then reductions flattened out making them the group with the highest poverty in 2010.

If we decompose the NMP to see the share of the dimensions to overall poverty we find the following. In general over the period the contribution of the dimensions of education to overall poverty has reduced for all ethnic groups whereas the contribution of consumption poverty has risen. This is similar to the national pattern (see Fig. 6). However, for the Newars the contribution of consumption poverty increased significantly more than for the others. Between 1995 and 2004 for all groups there was a reduction in the share of education which was compensated by an almost equal increase in share of living conditions. However, between 2004 and 2010 there was an increase in the share of consumption poverty which was more evenly spread out among the other dimensions with small reduction in the three other dimensions for all groups.

Nepal is a mountainous country with some parts of the country having very difficult terrain. Based on the terrain Nepal can be divided into three belts - mountains, hill and the terai (or low flat lands). Figure 7 shows the differences in the experiences in these three belts for consumption poverty and NMP. There was a sharp fall in poverty using both measure between 1995 and 2004; however, between 2004 and 2010, there is a difference in

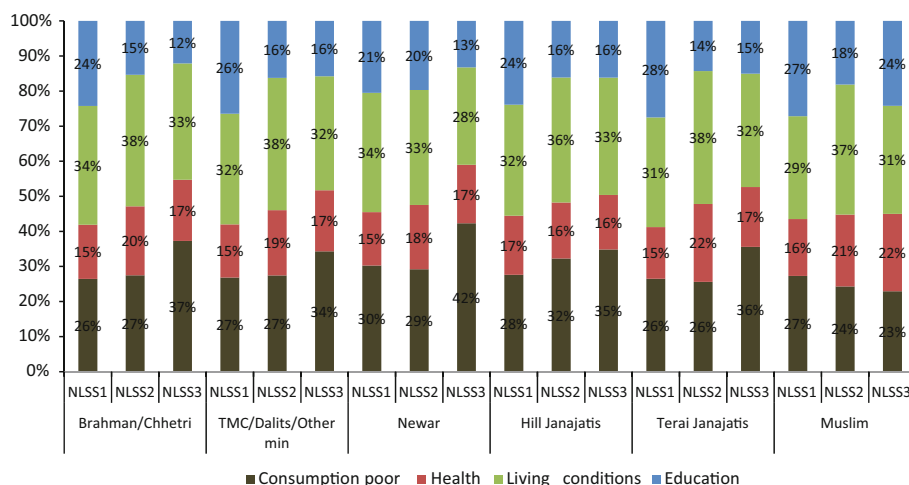


Fig. 6 Dimensional decomposition of poverty for all ethnic groups. (Color figure online)

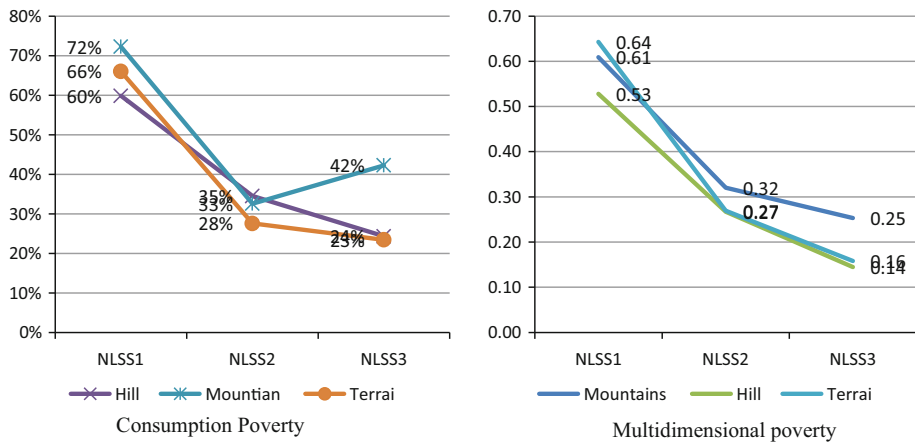


Fig. 7 Differences in poverty for the various geographical belts

the way consumption poverty and NMP move. For the mountain belt there was 7 % rise in consumption poverty between 2004 and 2010 but the NMP did not witness any such rise though the rate of reduction was slower in this period. In 2010, for consumption poverty there was higher variation among the belts than at any point earlier but this was not the case for NMP. The hill region had the lowest NMP in all three periods but the reduction rate was the slowest for this region. For consumption poverty on the other hand, between 1995 and 2004 the hill belt had the least fall in poverty; but this increased in the later period. This resulted in the hill belt having the highest poverty incidence in 2004 and the lowest in 2010 among the three belts.

For administrative purposes, the country is demarcated into five regions. These regions are called Eastern, Central, Western, Mid-western and Far western. For these regions, first we look at the incidence of deprivation for selected indicators separately. Overall there has been a fall in incidence in all indicators from 1995 to 2010 but the way this reduction has proceeded has been different for different regions. This is evident from looking at the incidence in the interim year-2004 (see Fig. 9 in the “Appendix”).

For assisted delivery there have been improvements in all regions, however, the Far western and mid-western regions have lagged behind. The far western region has actually had an increase in incidence between 2004 and 2010 making it the most deprived region whereas in 2004 the mid-western region was the most deprived. The other point to note is that as the reductions have occurred this has also increased inequality in access across regions. For sanitation though there was some improvement between 1995 and 2004 for the eastern, central and western regions there was none for the other two. Only in the latter period did the far western and mid-western region see any fall in incidence with far western doing slightly better than the Mid-western.

For the indicator of access to phone, there was a reduction in access between 1995 and 2004 for the central, western and eastern region making the country more homogenous in access in 2004 than in 1995. However, between 2004 and 2010, all regions saw dramatic fall in incidence with the largest fall for the far western and mid-western regions, this is one of the few indicators where the far regions have lower incidence than the central

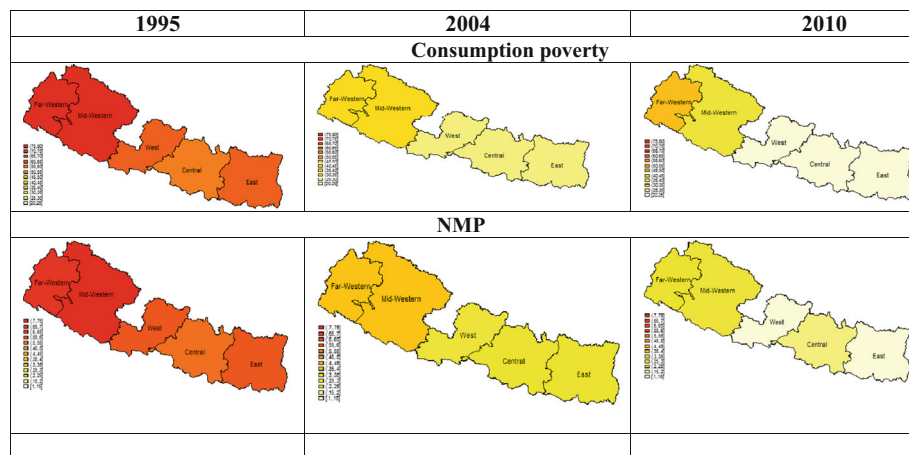


Fig. 8 Regional difference in consumption poverty and NMP. (Color figure online)

western and eastern regions (in 2010), with the far western region leading with the lowest incidence. Time to school fell drastically between 1995 and 2004 but has lost some of the improvements since then. Another point to note here is that the central region has done worse than all other regions as far as time taken to reach school is concerned. For school enrollment between 1995 and 2004 the improvements were made primarily in the eastern central and western regions. However, between 2004 and 2010, the far western and mid-western regions caught up and thus reduced the dispersion across regions.

Next we focus on the pattern of consumption poverty and NMP for the regions. The experiences of the regions differ when we use these two measures of poverty. At first glance, there is more variance among the regions based on consumption poverty than NMP, in spite of the fact that the variance looks similar in 1995 for the two measures. For consumption poverty, the difference between the central, western and eastern regions reduced since 1995 and in 2004 and 2010 these regions have similar incidences of consumption poverty (Fig. 8).

On the other hand, for the NMP, though they have similar incidences in 2004, by 2010 there are differences in poverty in these three regions due to a lower reduction in NMP for the central region than the other two. The far western and mid-western regions have had slower reduction in consumption poverty than the rest of the nation with the far western region actually increasing the incidence of consumption poverty between 2004 and 2010 making it the poorest region based on consumption. For the NMP, these two regions had fewer declines in poverty between 1995 and 2010 than the rest of the country but they showed more improvements in the latter period which resulted in a reduction in overall variation in poverty across the regions based on NMP.

4 Summary and Conclusions

There are several papers that measure multidimensional poverty internationally and for specific nations. However, there are few countries for which we have data on consumption

poverty and multidimensional poverty from the same source. In this paper we have used the Nepal Longitudinal Sample survey to assess the trends in multidimensional poverty between 1995 and 2010. The NLSS has had three waves in this period in 1995–1996, 2004–2005 and 2010–2011 in which it has collected data on consumption expenditure and other dimensions of wellbeing including an anthropometric survey done for children under age 5. We construct the NMP based on the Alkire and Foster (2011) methodology using four dimensions: consumption poverty, education, child and maternal health and access to facilities for the house and nine indicators within these dimensions. This allows us to study the overlap between these two definitions of poverty. Our results show that the two measures identify different households as being poor with the total error being a sizeable fraction of the overall poverty rate (by either measure). Secondly, the subnational analysis is able to track improvements in wellbeing which escape the consumption poverty estimations and may be more useful if we would like to track the effect of directed policy on poverty.

Our main results are that multidimensional poverty measured using NMP has fallen dramatically over the 15-year period from 0.59 to 0.16. We have also conducted a subnational analysis to see if all groups and regions have equally benefited from the observed reductions in poverty. Our analysis divided the population into the six ethnic groups and also based on the geography. We find that the differences across the six ethnic groups have reduced over time. Muslims have had a remarkable reduction in consumption poverty but not so much in NMP. In fact, they had the highest NMP rate in 2010. The reduction in consumption poverty may be due to the recent immigration that has had a high proportion of Muslims migrating to the Middle East for work and the remittances from abroad resulting in lower consumption poverty. However this has not translated into improvements in overall wellbeing.

Because of the diversity in terrain in Nepal, the country can be divided into three groups: mountains, hills and terai (low flat lands). For the three belts there has been improvement across the board using NMP but the terai has had the largest improvements. For consumption poverty, the mountain belt actually has a rise in poverty between 2004 and 2010. For administrative purposes, Nepal is often divided into five regions-eastern, central, western, mid-western and far western. For consumption poverty, the far western and mid-western regions did not have large reductions in poverty but have had large reduction between 2004 and 2010. By the NMP, however, these regions have done fairly well reducing the discrepancies across regions more based on NMP than consumption poverty. This may point to the effectiveness of targeted investments in these regions post conflict to improve the wellbeing of the people.

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Appendix

See Tables 8, 9 and 10 and Fig. 9.

Table 8 List of all indicators available from the NLSS

Possible indicators	Deprivation cutoffs
<i>Access to facilities</i>	
Access to drinking water	Have piped water to the house
Access to sanitation facilities	Flush connected to sewer/septic tank/non flush in the house
Access to electricity	Have electricity connection at home
Cooking fuel used	Use one of the following: kerosene/bio-gas/gas
Access to telephone	At least on mobile or other phone in the house
Adequate material for roofs and walls	Have the roofs or walls or both made of the following materials: cement/mud bricks/wood walls
Time to motorable road	Takes no more than 20 min to reach the road
Overcrowding	<1.5 person per room
<i>Education</i>	
Enrollment rates	All children in the age group 5–16 years are enrolled in school
Education level of adult members	At least one adult household member has at least a primary education
Access to primary schools	If there are any children under the age of 12 in the household, deprived if takes more than 20 min walking and 30 min using an automobile
Time to motorable road	Takes no more than 20 min to reach the road
<i>Child and maternal health</i>	
Under nourishment	No child under the age of 5 in the household is stunted (height-for-age <2 standard deviation from normal)
Underweight	No child under the age of 5 in the household is underweight (weight-for-age <2 standard deviation from normal)
Birth assisted by health professionals	All the women in the house hold with children <3 years of age were assisted by a medical professional
Contraceptive use	At least one married women in the household uses

Sources: The analysis is conducted at the house hold level therefore a 11 poverty lines are defined at the household

Table 9 Subjective wellbeing question used in the analysis

Concerning the health care your family gets, which if the following is true?
It was less than adequate for the family's needs
It was just adequate for your family's needs
It was more than adequate for your family's needs
Not applicable
Concerning the housing your family gets, which if the following is true?
It was less than adequate for the family's needs
It was just adequate for your family's needs
It was more than adequate for your family's needs
Not applicable
Concerning the access to educational facilities your family gets, which if the following is true?
It was less than adequate for the family's needs
It was just adequate for your family's needs
It was more than adequate for your family's needs
Not applicable

Table 10 Results of regression using subjective well being NLSS I, II, III

	Housing	Education	Health
<i>NLSS I</i>			
Consumption poor	0.094 (0.096)	0.275*** (0.073)	0.283*** (0.068)
Over crowding	0.412*** (0.092)		
Material of roof and walls	−0.591*** (0.145)		
Piped water	0.024 (0.141)		
Sanitation	0.115 (0.109)		
Electricity	0.395*** (0.118)		
Cooking fuel	0.412** (0.166)		
Access to phones	0.786*** (0.258)		
Access to road	0.027 (0.129)	0.292** (0.135)	
Anny member has primary school education		0.256*** (0.073)	
Enrollment		0.332*** (0.074)	
Time to primary school		0.051 (0.107)	

Table 10 continued

	Housing	Education	Health
Stunting in children			0.013 (0.099)
Underweight			−0.023 (0.101)
Assisted delivery			0.020 (0.067)
Use of contraceptives			0.070 (0.070)
Constant	−1.558*** (0.405)	−0.823*** (0.276)	−0.018 (0.226)
No. of observations	1,790.000	2,308.000	2,708.000
Adjusted R ²	0.069	0.060	0.022
<i>NLSS II</i>			
Consumption poor	0.241** (0.096)	0.181** (0.075)	0.354*** (0.067)
Over crowding	0.303*** (0.083)		
Material of roof and walls	−0.233 (0.214)		
Piped water	−0.010 (0.081)		
Sanitation	0.092 (0.086)		
Electricity	0.398*** (0.088)		
Cooking fuel	0.322*** (0.114)		
Access to phones	0.386*** (0.142)		
Access to road	0.055 (0.073)	0.031 (0.066)	
Any member has primary school education		0.211*** (0.070)	
Enrollment		0.505*** (0.071)	
Time to primary school		0.054 (0.094)	
Assisted delivery			0.142** (0.071)
Use of contraceptives			0.213*** (0.059)
Constant	−0.711*** (0.272)	−0.911*** (0.210)	−0.628*** (0.223)
No. of observations	2,170	2,579	3,177
Adjusted R ²	0.108	0.059	0.043
<i>NLSS III</i>			
Consumption poor	0.236*** (0.072)	0.232*** (0.063)	0.358*** (0.061)

Table 10 continued

	Housing	Education	Health
Over crowding	0.115 (0.073)		
Material of roof and walls	−0.333** (0.131)		
Piped water	−0.082 (0.067)		
Sanitation	−0.003 (0.066)		
Electricity	0.378*** (0.064)		
Cooking fuel	0.473*** (0.081)		
Access to phones	0.271 *** (0.064)		
Access to road	0.084 (0.056)	−0.001 (0.057)	
Anny member has primary school education		0.325*** (0.061)	
Enrollment		0.228*** (0.074)	
Time to primary school		−0.097 (0.059)	
Stunting in children			−0.225** (0.099)
Underweight			0.064 (0.100)
Assisted delivery			0.261 *** (0.073)
Use of contraceptives			0.130** (0.053)
Constant	−1.800*** (0.198)	−1.630*** (0.202)	−1.382*** (0.191)
No. of observations	4,611,000	4,028,000	4,601,000
Adjusted R ²	0.080	0.040	0.043

Sources: Dependent variables are the subjective questions for the specific dimension. Controls included: ethnicity, gender of head of household, household size

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

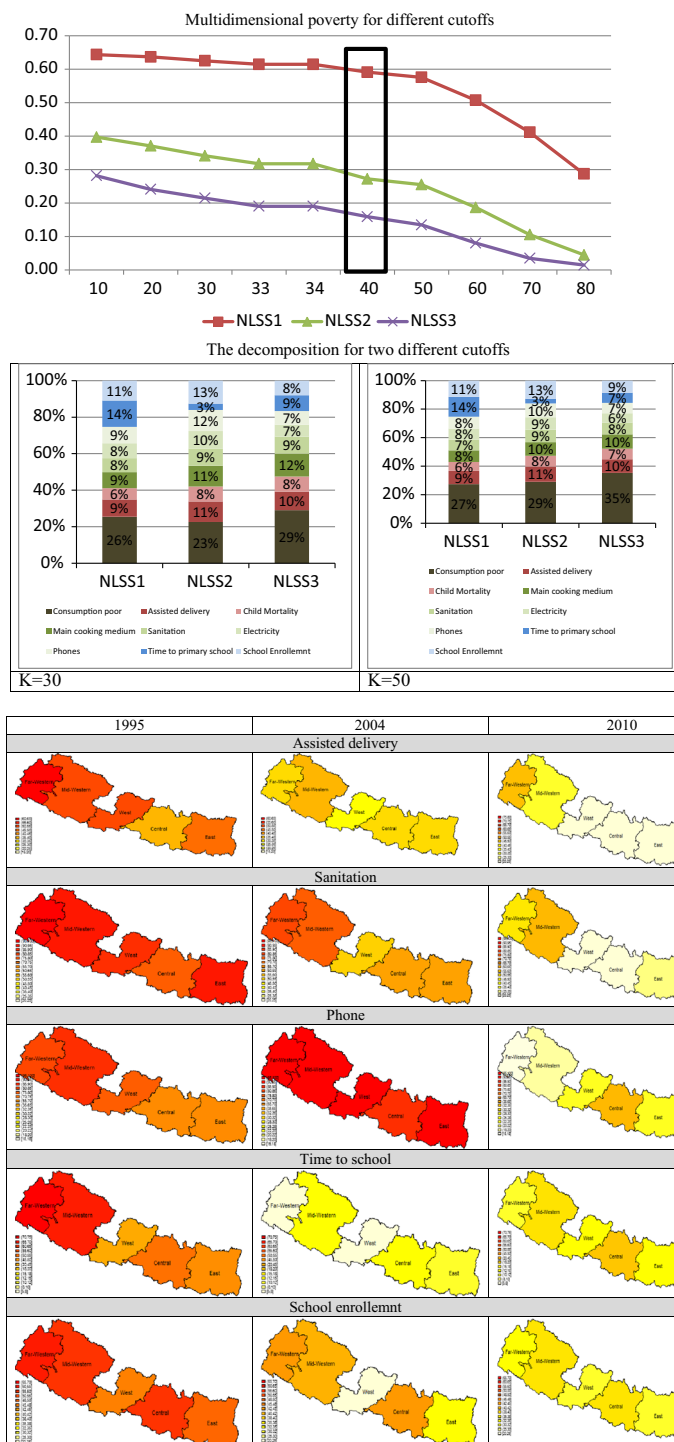


Fig. 9 Incidence for selected indicators across the regions. (Color figure online)

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