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# A Multidimensional Poverty Measure for the Hindu Kush–Himalayas, Applied to Selected Districts in Nepal

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*Approximately 211 million people live in the Hindu Kush–Himalaya region. Although poverty levels in this region are high, there is a lack of cohesive information on the socioeconomic status of its populations that would enable decision-makers to understand different manifestations of poverty and design effective poverty alleviation programs. Hence, the International Centre for Integrated Mountain Development (ICIMOD), in consultation with international and regional partners, has developed the Multidimensional Poverty Measure for the Hindu Kush–Himalayas (MPM-HKH). This measure aims to identify and describe poor and vulnerable households across the Hindu Kush–Himalaya region—which is predominantly rural and mountainous and covers several of the world's least developed countries—in a consistent manner. This article documents how the MPM-HKH was developed and demonstrates the utility of this approach, using Nepal as an example, by analyzing household survey data from 23 districts. The analysis gives important clues about differences in the intensity and composition of multidimensional poverty across these locations, which highlights the need for location-specific poverty alleviation strategies. The findings should help decision-makers to identify areas of intervention and choose the best measures to reduce poverty.*

***Keywords:*** *Mountain poverty; developing countries; poverty alleviation; location-specific targeting; South Asia.*

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## Introduction

Approximately 211 million people live in the greater Himalayan region. The 8 countries of the Hindu Kush–Himalayas (HKH) are Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan (ICIMOD 2015). Poverty levels in this predominantly mountainous region are high. A recent regional study found that national poverty rates range from 23% to 46% (Gerlitz et al 2012). The study also showed that available national survey data had limitations in terms of mountain-specific indicators, consistency across countries, and representativity for smaller administrative units. Policy-makers and development planners have little of the information they need to improve the effectiveness of their poverty alleviation programs in mountainous areas.

Hence, the International Centre for Integrated Mountain Development (ICIMOD), in consultation with regional and international partners, developed the Multidimensional Poverty Measure for the Hindu Kush–Himalayas (MPM-HKH) to identify and describe poor and vulnerable households across the HKH region in a consistent manner. The MPM-HKH aims to complement official poverty measures with a multidimensional measure that is able to describe the level and nature of mountain-specific poverty in developing countries, support the identification of areas of intervention, and thus help policy-makers and development planners shape and fine-tune development programs.

The following sections outline the research framework and development of the measure, describe data and computation, and exemplify the utility of the approach by applying it to primary data from 23 districts of Nepal, collected in 2011 and 2012. The fundamental benefits of this research are that it captures mountain-specific indicators of poverty, provides representative data at the district level, and, most importantly, expands the concept of poverty beyond income or consumption levels to capture the multidimensional nature of human deprivation.

## Conceptual background and methodologic outline

### Research framework

While several national multidimensional poverty measures have been developed in the HKH region (see

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Alkire and Seth 2013 for India; Roche 2013 for Bangladesh; Santos 2013 for Bhutan; Trani et al 2013 for Afghanistan; Mitra 2014 for Nepal), the MPM-HKH aims to be a regional measure that allows comparisons across countries. It is based on a research framework designed to fulfill the requirements of a region that is predominantly rural and mountainous and stretches across several of the world's least developed countries. The unit of analysis is the household. The MPM-HKH incorporates 16 indicators that measure deprivation in 7 dimensions: education, health, material wellbeing, energy, water and sanitation, social capital, and access to services. It is based on the Multidimensional Poverty Index (MPI) (Alkire and Santos 2010) and the Mountain Specificities Framework (Jodha 1992). The selection of dimensions and indicators was further supported by an extensive study of the causes of economic poverty in the mountains that analyzed National Living Standard Surveys of 6 countries of the HKH region (Hunzai et al 2011; Gerlitz et al 2012).

The MPI was introduced as a new and more holistic way to measure human poverty (Alkire and Santos 2010). In contrast to economic poverty, which is normally measured as the inability to participate in society owing to a lack of resources (Townsend 1979), multidimensional poverty measures are based on Sen's capability approach, in which poverty is understood to be "the failure of basic capabilities to reach certain minimally acceptable levels" (Sen 1992: 109) or "a denial of choices and opportunities for living a tolerable life" (UNDP 1997, 2004). The MPI consists of 10 deprivation indicators that measure the 3 dimensions of education, health, and standard of living; each indicator is strongly linked to the Millennium Development Goals (see Alkire and Santos 2010: 17). Within the MPM-HKH, the importance of these 3 dimensions was acknowledged, and indicators were replicated where appropriate and feasible. However, the MPI's standard-of-living dimension is broad and combines a variety of indicators. Findings of ICIMOD's earlier regional poverty study showed not only that the lack of basic facilities is one of the main components of poverty in the HKH region but also that this is one of the underlying reasons why mountainous regions are poorer than nonmountainous regions (Hunzai et al 2011; Gerlitz et al 2012). It was decided that within the mountain-specific MPM-HKH, rather than being part of the of the standard-of-living dimension, energy and water and sanitation should be 2 separate dimensions in their own right. The MPI dimension standard of living thus became, in the MPM-HKH, the 3 dimensions of material wellbeing, energy, and water and sanitation.

According to the Mountain Specificities Framework (Jodha 1992), mountain areas are characterized by inaccessibility, marginality, and fragility (constraints) as well as diversity, specific niche resources, and high levels of human adaptation to all of these conditions (opportunities). Inaccessibility and marginality were considered especially relevant for a mountain-specific poverty measure that aims to capture deprivations that can be tackled by policies and development interventions. Inaccessibility captures all elements of distance and mobility as well as the availability of risk management options. Marginality is defined as the lack of social and political capital, which often results in difficulty securing tenancy rights over land and access to social services, such as credit, education, and health. The MPM-HKH incorporates the mountain specificities inaccessibility and marginality in the dimensions access to services and social capital. (For a detailed discussion of dimensions and indicators, see Gerlitz, Banerjee, et al 2014.)

### Development of the poverty measure

The identification of specific dimensions of poverty and measurable indicators of those dimensions were the first steps in the development of the MPM-HKH. The measure was constructed using the Alkire-Foster method (Alkire and Foster 2011). Multidimensional poverty was defined by determining (1) a cutoff point for each deprivation indicator and (2) the number of indicators in which a household has to be deprived in order to be considered multidimensionally poor. In the next step, the information on the multidimensionally poor was aggregated by censoring data from nonpoor households and calculating the poverty headcount, poverty intensity, and the poverty measure itself. A vital step in aggregating the 16 deprivation indicators was assigning weights to individual indicators.

The weights and criteria were obtained by literature review (Gerlitz, Banerjee, et al 2014), data analysis (Hunzai et al 2011; Gerlitz et al 2012; Gerlitz, Hoermann, et al 2014), discussions with regional and international experts, and a technical workshop where local development practitioners from Bangladesh, India, Nepal, and Pakistan participated in 2 kinds of expert rating (factorial survey design and explicit expert rating). Table 1 presents the results of this work: the dimensions, indicators, criteria, and weights used in the MPM-HKH.

In assigning weights to indicators and dimensions, the MPM-HKH replicated the approach of the MPI (see Alkire and Santos 2010: 18f), giving equal weights to all dimensions and equal weights to all indicators within a certain dimension, as this is more comprehensible and easier to interpret.

Regarding the cutoff point that separates the nonpoor from the multidimensionally poor, robustness analyses based on 3 regions showed that the multidimensional poverty ranking was robust between the values of 0% and 60%. Similar analyses for selected districts showed the robustness of the poverty measure and its 95% confidence interval between 0% and 55%. In the end, it was decided to follow the approach of the MPI and choose a cutoff point of 33% (see Alkire and Santos 2013: 19ff): A household is considered multidimensionally poor if it is deprived in 33% or more of the weighted indicators. This


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**TABLE 1** MPM-HKH dimensions, indicators, weights, and deprivation cutoff.

| Dimension | Indicator | Weight | Deprivation cutoff |
|---|---|---|---|
| Education | Literacy | 7.1% | At least 1 member (≥6 years) is illiterate. |
| | School attendance | 7.1% | At least 1 child (6–14 years old) is not attending school. |
| Health | Illness | 4.8% | At least one member is seriously ill once a month. |
| | Health care | 4.8% | The household cannot afford health care. |
| | Food consumption | 4.8% | Per-head food consumption is below the national food poverty line, or the household is dependent on food aid. |
| Material wellbeing | Assets | 7.1% | The household owns no more than 1 television, radio, telephone, or nonmotorized vehicle and has no car, motorbike, or tractor. |
| | Dwelling | 7.1% | The dwelling's walls are made of grass, leaves, bamboo, plastic, or metal, or contain asbestos, or the roof material is straw, leaves, thatch, bamboo, plastic, or fabric. |
| Energy | Electricity | 7.1% | The household has no electricity for lighting from the grid or any other source. |
| | Cooking fuel | 7.1% | The household cooks with solid fuel (eg, dung, wood, or charcoal). |
| Water and sanitation | Drinking water | 7.1% | There is no access to an improved source of drinking water (as defined by WHO and UNICEF 2015), or water cannot be collected in a 30-minute round trip. |
| | Sanitation | 7.1% | The household has either no toilet facility at all or only an open pit. |
| Social capital | Political voice | 7.1% | It is very difficult for the household to influence the decision-making process at the local level. |
| | Social networks | 7.1% | It is very difficult for the household to borrow money. |
| Access to services | Market | 4.8% | It takes >3 hours 1 way to reach the nearest market center; a round trip within a day is not possible. |
| | Hospital | 4.8% | It takes >3 hours 1 way to reach the nearest hospital; a round trip within a day is not possible. |
| | Bus stop | 4.8% | It takes >3 hours 1 way to reach the nearest bus stop; a round trip within a day is not possible. |

is a higher absolute poverty threshold than that used by the MPI, which can be justified with the argument that the MPM-HKH focuses on poverty in a region that includes some of the least developed countries in the world, where most households experience 1 or 2 aspects of deprivation. (For a more detailed discussion of weights and criteria see Gerlitz, Hoermann, et al 2014.)

## Methodology

### Data

The MPM-HKH was developed using indicators of 3 poverty and vulnerability assessments at the household level carried out by ICIMOD: The Poverty and Vulnerability Assessment (PVA) survey 2011, the PVA survey 2012 and the Vulnerability and Adaptive Capacity Assessment (VACA) survey 2011/12. The 3 surveys used the same questionnaire (see Gerlitz, Banerjee, et al 2014), were restricted to specific regions, were representative at the district level, and followed a multistage random sample design for the selection of households.

- PVA 2011 and 2012 (Gerlitz, Hoermman, et al 2014) was implemented during April and May and carried out in the poorest and most vulnerable districts of Nepal, which were identified on the basis of available small-area estimates (Government of Nepal 2010).
- VACA 2011/12 (Gerlitz et al 2015) was implemented from December 2011 to February 2012 and carried out

**TABLE 2** Effective survey sample sizes by region.[a)]

| | Sample size (number of households) | | |
|---|---|---|---|
| **Geographic area** | **Urban** | **Rural** | **Total** |
| **Mountains** | 1122 | 2150 | 3272 |
| **Hills** | 1315 | 2440 | 3755 |
| **Plains (Terai)** | 532 | 988 | 1520 |
| **Total** | 2969 | 5578 | 8547 |

[a)]All found at DOI: http://dx.doi.org/10.1659/MRD-JOURNAL-D-14-00027.S1 (74 KB PDF).

to assess livelihood vulnerability to environmental and socioeconomic change in 4 subbasins in the HKH region, including the Koshi subbasin in Nepal.

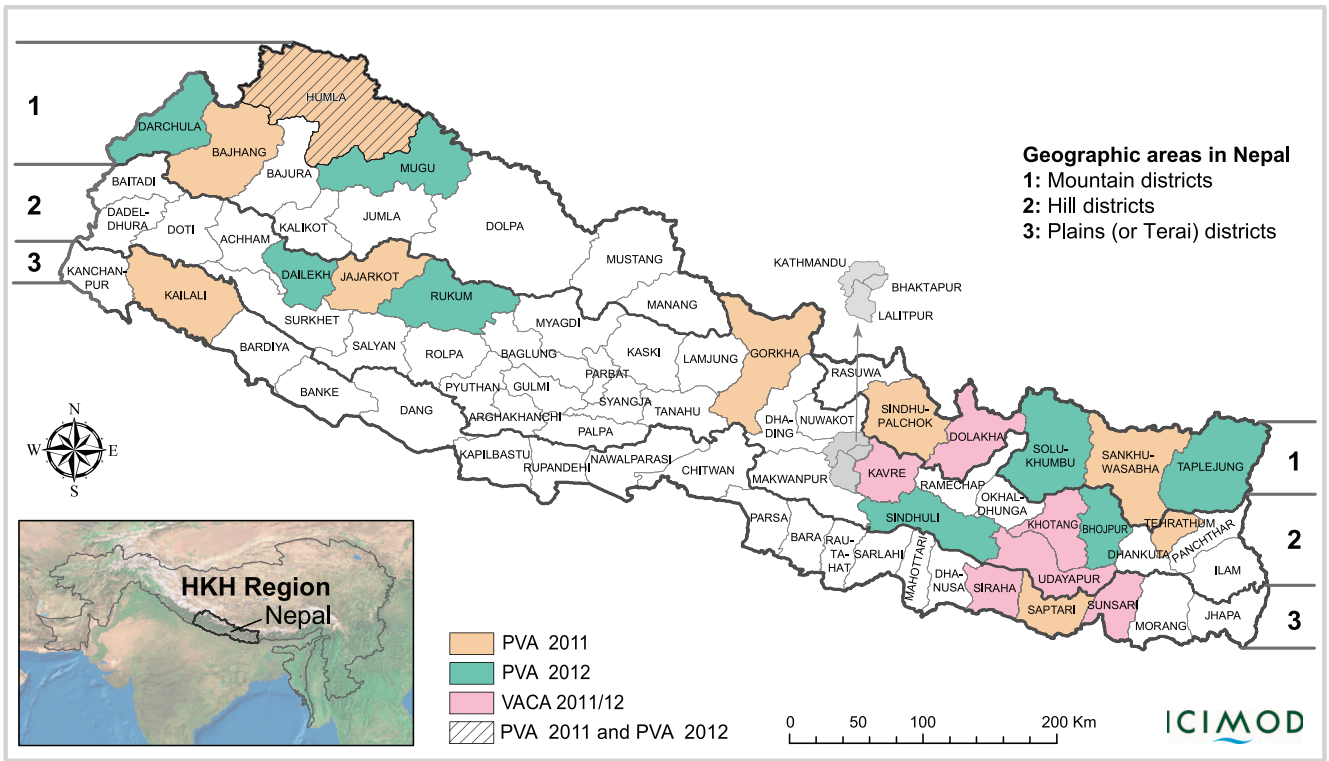
From the results of these 3 surveys, responses from households with missing values on one or more deprivation indicators were deleted to produce the effective samples—the data sets used for the development of the MPM-HKH. Table 2 shows the effective sample size per district. Results of the 3 surveys were pooled, resulting in a combined data set that contained socioeconomic information on 8547 households in 23 districts of Nepal. The PVA/VACA 2011/12 covers 3272 households from 9 of Nepal's 16 mountain districts, 3755 households from 10 of Nepal's 39 hill districts, and 1520 households from 4 of the 20 plains (or Terai) districts (Figure 1). The validity of the data was analyzed by comparing deprivation headcounts of the PVA/VACA 2011/12 with those of the Nepal Living Standards Survey 2010/11 (see Government of Nepal 2011). The findings proved to be highly consistent (see Gerlitz, Hoermann, et al 2014).

It is acknowledged that differences in year and season might affect the comparability of the data. On the other hand, all interviews were conducted within a time frame of 12 months, during which drastic socioeconomic and infrastructural changes were unlikely. Most of the deprivation indicators used should be relatively robust with regard to seasonal trends.

### Computing the measure for the HKH region

The MPM-HKH framework presented earlier provided the basis for calculating the poverty measure following the Alkire-Foster (2011) method. First, the extent and type(s) of household deprivation were determined based on the predefined indicator criteria and weights. The next stage consisted of adding up the types of deprivation each household faced. As discussed earlier, households that experienced deprivation in 33% or more of the deprivation indicators were categorized as multidimensionally poor. Data on the other households were censored, that is, ignored during further analysis.

**FIGURE 1** Districts where the PVA and VACA surveys were carried out. (Map courtesy of ICIMOD)





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(Raw and censored deprivation data are presented in *Supplemental material*, Tables S1 and S2; http://dx.doi.org/10.1659/MRD-JOURNAL-D-14-00027.S1.)

Next, the multidimensional poverty headcount (share of population experiencing multidimensional poverty) and intensity (average share of deprivations that the multidimensionally poor are experiencing) were calculated. The MPM-HKH, the actual index, is the product of the poverty headcount and poverty intensity; it ranges from 0 (no household is multidimensionally poor, and no household is deprived in any indicator) to 1 (every household is multidimensionally poor and deprived in all indicators). Although the data were collected at household level, the results presented in the following sections were calculated using population weights, that is, they show the poverty status of the population of the surveyed districts.

## Findings

### Multidimensional poverty in the surveyed districts

Multidimensional poverty varies across the 23 surveyed districts of Nepal. Figure 2 presents the MPM-HHK index value, headcount, and intensity by district. The MPM-HKH ranges from 0.04 in Dolakha, the district with the lowest multidimensional poverty with a headcount of 0.12 (ie. 12%) and an intensity of 0.38 (ie, 38%), to 0.45 in Bajhang, the district with the most multidimensional poverty (a headcount of 0.88 and an intensity of 0.51). Since the average share of deprivations among the poor is comparatively homogenous (ranging from 38% to 51%), the differences in the index value are mainly caused by the poverty headcount (which ranges from 12% to 91%).

The poverty status among the mountain and hill districts is highly heterogeneous: Of the 19 surveyed mountain and hill districts, 4 are among the 5 poorest districts (Bajhang, Humla, Jajarkot, and Mugu), and 5 have the lowest multidimensional poverty (Dolakha, Gorkha, Kavre Palanchok, Solukhumbu, and Tehrathum). Some mountain and hill areas are very remote and characterized by high multidimensional poverty, while others are well connected or are hot spots of tourism and relatively well off. In contrast, the poverty status of the plains districts is rather homogenous: 3 of the 4 surveyed districts are positioned in the middle field (Kailali, Siraha, and Sunsari). Only Saptari shows high multidimensional poverty, with a headcount of 85%, a poverty intensity of 50%, and an MPM-HKH index value of 0.43.

Comparison with other district-level poverty measures shows an ambivalent picture (see *Supplemental material*, Table S3; http://dx.doi.org/10.1659/MRD-JOURNAL-D-14-00027.S1), which can be attributed to the fact that the MPM-HKH is the only measure entirely based on household survey data that are recent and representative at the district level.

Figure 3 gives an overview of the composition of poverty in the form of the relative contribution of the 7 poverty dimensions used in calculating the MPM-HKH. The composition of multidimensional poverty varies considerably across districts. One of the main reasons for this is the wide variation in the importance of physical access to services, which ranged from 0% in the plains districts Saptari, Siraha, and Sunsari to 30% in the mountain district Humla. Inadequate physical infrastructure hinders access to crucial facilities like credit and health services and restricts access to markets, which in turn results in higher prices for basic goods as well as higher transportation costs and lower profit margins (Ali and Pernia 2003; Gibson and Rozelle 2003). The plains districts Siraha and Sunsari show a relatively high impact of the water and sanitation dimension (32% and 35%). Inadequate drinking water supply and toilet facilities increase vulnerability to waterborne diseases (Hales et al 2003) and are negatively related to the health status and income of households and communities (WHO and UNICEF 2006). In the plains district Kailali, deprivation in terms of social capital is quite influential (21%). Social capital can be transformed into other forms of capital (Bourdieu 1986) and enables collective action to manage resources to spread risks and to establish wider support networks, for example, with policy-makers or development agents (Tompkins and Adger 2004). In the mountain district Sankhuwasabha, deficits in material wellbeing are of comparatively high relevance (28%).

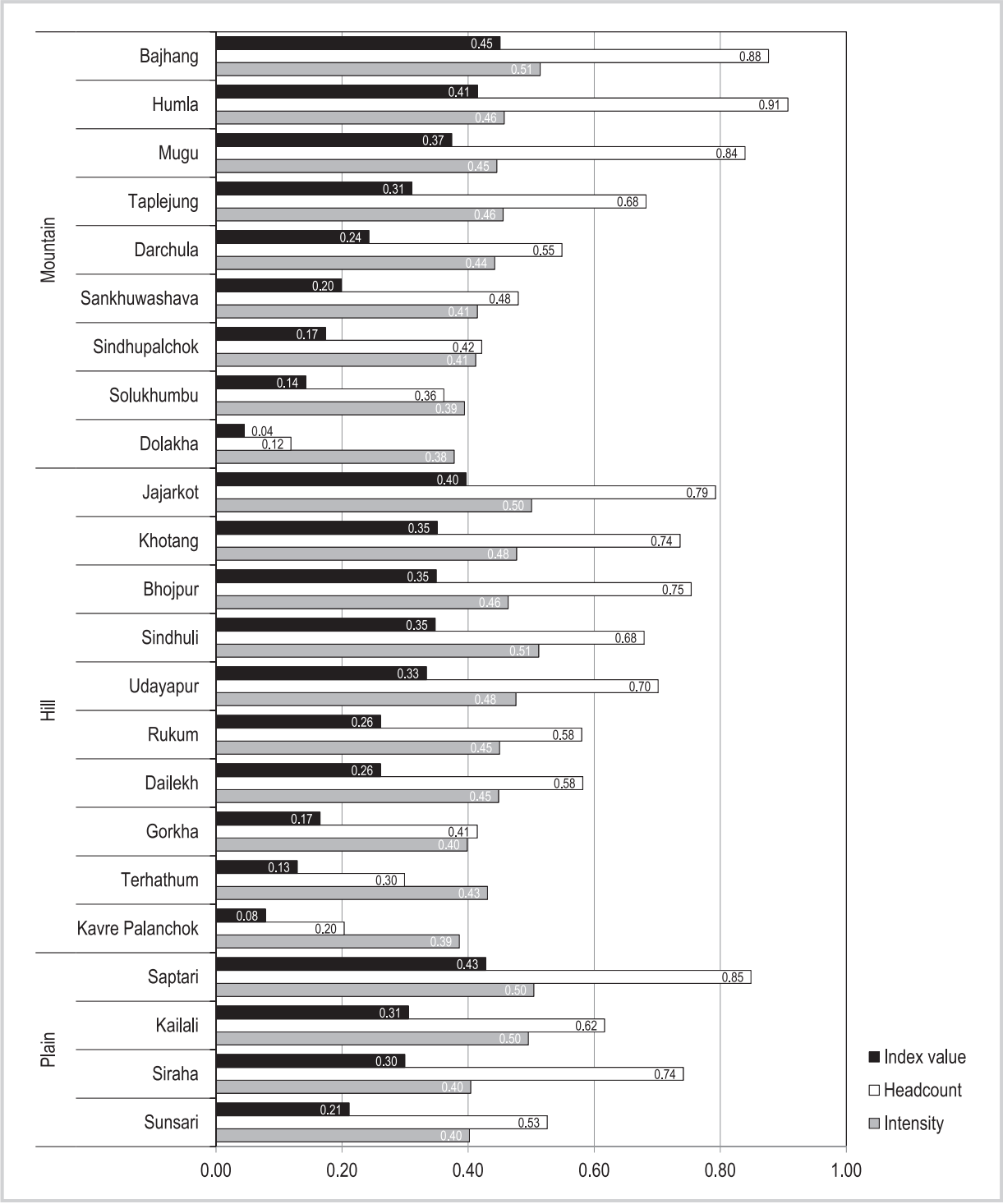
Absolute measures of the relevance of the poverty indicators in the form of censored deprivation headcounts are presented in *Supplemental material*, Table S2 (http://dx.doi.org/10.1659/MRD-JOURNAL-D-14-00027.S1).

### District profiles: Bajhang and Saptari

The PVA/VACA 2011/12 data permit analysis at the district level, which is a potential resource for the development of district-specific poverty alleviation programs. In the following discussion, censored deprivation headcounts for Bajhang and Saptari, the poorest mountain and plains districts in the sample, respectively, are discussed to highlight the value of decomposable, location-specific measures.

Bajhang is a rural and remote mountain district in the Far Western Development Region with a population of 195,159 (Government of Nepal 2012). Because of Bajhang's remote location, deprivation in access to services is the main contributor to multidimensional poverty (28%). The censored deprivation headcount shows that more than 80% of Bajhang's population is multidimensionally poor and needs at least 3 hours to reach the next market center (83%), hospital (86%), or bus stop (83%). Access to markets and bus stops are linked to 2 of the basic coping and adaptation strategies identified by Agrawal and Perrin (2009): (1) exchange to promote specialization and increase revenue flows and (2) mobility to pool or avoid risks. Hospitals represent the

**FIGURE 2** MPM-HKH index value, headcount, and intensity by district.




availability of an effective emergency response to essential health care demands.

With a contribution of 21%, the lack of improved energy sources is the second most important poverty dimension in Bajhang. The multidimensionally poor who are deprived in terms of improved cooking fuels make up 88% of the population. If energy conversion technologies are inefficient, the use of solid cooking fuels has serious


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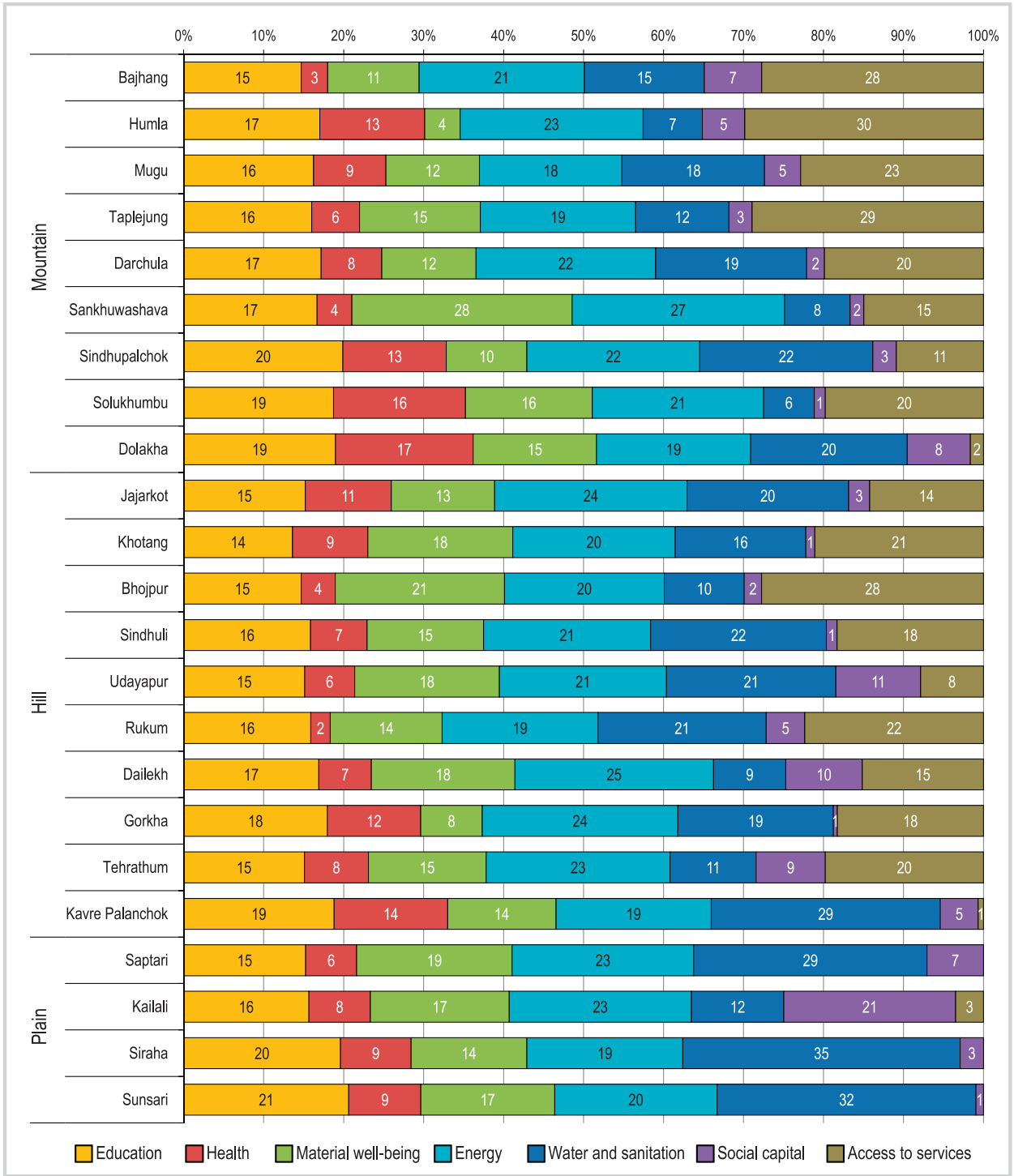
**FIGURE 3** Relative contribution of poverty dimensions by district.




implications for households' health and economic development. In addition, if fuel resources are harvested unsustainably, their use causes deforestation and degradation (IEA 2006). Deprivations in terms of education and water and sanitation each contribute 15% to Bajhang's multidimensional poverty. Of Bajhang's households, 85% have at least one household member who is illiterate. Literacy enables people "to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society"


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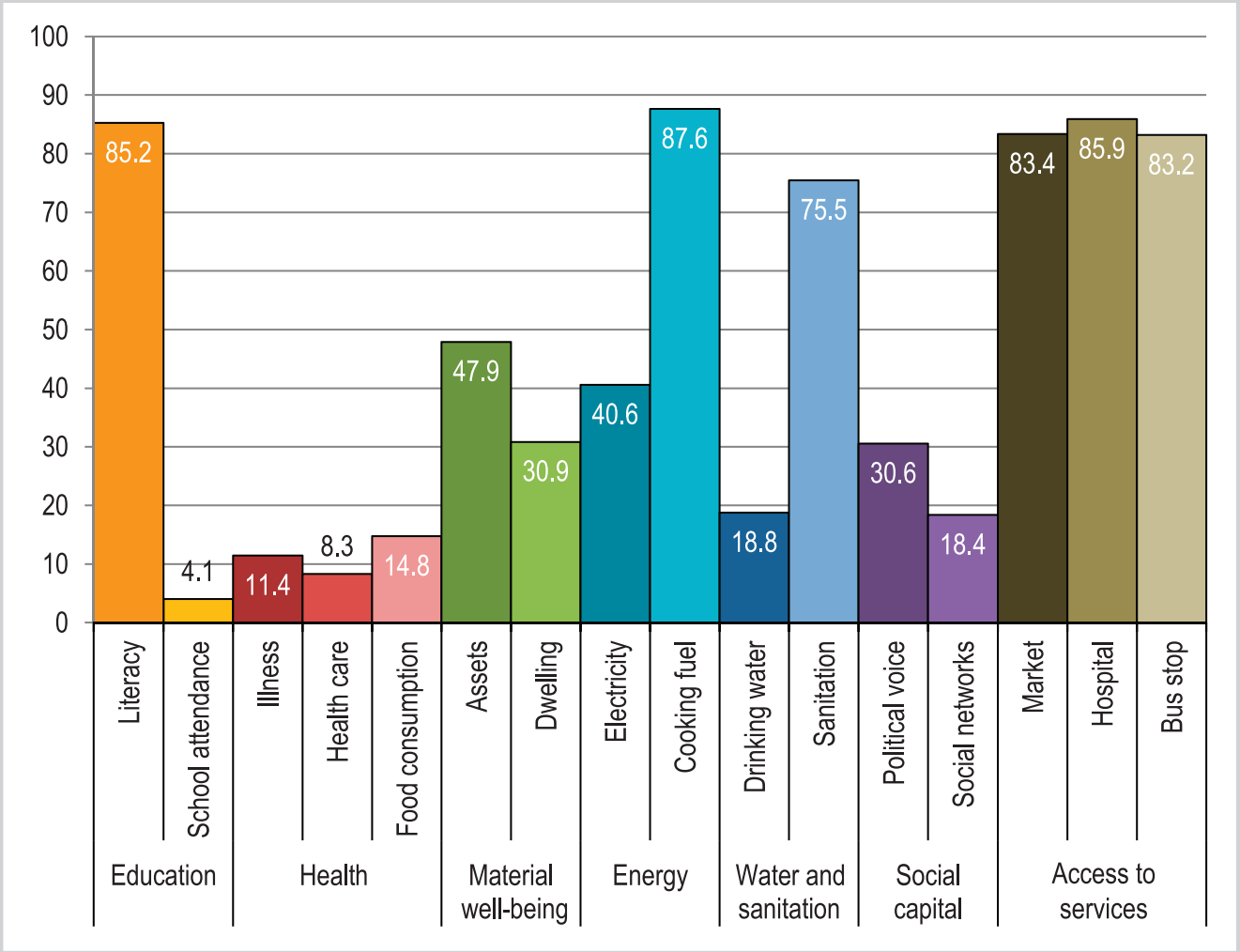
**FIGURE 4** Censored deprivation headcounts, Bajhang (percent based on 381 households).




(UNESCO 2004: 13). Furthermore, 76% of the population lives in poverty and has inadequate toilet facilities (see Figure 4).

Saptari is a plains district in the Eastern Development Region with a population of 639,284 (Government of Nepal 2012). Here, deprivation in terms of water and sanitation, energy, and material wellbeing together contribute 71% to the MPM-HKH. Of households in Saptari, 84% are multidimensionally poor and deprived in terms of improved sources of drinking water, improved toilet facilities, or improved cooking fuels. The multidimensionally poor who live in low-quality dwellings make up 68% of the population. One of the main functions of a dwelling is to provide security and shelter from weather and climate (Human Rights Education Associates 2012), which is especially important in harsh mountainous environments. About half of Saptari's population is poor and deprived in terms of assets (51%) or electricity (49%). Assets are central indicators of material wellbeing (Haughton and Khandker 2009) and useful proxies for the economic status of households (McKenzie 2005), while lack of access to electricity has serious implications for the health, education, and income of households and communities (Kanagawa and Nakata 2008). The multidimensionally poor who live in a household that is deprived in terms of literacy make up 83% of Saptari's population (Figure 5).

To alleviate poverty in Bajhang, policy-makers and development practitioners should focus on infrastructure to improve access to crucial institutions and services, and also on access to basic necessities such as cooking fuels and toilet facilities. In contrast to Bajhang, the population of Saptari is well connected to crucial institutions. Here, investment in other forms of physical infrastructure, such as improved sources of drinking water, toilet facilities, and dwellings, are urgently needed. In both districts, improved infrastructure has the potential to increase incomes, which will in turn be reflected in improved material wellbeing. Beyond infrastructure measures, in both districts there should be a focus on social inclusion


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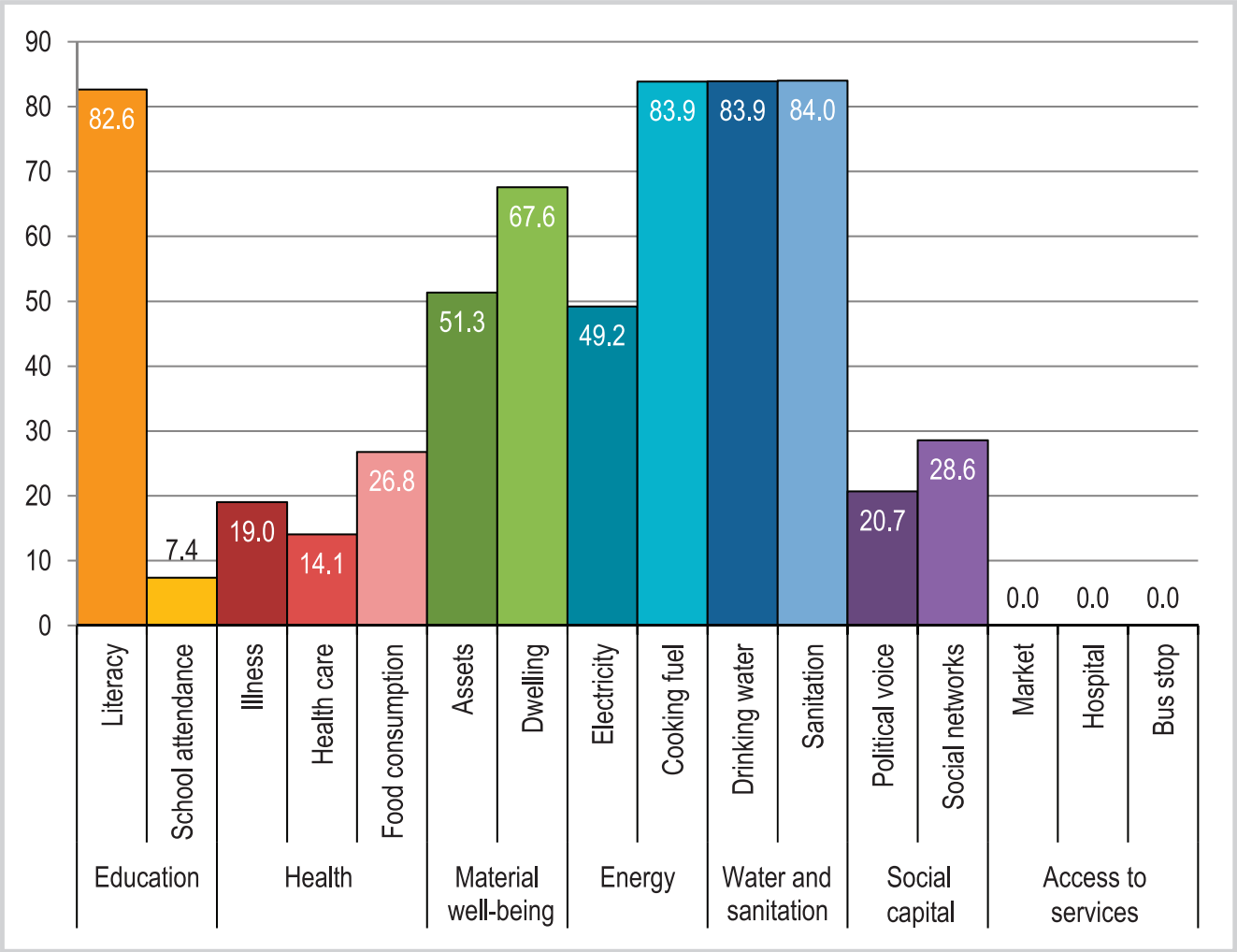
**FIGURE 5** Censored deprivation headcounts, Saptari (percent based on 370 households).




in the form of literacy and political empowerment programs.

## Conclusion

Every second to every fourth household in the HKH lives in poverty. Decision-makers are mandated to address this challenge but have limited hard data on where the poverty pockets are and, more importantly, on the dimensions along which people are poor and vulnerable. The ICIMOD, in cooperation with regional and international partners, addressed this lack of knowledge by initiating extensive primary research to develop a multidimensional poverty measure for a region that is predominantly rural and mountainous and stretches across several of the world's least developed countries. The research reported here used data collected in Nepal to demonstrate the utility of the MPM-HKH as a tool that can be applied throughout the HKH region.

The MPM-HKH allows the user to go beyond the concept of poverty as determined solely on the basis of income or consumption to examine poverty as a complex phenomenon with many dimensions. It complements existing poverty measures with a multidimensional measure that is relevant in the mountain context. The MPM-HKH can be used as a single-value index or decomposed into its 7 poverty dimensions and 16 deprivation indicators. The facility for such decomposition is vital if poverty assessments are to be used to identify and target the most significant deprivations in specific locations. With the intention of supporting government institutions and nongovernmental organizations in their efforts to address the most pressing local problems, 23 districts of Nepal were ranked in terms of the overall incidence of multidimensional poverty, and differences in the prominence of various dimensions of poverty across these districts were explored.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This research shows that the contribution of different dimensions of poverty—such as those related to education, health, material wellbeing, energy, water and sanitation, social capital, and access to services—varies considerably in different locations in Nepal. It illustrates the importance of location-specific data in the development of effective poverty reduction strategies. Blanket country-level approaches are likely to miss crucial local manifestations of poverty and thus be less effective. The findings also reveal some common patterns in the profile of mountain poverty—for example, the frequency with which lack of physical access to services appears to be the dominant dimension of poverty in mountainous areas.

Multidimensional poverty measures are based on normative decisions about the most important dimensions of poverty and the best indicators for these dimensions, and findings are influenced to a great extent by these judgments. Accordingly, there is always scope for refining and adjusting a multidimensional poverty concept. The research framework of the MPM-HKH is the result of a process of consultations and discussions that took place over 3 years. The concept represents a compromise between a variety of ideas and opinions, the objective of the study, and data availability. Whatever its limitations, the MPM-HKH is the first successful prototype of a multidimensional poverty measure for the HKH. The ICIMOD has already carried out PVA surveys in parts of China, India, and Pakistan, and data collection in parts of Bangladesh, Bhutan, and Myanmar is planned in the near future. Thus, the MPM-HKH will soon be applied to other countries of the HKH region as well.

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## Supplemental material

**TABLE S1** Raw headcounts of MPM-HKH deprivation indicators by district. Standard error of the mean is given in parentheses.
**TABLE S2** Censored headcounts of MPM-HKH deprivation indicators by district. Standard error of the mean is given in parentheses.
**TABLE S3** Comparison of 4 poverty rankings for the 23 surveyed districts.

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