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A Different Perspective on Poverty in Lao PDR: Multidimensional Poverty in Lao PDR for the Years 2002/2003 and 2007/2008

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Abstract

This paper presents an indicator for measuring multidimensional poverty in the Lao People's Democratic Republic (PDR) applying the Alkire-Foster methodology to the Lao Expenditure and Consumption Survey 2002/2003 and 2007/2008. We calculated a multidimensional poverty index (MPI) that includes three dimensions: education, health, and standard of living. Making use of the MPI's decomposability, we analyse how much each of the different dimensions and its respective indicators contribute to the overall MPI. We find a marked reduction in the multidimensional poverty headcount ratio over the study period, regardless of how the indicators are weighted or how the deprivation and poverty cut-offs are set. This reduction is based on improvements regarding all indicators except cooking fuel and nutrition. We observe no significant reduction in the intensity of poverty, however; there are wide disparities between the country's regions and between urban and rural areas. The proportion of poor people in rural areas is more than twice as high as that in urban areas. By complementing the traditional income-based poverty measure, we hope to provide useful information that can support knowledge-based decision-making for poverty alleviation.

Keywords: Multidimensional poverty, poverty measurement, Lao PDR, LECS

1 Introduction

In current debates on poverty and poverty measurement, poverty is seen as a multidimensional phenomenon that involves a lack of material as well as non-material resources (Alkire 2007b; Ravallion 2011; UNDP 2003). Its quantification, however, has remained essentially one-dimensional: poverty is generally quantified via income or consumption, according to the basic needs approach1. The first Millennium Development Goal (MDG) – to halve the population affected by hunger and

1 Although many countries base their official poverty classification on a variety of criteria such as health, education, and access to services, the poverty line is then calculated by estimating the costs of these criteria (Haughton and Khandker 2009). Thus poverty is in fact measured via a single dimension, i.e. income or consumption. The basic needs approach is one of the most widespread approaches to measuring absolute poverty in developing countries. It measures poverty via a single dimension, i.e. income (often proxied by measuring consumption), by comparing it to an agreed poverty line. This is calculated by estimating the costs of an adequate nutrition and other essentials such as clothing and shelter (Haughton and Khandker 2009).

poverty by 2015 – is a prominent example, with progress being measured against a definition of poverty as living on less than USD 1.25 a day. This one-dimensionality of traditional poverty measures has been criticized by the Stiglitz-Sen-Fitoussi commission (Fitoussi et al. 2011), who argue that poverty needs to be addressed as a lack not only of material resources, but of overall well-being, and that the availability of financial resources alone is not a sufficient measure of this. The commission lists seven non-material factors that influence well-being: (1) health, (2) education, (3) employment, (4) political participation and rights, (5) social relations, (6) the environment, and (7) financial uncertainty. They call for new indices to measure progress along these dimensions, and request that these indices be capable of delivering information not only about a population's average well-being but also about inequalities within populations (Fitoussi et al. 2011).

The commonly used monetary approach is based on the assumption that money is a "universally convertible asset that can be translated into satisfying all other needs" (Scott 2002). To uphold this assumption, the approach presupposes that functioning markets and access to these markets exist for all goods and services (Thorbecke 2007; Bourguignon and Chakravatry 2003). We question this assumption by asking whether the poor are indeed able to transform their income, for example, into public goods such as access to drinking water, and having a shelter or electricity. People who have no access to education, for example, are denied the chance to change their situation. This point also emerges in critical discussions of the MDGs and in the debate surrounding the Sustainable Development Goals (SDGs) that are to succeed them (Griggs et al. 2013). Although objective and scientific methods exist for measuring indicators of progress towards the MDGs (UNDP 2003), it remains unclear what the progress thus measured means to those affected by poverty. For example, it is questionable whether a reduction in the overall poverty level (MDG 1) can be considered as progress if social inequality rises at the same time. Furthermore, there is consensus that the current MDG indicators are inadequate when it comes to evaluating the situation of the most vulnerable people (Karver et al. 2012; Vandemoortele 2011).

With a view to the new development agenda beyond 2015, we therefore need more comprehensive measures that take adequate account of the multiple factors causing poverty and can thus provide a more accurate and comprehensive picture of the challenges that poor people face. This also includes detection of inequalities between and within societies (Alkire 2007; Fitoussi et al. 2011). At the same time, however, a new multidimensional poverty measure is generally expected to be both coherent and readily understandable to policymakers, who may have no specific understanding of statistics – an expectation that was met by the measure of USD 1.25 a day. In this debate about new ways of measuring poverty, the capability approach (Sen 1976; Sen 1980; Sen 1982; Sen 1992; Sen 2001; Sen and Nussbaum 1993) stands out as the most influential. The approach was developed by Nobel Prize winner Amartya Sen and Martha Nussbaum, who argue that development is about freedom of choice in the personal, social, economic, and political spheres. The capability approach takes this into account and thus enables us to go beyond the normative economic goal of satisfying needs and desires. The approach emphasizes the importance of freedom of choice, individual heterogeneity, and the multidimensional nature of welfare/well-being, and its main focus is on what people are effectively able to do and be, or, in other words, on their capabilities. The approach stipulates, for example, that every person should have the opportunity to be part of a community and to practice a religion, but if someone prefers to be a hermit or an atheist, they should have this option as well (Robeyns 2005). Essentially, the capability approach understands poverty as deprivation of capabilities. Several attempts have been made to operationalize the approach (e.g. Bourguignon and Chakravatry 2003; Atkinson 2003; Wagle 2012; Duclos et al. 2006), and the global multidimensional

poverty index (MPI) based on Alkire and Foster (2007) has received attention not just in academic discussions but also in the broader policy debate. In 2009, for example, Mexico's National Council for the Evaluation of Social Policy (CONEVAL) adopted a multidimensional index as the country's official poverty measure. The government of Colombia based their new poverty reduction strategy on five separate dimensions, using a variant of Alkire and Foster's approach.

In response to the growing importance of multidimensional poverty indices in the policy debate, we have calculated an MPI for the Lao People's Democratic Republic (hereafter Laos) using national data. More specifically, we calculated the MPI for two points in time, thus making it possible to trace developments in social inequalities over the period in between. In this paper, following a literature overview in section 2, we describe the datasets we used, the procedure for selecting dimensions, as well as indicators and weights in section 3. Section 4 presents the results. In section 5 we perform a robustness test on our results, and in section 6 we draw some conclusions.

2 Poverty in Laos

Since economic liberalization in the 1990s, Laos has experienced an average economic growth rate of seven per cent (Gov. of Lao PDR 2013). At this pace, Laos is expected to achieve its long-term goal of graduating from least developed country status by 2020. Moreover, Laos is on track to achieve the goal of halving hunger and poverty by the time the MDGs draw to a close in 2015. Thus, from a purely economic perspective on poverty, Laos is doing well in terms of poverty alleviation (TABLE 1), and the country has also achieved considerable improvements in social services and access to infrastructure (World Bank and DoS 2009). Much less is known about how the benefits are distributed across different geographic regions and population segments, however. Laos is not only experiencing high growth rates but also observing growing social inequalities (World Bank and DOS 2009). A better understanding of how the risks of growth are shared is thus an important first step towards more equitable development. Numerous efforts have been made to analyse the determinants and the geography of poverty in Laos. Most of these studies are based on the traditional monetary approach using income or consumption as a proxy for the well-being of individuals.

Table 1 MPI results for Lao PDR; 2002/2003 and 2007/2008, k = 3

	National poverty line				MPI headcount	
	1992/3	1997/8	2002/3	2007/8	2002/3	2007/8
National	0.46	0.39	0.34	0.28	0.44	0.35
Urban	0.27	0.22	0.20	0.17	0.14	0.19
Rural	0.60	0.51	0.46	0.43	0.54	0.42
Northern Region	0.52	0.47	0.38	0.33	0.60	0.48
Central Region	0.45	0.39	0.35	0.30	0.33	0.31
Southern Region	0.45	0.40	0.33	0.23	0.46	0.29

Source for the national poverty line and the corresponding poverty ratio: World Bank DoS 2009

Andersson et al. (2005) analysed the determinants of poverty using econometric modelling of household-level consumption based on the Lao Expenditure and Consumption Survey (LECS)

2002/2003. Their findings suggest that household size, education, and agricultural inputs are among the main determinants of poverty. In a deeper analysis of the role of ethnicity, Engvall (2006) found that a higher poverty incidence among minority households was due to their limited access to productive resources. Warr (2005) and Oraboune (2008) analysed the linkage between poverty and rural road development, and concluded that the higher poverty incidence in rural regions can be attributed, to a great extent, to the absence of all-weather road access.

Contrary to most other studies, Epprecht et al. (2008) used a "small area estimation" method to estimate various measures of poverty and inequality (e.g. poverty headcount, poverty gap ratio, Gini coefficient) for the provinces, districts, and villages of Laos. They combined information from the LECS 2002/2003 and the 2005 Population and Housing Census to provide a detailed, spatially disaggregated assessment of the incidence of poverty in Laos. The results show that the poverty incidence is greatest in remote areas in the eastern and south-eastern parts of Laos, along the Vietnamese border. Furthermore, the study suggests that market accessibility and agroclimatic variables can explain a large part of the differences in rural poverty rates. Although Epprecht et al. (2008) acknowledge the multidimensional nature of poverty, their estimation is based on consumption patterns.

In 2009, the World Bank and the Department of Statistics (DoS) jointly presented a number of detailed thematic studies on access to services and infrastructure. They found improvements in access to roads, clean water, and sanitation. Furthermore, they stated that education opportunities had expanded and that more than eight in ten children between the ages of six and ten were enrolled in primary school by 2008. Nevertheless, they also pointed out remaining significant challenges; for example, while urban areas and districts along the Thai border had experienced rapid growth and poverty reduction, other areas continued to lag behind. Although these studies, taken together, clearly offer a multidimensional perspective on poverty, their findings are based on average improvements for the total population of Laos. As a result, it remains unclear whether the improvements in each dimension benefitted the poor or the non-poor population. In addition, these study do not analyse the deprivation level of individuals across different indicators and population segments.

These shortcomings can be addressed by using measures based on Alkire and Foster's (2007) methodology. These measures focus exclusively on the poor population and serve to analyse whether poor people have really been able to improve their situation. They make it possible to study what is referred to as joint deprivation2. This means focusing on those who experience multiple deprivations at once: the multidimensionally poor. A first attempt to calculate a global MPI for Laos was made by Alkire and Santos (2010), who constructed MPIs for 104 developing countries based on the theoretical framework of Sen and Nussbaum's capability approach (Sen 1976; Sen 1980; Sen 1982; Sen 1992; Sen 2001; Sen and Nussbaum 1993). The calculation used information from the Lao Multiple Indicators Cluster Survey (MICS) conducted in 2006. Given that this study's main focus was

2 The MPI makes it possible to look at joint distribution as opposed to marginal distribution. The relevance of joint distribution in multidimensional analysis was articulated by Atkinson and Bourguignon (1982), who observed that multidimensional analysis is intrinsically different because it is capable of revealing differing degrees of interdependence between dimensions even if the marginal distributions per dimension are identical. Marginal distribution shows how deprivation is distributed within one specific dimension without reference to any other dimension (as in the above-mentioned detailed thematic studies). However, by looking only at the marginal distribution, one does not know who is simultaneously deprived in other dimensions.

on global comparability, the MPI it provided is a snapshot that offers no insights into the development of social inequalities over time.

We have addressed this research gap by calculating an MPI for the years 2002/2003 as well as 2007/2008, based on data from the LECS. This enabled us to analyse changes in multidimensional poverty and contribute to a better understanding of whether the improvements in access to services and infrastructure were inclusive or not. In this paper, rather than looking at a dashboard of independent indicators, as the above-mentioned detailed thematic studies for Laos (Fenton et al. 2010, World Bank and DoS 2009) or the MDG indicators do, we focus on joint deprivation of several indicators (see Santos 2013). Moreover, we decompose our measure in order to analyse disparities in multidimensional poverty for two subgroups of the Laotian population in greater detail. Laos is traditionally a rural dominated country, however, Laos recently experience a rapid urbanization (UN 2014, Bertrand 2013). Against this background we analyse the subgroups of urban and rural areas. Furthermore, in the context of poverty in Laos earlier studies often mentioned ethnic minorities as having a higher risk to be poor (Engvall 2006, Epprecht et al. 2008). In order to test whether a multidimensional poverty measure reveals similar results, we decompose the measure by ethnic groups.

3 Methodology

3.1 Analytical framework

To calculate MPIs for Laos we used the methodology developed by Alkire and Foster (2007, 2011). This methodology is based on the Foster-Greer-Thorbecke measures (Foster et al. 1984) and produces a two-component multidimensional poverty measure. The MPI combines two basic variables: (1) the multidimensional poverty headcount ratio (H), which indicates the incidence of poverty, and (2) an adjustment measure (A), which captures the average intensity of poverty, that is, the joint distribution of the deprivations experienced by the multidimensionally poor.

$$MPI = H * A$$

Where:

$$H = \frac{q}{n}$$

The multidimensional poverty headcount ratio (H) provides the number of poor people (q) in a society divided by the total number of individuals (n) in that society. Thus H is similar to the traditional USD 1.25 a day poverty headcount ratio, although the number of multidimensionally poor people (q) is assessed via a dual cut-off approach represented by $\rho_k(y_i; z)$, where the first cut-off is indicator-specific and the second is the number of different deprivations required to be identified as poor.

The total number of multidimensionally poor is given by:

$$q = \sum_{i=1}^{n} \rho_k(y_i; z)$$

Where $y_i = (y_{i1}, \dots, y_{ij}, \dots, y_{id})$ represents the poverty profile of individual or household i's achievements across indicators (d). The first cut-off is given by z_j, which is the deprivation threshold for each specific indicator j=1,…,d that separates the deprived from the non-deprived as shown in TABLE 2. An example of a specific indicator's deprivation cut-off might be that one household member has at least five or more years of schooling. The second cut-off, called the poverty cut-off, is represented by (k). The poverty cut-off defines the share of (weighted) deprivations (k) a person must have in order to be identified as poor. In the framework developed for the global MPI by Alkire and Santos (2010), a person is considered poor if he or she has a deprivation score that is higher than k = 33.

Table 2 Selection of dimensions, indicators, deprivation cut-offs, and weights

Dimension	Indicators	Deprived if	Weights
Education			1/3
	Years of schooling	No household member has completed five years of schooling	[1/6]
	School enrolment	At least one school-age child (years 1 to 8) is not attending school	[1/6]
Health			1/3
	Nutrition	At least one adult or child is malnourished	[1/3]
Standard of living			1/3
	Electricity	Household has no electricity	[1/18]
	Sanitation	Household's sanitation facility is not improved or is shared	[1/18]
	Water	Household does not have access to drinking water within walking distance of 30 min	[1/18]
	Floor	Household has dirt, sand, or dung floor	[1/18]
	Cooking	Household cooks with dung, wood, or charcoal	[1/18]
	Assets	Household owns no car and no more than one radio. TV. telephone, bike, or motorbike	[1/18]

Nested weights are indicated in [ ]

Like the traditional poverty headcount ratio, the multidimensional poverty headcount ratio (H) also violates one of the axioms (Sen 1976; Alkire and Foster 2007) that a poverty measure should reasonably fulfil[4]. For this reason, H is adjusted by the so-called intensity of poverty (A), which reflects the number of different deprivations suffered by the poor.

$$A = \frac{\sum_{i=1}^{n} c_i(k)}{q}, \textit{ if ci>k}$$

3 A poverty identification of k=1 is in line with the union approach, which defines poverty as deprivation regarding only one indicator. At the other extreme, k=d corresponds to the intersection approach, which defines poverty as deprivation regarding all indicators at once, meaning that a person is considered poor only if he or she is deprived with regard to all indicators.

4 According to the classification of Foster (2006), the headcount ratio does not fulfil the dominance axioms of monotonicity and transfer. A poverty measure that does not fulfil these axioms is unsustainable because it encourages policymakers with a limited budget to assist the marginally poor rather than the severely poor.

Where $c_i(k)$ is the censored deprivation score of individual i, and q is the number of people who are multidimensionally poor. In $c_i(k)$ we assign a deprivation score to each individual according to his or her deprivations. The deprivation score of each person is calculated as a weighted sum of the number of deprivations in such a way that $c_i(k)$ is between 0 and 1. If a person is deprived with regard to every indicator, the deprivation score equals 1, and vice versa. Using the formula:

$$c_i = w_1 I_1 + w_2 I_2 + \cdots + w_d I_d$$

where $I_i = 1$ if the person is deprived with regard to indicator i and $I_i = 0$ otherwise, and w_i is the weight attributed to indicator i with $\sum_{i=1}^{d} w_i = 1$.

A key feature of the MPI is that it can be decomposed by population subgroups, for example:

$$MPI_{country} = \frac{n_U}{n} MPI_U + \frac{n_R}{n} MPI_R$$

Where U represents the urban population, R the rural population, and n the total population in a country. Using the above expression, we can calculate the contribution of each subgroup to the overall MPI:

$$Contribution\ of\ rural\ areas\ MPI = \frac{\frac{n_R}{n} MPI_R}{MPI_{country}} * 100$$

We proceed in a similar fashion to decompose the MPI by indicators. We compute the censored headcount ratio (CH) for each indicator by simply adding up the number of people who are multidimensionally poor and deprived with regard to that indicator, and dividing this by the total population. If we then take the weighted sum of the censored headcount ratios, we obtain the country's MPI:

$$MPI_{country} = w_1 CH_1 + w_2 CH_2 + \cdots + w_9 CH_9$$

Here w_1 is the weight of indicator 1 and CH_1 is the censored headcount ratio of indicator 1, and so on for the other eight indicators, such that the sum of all weights equals one. By rearranging the above expression we obtain the contribution of each indicator to overall poverty:

$$Contribution\ of\ indicator\ i\ MPI = \frac{w_i CH_i}{MPI_{country}} * 100$$

3.2 Data, dimension, and indicators

The data used for the analysis is from the LECS series (LSB 2013), a survey conducted at the household level by the Lao Statistics Bureau (2002/3, 2007/8)[5]. Our choice of the LECS as our data source has two reasons: on the one hand, the LECS data provide information for all indicators used in our analysis, and on the other, they are collected at regular intervals[6] and can thus serve as a basis for effective monitoring and evaluation of social policies. Four LECS have been conducted in Laos since 1992. Their main purpose is to provide basic statistical data for calculating the gross domestic

5 We considered including the LECS 1997/1998 as well, but decided against it because its method of data collection differed from that used in the later surveys.
6 The LECS is conducted every five years.

product (GDP) and a number of other important measures, as well as for defining the poverty line. Accordingly, the surveys include data on nutritional, demographic, and health aspects, as well on educational attainment, labour market outcomes, physical features of the household, and other areas of social and material well-being.

The dimensions and indicators for the MPI were chosen in such a way that they enable assessment of whether people have the necessary resources – e.g. food, water, health care, and energy – to fulfil their plans in life. Recently, Raworth (2012) defined a "safe and just space for humanity" according to her concept of social boundaries, in which she includes the dimensions of health, food, water, income, education, resilience, voice, jobs, energy, social equity, and gender equality. Data limitations made it impossible for us to include all eleven dimensions. However, in order to respect the multidimensionality of poverty and ensure comparability, we included the three dimensions used for the global MPI by Alkire and Santos (2010), namely health, education, and standard of living. Two indicators are used for the dimension of education, one for the dimension of health, and six for the dimension of standard of living. Due to a lack of data we were unable to calculate child mortality, which would have completed the standard set of indicators proposed by Alkire and Santos. The nine indicators selected and the nested weights assigned to each of them are presented in TABLE 2. Some of the indicators refer to individuals and others to households. For this reason, the MPI applies a unitary household definition, according to which all members of a given household are assigned the same poverty status. As a result, the MPI does not reflect intra-household inequality.

The dimensions and indicators were weighted according to Alkire and Foster (2007), using nested weights. Each dimension was assigned an equal weight of 1/3, and each indicator was weighted equally within its corresponding dimension. Since we were unable to include child mortality, the relative weights we used are not entirely equal in absolute terms to the standard ones defined by Alkire and Santos (2010). The issue of assigning weights is of considerable importance and has been the subject of critical reflection in recent discussions on multidimensional poverty measures[7]. We chose the weighting scheme proposed by Alkire and Foster (2007) to ensure that we could use the global MPI (Alkire and Santos 2010) as a benchmark for our findings. For the same reason, we followed Alkire and Santos in setting the number of deprivations (k) that are required for a household to be defined as multidimensionally poor at k=3. However, we also present results for alternative values of k, mainly for the purpose of analysing robustness.

The indicator for nutrition is not entirely consistent due to data limitations. Thus we were unable to calculate the Body Mass Index for children based on the LECS 2002/2003 data. Instead, we considered a household malnourished if a child's weight-for-age z-score was below -2. The LECS 2007/2008 does not contain data on height and weight for children, so for this year we took the food poverty headcount calculated by the Lao Statistics Bureau on the basis of household diaries (Kakwani et al. 2002). In the analysis we included only households for which data were available for all nine indicators. Thus, we included 45,278 individuals out of 49,789 from the 2002/2003 sample, which corresponds to 90.9% of the original sample. This reduced the number of households from 8,092 to

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7 In his blog, Duncan Green, who works as a strategic advisor for Oxfam GB and authored *From Poverty to Power*, features a discussion on the MPI between its co-creator, Sabina Alkire, and Martin Ravallion of the World Bank. Ravallion criticizes the MPI for being based on normative rather than price-based weights. Alkire responded by arguing that some aspects of poverty are impossible to price (e.g. morbidity, mortality, illiteracy), but giving them zero weight would not seem right either.

7,344 or 90.7% of the original sample. Of the 2007/2008 sample we included 47,418 out of 48,021 individuals (98.7%), and 8,183 out of 8,376 households (97.7%).

3.3 Constraints and limitations

A major constraint on applying the global MPI based on Alkire and Santos (2010) to Laos was the poor availability of data pertaining to the same household on all indicators. For example, most surveys that contained data on health and living standards offered insufficient data on work, employment, and consumption. In our study, we were unable to include data on child mortality, and the data on nutrition were not entirely consistent due to differences in measurement methods between the two surveys considered. This might be a source of error or insecurity in the findings on the nutrition indicator. Furthermore, we noticed limitations with regard to the MPI's use in assessing the adequacy of policy interventions, as the three standard dimensions and the corresponding indicators selected may not be sufficiently meaningful for Laos8. We are currently working on constructing a tailored national MPI, the need for which was clearly emphasized by Alkire and Santos (2010). Work on the national MPI will also require rethinking the weighting scheme and considering alternatives to the equal-weighting scheme applied in the global MPI presented here.

4 Results

4.1 Overview of multidimensional poverty in Laos

The main results for the MPI and the multidimensional headcount ratio (H) are reported in TABLE 3, with k=3 to assure international comparability. In 2007/2008 the multidimensional headcount ratio (H) was 0.35 at the national level, meaning that slightly more than one-third of the population was deprived with regard to at least three of the nine indicators. By multiplying this with the average intensity of poverty (A), we obtain an MPI of 0.18. This is somewhat lower than the MPI for 2002/2003, which was calculated at 0.23. The decrease in the MPI between 2002/2003 and 2007/2008 is entirely due to a reduction in the headcount ratio, since the average intensity of poverty (A) faced by the multidimensionally poor remained virtually the same. It is worth noting that even with a poverty cut-off of k = 1, multidimensionally poor people are deprived in more than 1/3 of the weighted indicators on average9, meaning that people are deprived in multiple indicators at the same time. The reduction in the proportion of people deprived with regard to each indicator is broad-based, in the sense that all indicators except cooking fuel and nutrition show a decrease in this proportion over the study period. For electricity and drinking water we observe remarkable reductions, from 53% to 35% and from 53% to 37%, respectively (TABLE 4). For the indicators in the standard of living dimension we found considerable differences between the ratio based on all people in Laos (raw headcount) and the ratio used in the MPI (censored headcount), which includes only people who are both deprived in the corresponding indicator and multidimensionally poor. For example, a considerable share of people is deprived of access to electricity without being multidimensionally poor.

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8 For example, market accessibility measured as travel time to towns has a strong positive association with poverty (Epprecht et al. 2008) but is not included in the MPI.
9 The same is true when other weighting schemes are applied.

Table 3 MPI results for Lao PDR, 2002/2003 and 2007/2008, k = 3

	MPI		H		A	
	2002/3	2007/8	2002/3	2007/8	2002/3	2007/8
National	0.23	0.18	0.44	0.35	0.53	0.52
Urban	0.06	0.09	0.14	0.19	0.46	0.45
Rural	0.29	0.22	0.54	0.42	0.54	0.54
Northern Region	0.34	0.27	0.60	0.48	0.56	0.56
Central Region	0.17	0.15	0.33	0.31	0.50	0.49
Southern Region	0.24	0.16	0.46	0.29	0.52	0.53

FIGURE 1 shows the development of deprivation by indicator and region for multidimensionally poor people from 2002 to 2008. All regions show an improving trend across indicators. However, not all regions improved at the same pace. For example, the share of multidimensionally poor people who are deprived of electricity is still large in the Northern Region. A possible explanation for this difference is that access to electricity is linked to road infrastructure, as electricity is mainly grid-based in Laos. The Northern Region is less accessible than the Central or the Southern regions (Messerli et al. 2008), which may be the reason why it cannot keep pace with the other regions in terms of improving access to electricity.

Table 4 Proportion of people deprived by indicators

Dimension	Indicators	Raw headcount (%)		Cens. headcount (%)	
		2002/3	2007/8	2002/3	2007/8
Education	Years of schooling	24.9	15.6	20.6	13.3
	School enrolment	26.7	15.3	20.2	12.7
Health	Nutrition	19.9	24.6	19.9	24.6
Standard of living	Electricity	52.8	35.1	29.3	20.9
	Sanitation	19.7	16.5	9.3	4.2
	Water	52.5	37.1	30.3	20.6
	Floor	7.8	7	5.6	4.9
	Cooking	91.8	95.7	37.5	34.7
	Assets	49.1	31.6	29.1	20.0

The reference population of the raw headcount is the total population. The reference for the cens. headcount is the share of multidimensionally poor people in Laos (k = 3)

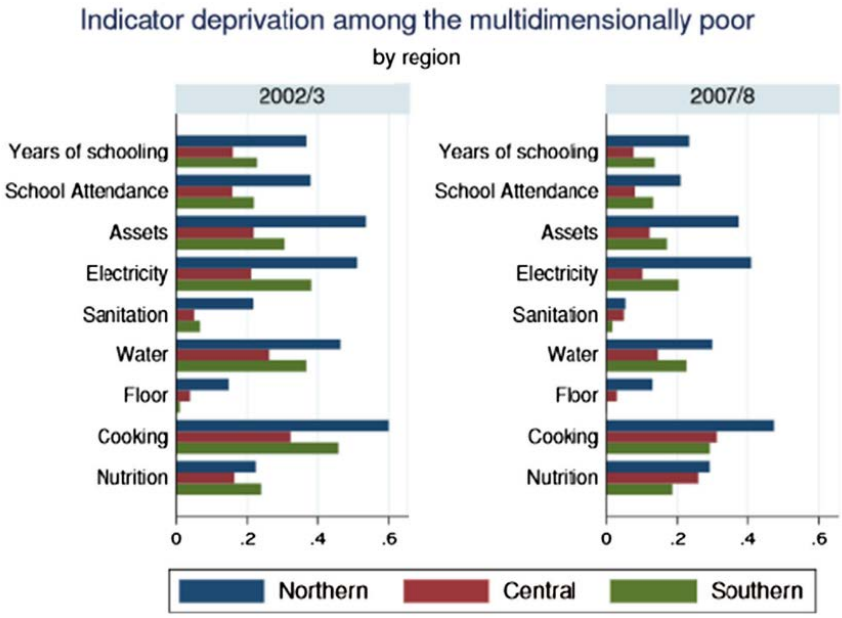

Fig. 1 Percentage of multidimensionally poor people deprived with regard to the different coparing 2002/3 and 2002/8

4.2 Disparities in multidimensional poverty between regions and ethnic groups

TABLE 3 presents results for subgroups such as urban and rural populations, as well as a geographical breakdown into regions. As is well documented in the literature (e.g. Engvall et al. 2005, Epprecht et al. 2008), rural areas exhibit higher multidimensional poverty headcount ratios and higher poverty intensities than urban areas. The geographic overview of multidimensional poverty also reproduces results from earlier studies, with the highest poverty headcount ratios found in the Southern Highlands of Saravane and Sekong, as well in the Northern Highland of Phongsaly, and the lowest in Vientiane and other urban areas (see TABLE 5).

While the poverty headcount ratio has decreased in rural areas, it has increased in urban areas (see TABLE 6). More specifically, the headcount ratios in urban areas have increased in ten provinces. The urban areas in Vientiane Capital, Luangnamtha, Xiengkhuang, and Khammuane provinces even show drastic increases of more than 10 percentage points. Possible explanations include the migration of rural poor to Vientiane; another factor may be that in the survey period of 2007/2008 the world was experiencing a food price crisis, which peaked in September 2008. During this time, the food price of rice rose steadily in Laos (Eliste and Santos 2012), posing a major problem for mainly non-agricultural urban households. We took advantage of the MPI's decomposability to gain some insight into the possible impact of the global food price crisis on the multidimensional poverty headcount.

Table 5 MPI results for Lao PDR provinces, 2002/2003 and 2007/2008, k = 3

	MPI		H		A	
	2002/3	2007/8	2002/3	2007/8	2002/3	2007/8
National	0.23	0.18	0.44	0.35	0.53	0.52
Northern Region	0.34	0.27	0.60	0.48	0.56	0.56
Phongsaly*	0.41	0.39	0.70	0.65	0.59	0.60
Luangnamtha	0.32	0.29	0.58	0.53	0.55	0.54
Oudumxay	0.38	0.26	0.66	0.48	0.57	0.56
Bokeo	0.30	0.23	0.60	0.40	0.51	0.57
Luangprabang	0.32	0.18	0.57	0.37	0.57	0.50
Huaphanh	0.30	0.31	0.55	0.52	0.54	0.59
Central Region	0.17	0.15	0.33	0.31	0.50	0.49
Vientiane Capital*	0.04	0.08	0.08	0.18	0.42	0.43
Xayabury*	0.13	0.06	0.26	0.12	0.50	0.50
Xiengkhuang*	0.26	0.29	0.47	0.54	0.55	0.54
Vientiane*	0.11	0.18	0.23	0.38	0.46	0.48
Borikhamxay*	0.17	0.09	0.32	0.18	0.52	0.47
Khammuane	0.22	0.17	0.44	0.36	0.49	0.49
Southern Region	0.24	0.16	0.46	0.29	0.52	0.53
Savannakhet	0.25	0.17	0.48	0.33	0.52	0.50
Saravane*	0.36	0.30	0.67	0.53	0.54	0.57
Sekong	0.42	0.35	0.72	0.59	0.58	0.59
Chamapasak*	0.20	0.09	0.41	0.20	0.50	0.48
Attapeu	0.30	0.18	0.57	0.35	0.53	0.50

An asterisk (*) denotes provinces selected for the analysis of individual indicators' relative contributions to the MPI

We found considerable differences among ethnic subgroups. In line with Epprecht et al. (2008) and Heinimann et al. (2013) we considered groups belonging to the Tai-Kadai ethnolinguistic family as ethnic majority and groups belonging to the Mon-Khmer, Hmong-Mien, and Tibeto-Burman ethnolinguistic families as ethnic minority groups. In contrast to the disparity between urban and rural regions, which results largely from the headcount ratios, we found considerable differences between the ethnic majority and ethnic minorities not only in the headcount ratios but also in the intensity of poverty. While only 22% of the ethnic majority are multidimensionally poor, we found that 62% of all people belonging to an ethnic minority in Laos are multidimensionally poor. In addition, the average ethnic minority member suffers from a higher intensity of poverty, meaning that multidimensionally poor members of an ethnic minority are more severely deprived than multidimensionally poor members of the ethnic majority (see FIGURE 2).

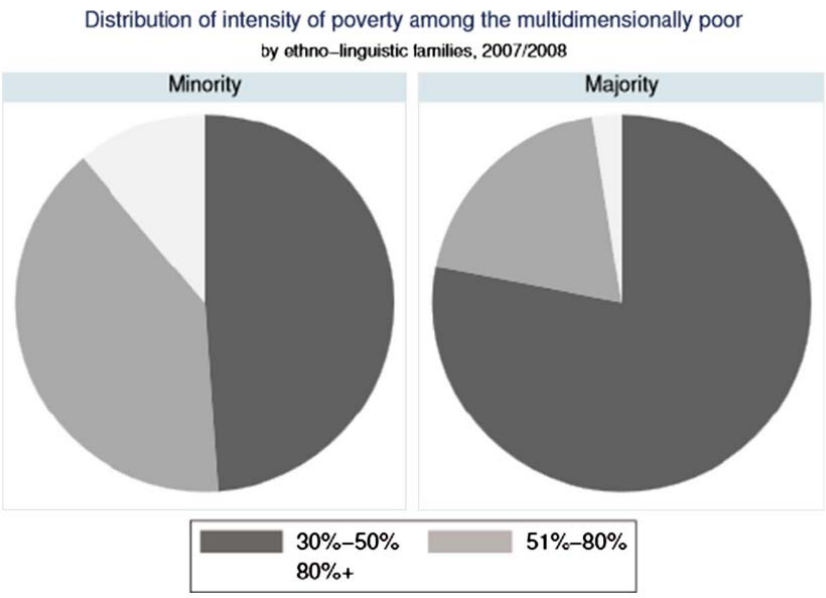

Fig. 2 Distribution of intensity of poverty among the multidimensionally poor in Laos by ethno-linguistic families for the years 2007/2008

4.3 Dimensional and indicator contribution

Using Equation 8, we see that in 2002/2003 the dimension of standard of living makes the largest overall contribution to the MPI (37%), while the health dimension contributes the least (less than 30%). If a certain indicator's contribution to multidimensional poverty exceeds its weight, this suggests relatively high deprivation with regard to this indicator. In other words, it means that the poor are more deprived with regard to this indicator than with regard to others. The high contribution to multidimensional poverty of the standard of living in 2002/2003 is in line with the findings of Alkire and Santos (2010), where the standard of living was the biggest contributor to multidimensional poverty in 55 countries out of 104. In 2007/2008, however, health contributes the largest share of the MPI, at almost 50%. As TABLE 6 shows, the drastic increases in the headcount ratio of mainly central provinces are combined with high percentage-point increases in nutrition deprivation. We plotted the relative indicator contribution to the MPI for selected provinces 10 in FIGURE 3 and FIGURE 4. It is interesting to note that the relative contribution of nutrition increased unequally among provinces. In Phongsaly and Saravane provinces, for example, nutrition deprivation increased only marginally, whereas it rose markedly in Vientiane and Xiengkhuang and almost doubled in Borikhamxay.

10 Our aim was to test whether the food price increase in 2007/2008 mainly affected non-agricultural urban households. Accordingly, we selected the provinces of Vientiane capital, Vientiane, Xayabury, Borikhamxay, and Champasak, for which Schoenweger et al. (2012) had indicated that food security was at risk; in addition, we selected Phongsaly and Saravane because they have a high proportion of agricultural households (Lao PDR 2012).

Table 6 %-point changes in headcount ratio and nutrition indicator from 2002/2003 to 2007/2008, k = 3

	%Urban pop	%-Point change in H			%-Point change in nutrition		
		Urban	Rural	Total	Urban	Rural	Total
National	25	5	−12	−9	8	4	5
Northern Region	17	−2	−12	−12	1	8	7
Phongsaly*	13	−1	−7	−5	10	14	14
Luangnamtha	23	9	−10	−5	5	15	13
Oudurnxay	23	−11	−18	−19	3	6	5
Bokeo	16	11	−19	−20	9	11	11
Luangprabang	15	−11	−17	−20	−11	−4	−7
Huaphanh	15	6	−6	−2	6	17	16
Central Region	33	9	−7	−2	12	9	9
Vientiane Capital*	69	9	12	10	10	13	11
Xayabury*	29	−7	−15	−14	−5	−7	−7
Xiengkhuang*	21	14	5	7	23	27	26
Vientiane*	42	4	18	15	7	28	24
Borikhamxay*	13	7	−20	−14	7	−1	1
Khammuane	15	10	−13	−9	22	−1	4
Southern Region	21	−2	−18	−17	1	−6	−6
Savannakhet	21	5	−18	−15	−2	−2	1
Saravane*	12	−3	−2	−14	−5	3	2
Sekong	30	0	−13	−13	3	5	3
Chamapasak*	25	−1	−26	−21	3	−14	−10
Attapeu	11	5	−23	−22	10	11	−9

An asterisk (*) denotes provinces selected for the analysis of individual indicators' relative contributions to the MPI

5 Robustness tests

The results presented above are based on k = 3 and a scheme of equal weighting for all three dimensions. In order to clarify whether the MPI is oversensitive to deprivation in a specific dimension (e.g. health) or to the weighting scheme itself, we performed robustness tests using different k values and weighting schemes. Furthermore, we analysed spatial dominance to underline the robustness of within-country inequality.

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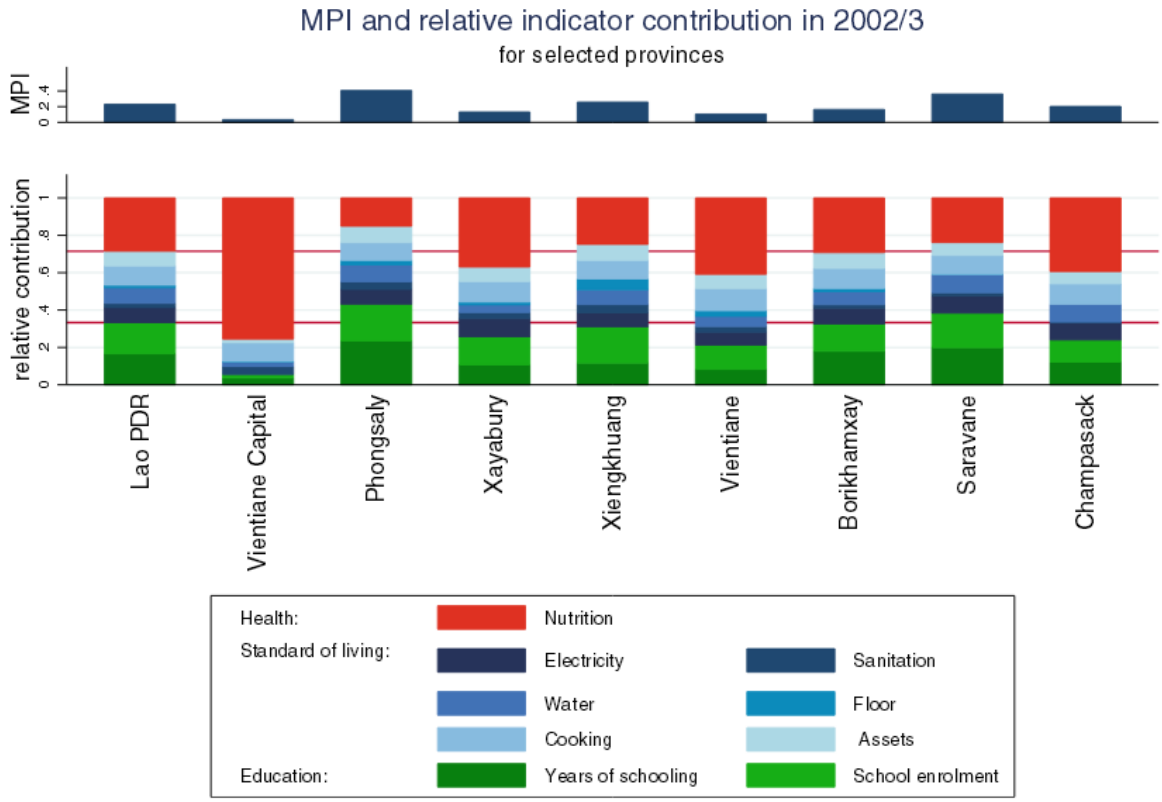


Fig. 3 Relative indicator contribution to the MPI for the years 2002/2003

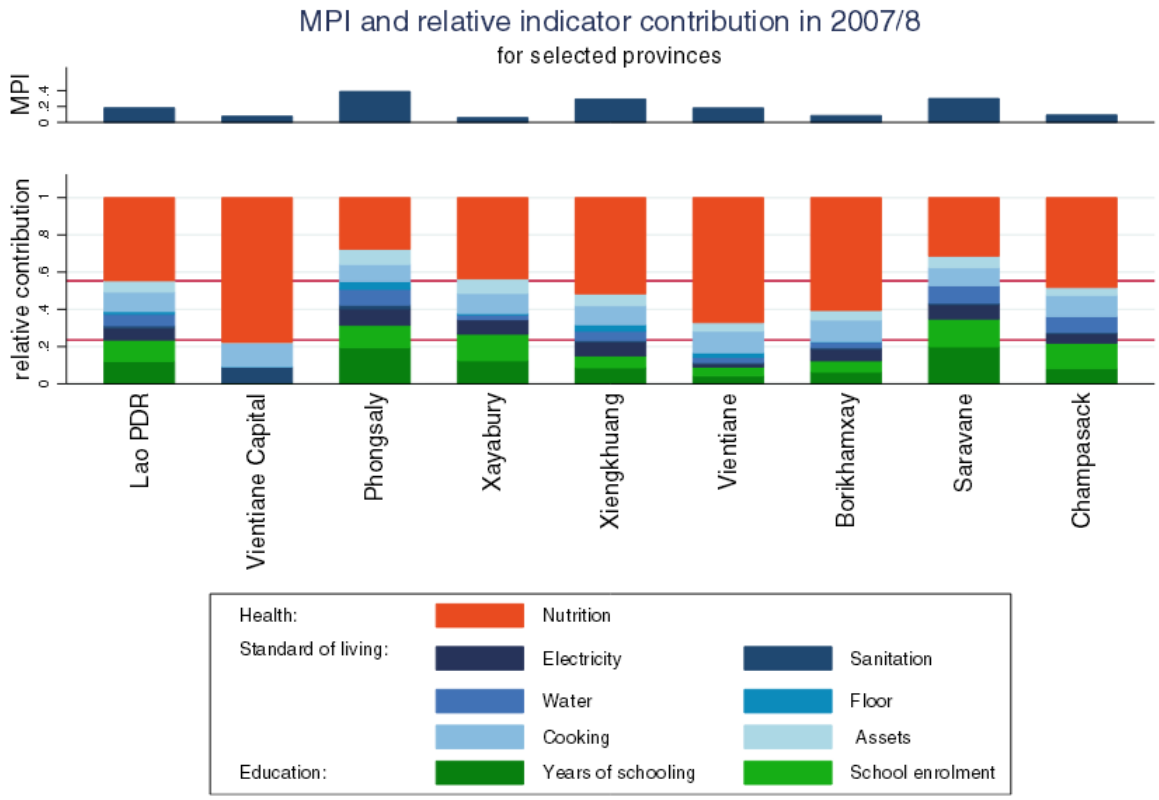


Fig. 4 Relative contribution of individual indicators to the MPI for 2007/2008

5.1 Multidimensional poverty using different weighting schemes

As explained in the methodology section, the MPI was developed using nested weights so that each of the three dimensions receives equal weighting. Due to a lack of data on child mortality, the health dimension has only one indicator (nutrition). The analysis of results showed that for 2007/2008, health contributed almost 50% to the MPI. One might argue that the health dimension has a greater influence on (H) and (A) because it was given the same weight as the other two dimensions (1/3 each) despite its comprising only one indicator. To make sure that this is not the case, we tested the results using three alternative weighting structures, giving 50% of the relative weight to one of the three dimensions and 25% to each of the other two[11].

The different weighting schemes affect the poverty estimates. However, the provincial rankings are robust to different weights for the three dimensions. TABLE 7 presents the correlation between the alternative weightings. The correlation is 0.76 or higher using Kendall Tau-b, and even higher using the Spearman rank correlation. In addition, the average intensity (A) of deprivation also changes only marginally[12].

We conclude that although the weighting structure affects multidimensional poverty estimates, the relative position of each province with respect to others is highly robust to different weightings of the three dimensions.

Table 7 Spearman rank correlations between different weighting schemes

	Equal weights	50 % Health 25 % Education 25 % Standard of living	25 % Health 50 % Education 25 % Standard of living
50 % Health 25 % Education 25 % Standard of living	0.8954 [0.7647]		
25 % Health 50 % Education 25 %; Standard of living	0.9477 [0.8301]	0.8431 [0.5948]	
25 % Health 25 % Education 50 %: Standard of living	0.8824 [0.9346]	0.8562 [0.6993]	0.8824 [0.8431]

Kendall Tau-b rank correlations are indicated in [ ]

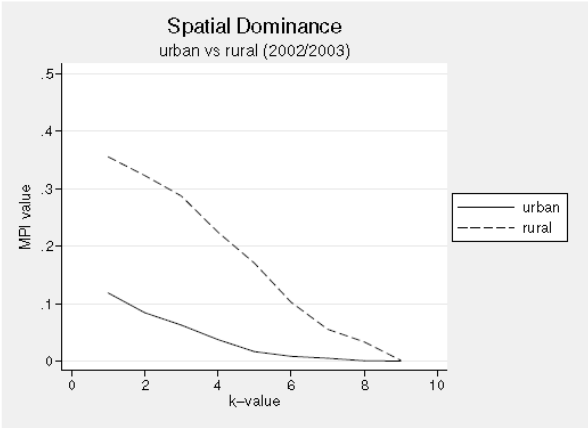
5.2 Spatial dominance

In order to analyse inequalities between and within subgroups we tested whether there is a robust ranking of poverty between rural and urban areas and between regions and provinces. An area or region is said to statistically dominate another in terms of multidimensional poverty if its MPI value always remains lower regardless of the value assigned to k. FIGURE 5 shows that urban areas dominate over rural areas and that the Northern Region is the most deprived whereas the Southern

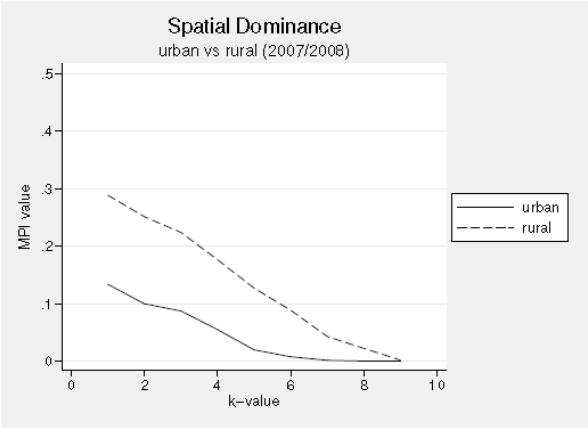
11 We assigned 50% to the education dimension, with each indicator in this dimension weighing 25% and the health indicator also weighing 25%, whereas the indicators of standard of living each received a relative weighting of 4.16%.

12 When the health dimension is assigned 50%, the average intensity (A) rises from 0.53 to 0.65; a 50% weight for the standard of living dimension leads to a decrease in (A) from 0.53 to 0.45.

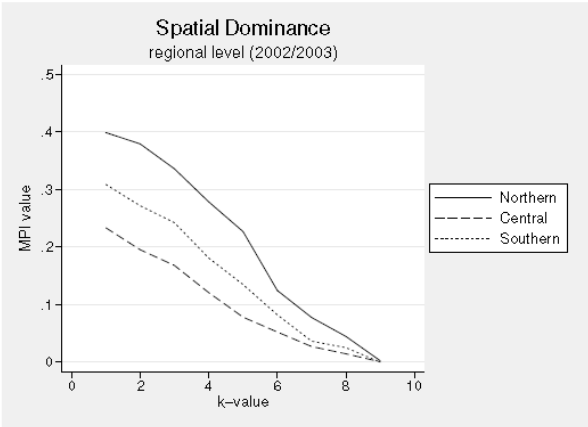
and Central regions are the least deprived. For the provinces we have no clear picture: not every province strictly dominates over another. A look at the provinces within their respective regions, however, enables a clear distinction between the most and least deprived provinces for both the Northern and the Southern regions: in the Northern Region, Phongsaly is the most deprived province and Luangprabang the least deprived province, and in the Southern Region, Sekong is most deprived and Champasak least deprived.



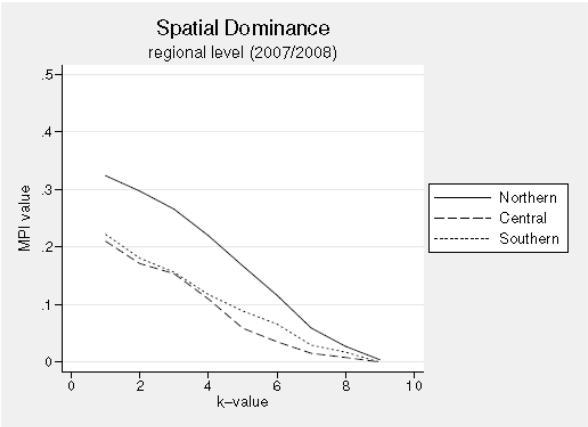
(a) Spatial dominance analysis for urban and rural areas, 2002/3



(b) Spatial dominance analysis for urban and rural areas, 2007/8



(c) Spatial dominance analysis by region, 2002/3



(d) Spatial dominance analysis by region, 2007/8

Fig. 5 Spatial dominance analysis, comparing 2002/2003 and 2007/2008

6 Discussion

In this paper we have sought to broaden the discussion of Laos's successful poverty reduction over the last decade by widening the conventional one-dimensional focus on poverty. We have estimated multidimensional poverty in Laos for two points in time, 2003 and 2008, using the measures proposed by Alkire and Foster (2011). This broader approach to poverty, based on Sen's capability approach, enables us to evaluate whether economic growth in Laos during that period was equitable, and whether it resulted not only in reduced monetary poverty but also in joint improvements with regard to other dimensions of well-being. The MPI values for 2002/2003 and 2007/2008 rank Laos in the 68th and 62nd place, respectively, among the 104 countries for which a global MPI is available

(Alkire and Santos 2010). Countries like Cambodia, Nepal, Kenya, or Bangladesh fall into the same MPI class. With a multidimensional poverty cut-off of k=3, the proportion of deprived households decreased from 44% to 35% between 2003 and 2008. We found that the change was always a decrease, regardless of indicator weightings or poverty cut-offs. Our findings are in line with conventional monetary and consumption-based poverty assessments in Laos. But the MPI made it possible to additionally show that poverty reduction in Laos encompasses not only the monetary dimension, but other dimensions as well.

It is worth noting, however, that although Laos was relatively successful in reducing poverty, the average deprivation (A) among Laotians remains high for all regions. In some provinces, the average deprivation has even increased. This is interesting and contrasts with findings presented in the detailed thematic studies on access to services and infrastructure mentioned above, which show partially impressive improvements (World Bank and DOS 2009). Moreover, the intensity of poverty is still higher than 33% of the weighted indicators when using a poverty cut-off of k=1. Thus, even though people have to be deprived regarding only one indicator to count as poor, on the national average poor people are deprived with regard to at least two indicators. This suggests that deprivations of different indicators tend to go together in Laos. The question remains, therefore, whether the intensity of poverty is concentrated among certain subgroups of the population or whether it is equally distributed among the population. To clarify this we analysed the distribution of intensity across different ethnic groups. We found that ethnic minorities not only show higher poverty headcount ratios but also suffer from higher intensities of poverty than the ethnic majority. However, the question of winners and losers in the context of the recent economic growth needs to be further examined in future research.

By analysing relative indicator contributions, we found that nutrition was the largest contributor to aggregate multidimensional poverty in 2008. According to the World Food Programme report on food security in Laos (WFP Laos 2008), people in urban areas face a significant risk of a shock to their household's food security resulting from higher food prices (e.g. the world food crisis 2007–2008); the reason for this is that they tend to produce less of their own food (net food buyers). In addition, half of the Laotian population collects food from forests (WFP Laos 2008, Fenton et al. 2010), but access to natural resources in Laos is increasingly under pressure. One of the biggest pressures is from foreign direct investment (FDI) via land leases and concessions (Schoenweger et al. 2012) for large-scale plantations, hydropower dams, and mining. High concentrations of projects occur in the South of the Bolaven Plateau, as well as along the Mekong plain and around Vientiane (Schoenweger et al. 2012(Sen 1976; Sen 1980; Sen 1982; Foster, Greer et al. 1984; Sen 1992; Nussbaum, Sen et al. 1993; Sen 2001; Kakwani, Datt et al. 2002; Scott 2002; Atkinson 2003; Bourguignon and Chakravarty 2003; UNDP 2003; Andersson Magnus, Engvall Anders et al. 2005; Robeyns 2005; Warr 2005; Duclos, Sahn et al. 2006; Engvall 2006; Foster 2006; Alkire 2007; Alkire 2007; Alkire and Foster 2007; Thorbecke 2007; Epprecht, Minot et al. 2008; Messerli, Heinimann et al. 2008; Oraboune 2008; PDR 2008; Bank and DOS 2009; Haughton, Khandker et al. 2009; Alkire and Santos 2010; Fenton, Krahn et al. 2010; Alkire and Foster 2011; Alkire and Foster 2011; Fitoussi, Sen et al. 2011; Ravallion 2011; Vandemoortele 2011; Eliste and Santos 2012; Karver, Kenny et al. 2012; PDR 2012; Raworth 2012; Schönenweger, Heinimann et al. 2012; Wagle 2012; Bertrand 2013; Government of Lao People's Democratic Republic 2013; Griggs, Stafford-Smith et al. 2013; Heinimann, Hett et al. 2013; LSB 2013; Santos 2013; UN 2014)). The findings of the present study, however, give cause for critical discussion of land leases and concessions with respect to food security. While there seems to be a tendency for provinces with a high concentration of land concessions to show lower poverty incidences and high

poverty reduction, it is also an eye-catching fact that these are the very areas which showed the highest increase in nutrition deprivation from 2003 to 2008. Although the increase in nutrition deprivation is significant, the fact that the measuring methodology for this indicator differed slightly between 2002/2003 and 2007/2008 diminishes the meaningfulness of these findings and their interpretation. Nevertheless, our findings showing an increase in nutrition deprivation in both rural and urban populations are in line with other detailed studies on food poverty in Laos (e.g. World Bank and DoS 2009, Fenton et al. 2010).

Our study shows that a broader approach to poverty via an MPI enables a better identification and evaluation of the situation of the most vulnerable people. This is achieved by focusing on improvements among multidimensionally poor people rather than looking at the average improvements across the total population. On these grounds, an MPI seems to offer a more adequate basis for efficient allocation of resources in social programmes. By including the newest dataset for the years 2012/2013, we will be able to analyse the effect of the 2008 financial and food crisis in greater detail, which is of high importance for national poverty alleviation policies. Moreover, with a country-specific MPI and the inclusion of forthcoming spatially explicit data on land concessions, we will be able to study the relation between land deals and well-being in much greater detail.

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Reference

Alkire, S. (2007). "Choosing dimensions: the capability approach and multidimensional poverty." Chronic Poverty Research Centre Working Paper(88).

Alkire, S. (2007). "The missing dimensions of poverty data: introduction to the special issue." Oxford development studies **35**(4): 347-359.

Alkire, S. and J. Foster (2007) "Counting and multidimensional poverty measures." OPHI Working Paper **7**.

Alkire, S. and J. Foster (2011). "Counting and multidimensional poverty measures." Journal of Public Economics **95**: 476-487.

Alkire, S. and J. Foster (2011). "Understandings and misunderstandings of multidimensional poverty measurement." Journal of Economic Inequality **9**(2): 289-314.

Alkire, S. and M. E. Santos (2010) "Acute multidimensional poverty: a new index for developing countries." OPHI Working Paper **38**.

Andersson Magnus, Engvall Anders, et al. (2005). Determinants of poverty in Lao PDR. Working Paper 223. Stockholm, Stockholm School of Asian Studies,Stockholm School of Economics.

Atkinson, A. B., & Bourguignon, F. (1982). The Comparison of Multi-Dimensioned Distributions of Economic Status. Review of Economic Studies, 49(2), 183-201

Atkinson, A. B. (2003). "Multidimensional deprivation: contrasting social welfare and counting approaches." Journal of Economic Inequality **1**(1): 51-65.

Bank, W. and DOS (2009). Poverty in Lao PDR 1992/3-2007/8. World Bank, Washington D.C and Department of Statistics Vientiane, Lao PDR, World Bank.

Andersson Magnus, Engvall Anders, & Ari, K. (2005). Determinants of poverty in Lao PDR Working Paper 223. Stockholm: Stockholm School of Asian Studies ,Stockholm School of Economics

Bertrand, J. (2013). Political Change in Southeast Asia. Cambridge, Cambridge University Press.

Bourguignon, F. and S. R. Chakravarty (2003). "The measurement of multidimensional poverty." The Journal of Economic Inequality **1**(1): 25-49.

Duclos, J. Y., D. E. Sahn, et al. (2006). "Robust multidimensional poverty comparisons." The economic journal **116**(514): 943-968.

Eliste, P. and N. Santos (2012). Lao People's Democratic Republic Rice Policy Study. W. Bank. Rome, World Bank FAO.

Engvall, A. (2006). „Ethnic minorities and rural poverty in Lao PDR‟, Mimeo, Stockholm School of Economics, Stockholm.

Epprecht, M., N. Minot, et al. (2008). The geography of poverty and inequality in the Lao PDR, Swiss National Centre of Competence in Research North-South, Geographica Bernensia.

Fenton, N., J. Krahn, et al. (2010). Household Reliance on Natural Resources in Lao PDR: Some Evidence frome the LECS Surveys. Background paper in Lao PDR Development Report 2010. Washington D.C., World Bank.

Fitoussi, J.-P., A. K. Sen, et al. (2011). Mismeasuring Our Lives: Why GDP Doesn't Add Up, The New Press.

Foster, J. (2006). Poverty indices. Poverty, Inequality and Development, Springer**:** 41-65.

Foster, J., J. Greer, et al. (1984). "A class of decomposable poverty measures." Econometrica: Journal of the Econometric Society: (52) 761-766.

Government of Lao People's Democratic Republic, U. N. (2013). The Millenium Development Goals Progress Report for the Lao PDR 2013. U. Nations, United Nations.

Griggs, D., M. Stafford-Smith, et al. (2013). "Policy: Sustainable development goals for people and planet." Nature **495**(7441): 305-307.

Haughton, J. H., S. R. Khandker, et al. (2009). Handbook on poverty and inequality. Washington, DC, World Bank**:** xxi, 419 p.

Heinimann, A., C. Hett, et al. (2013). "Socio-Economic Perspectives on Shifting Cultivation Landscapes in Northern Laos." Human Ecology **41**: 51-62.

Kakwani, N., G. Datt, et al. (2002). Poverty in Lao PDR During the 1990s. mimeo. Manila, Asian Development Bank.

Karver, J., C. Kenny, et al. (2012). "MDGs 2.0: What Goals, Targets, and Timeframe?" IDS Working Papers **2012**(398): 1-57.

LSB (2013). Lao Expenditure and Consumption Survey 2002/3 and 2007/8. L. S. Bureau. Vientiane.

Messerli, P., A. Heinimann, et al. (2008). Socio-economic Atlas of Lao PDR - an analysis based on the 2005 census. Geographica Bernensia. Bern**:** 180pp.

Nussbaum, M. C., A. Sen, et al. (1993). The quality of life, Clarendon Press Oxford.

Oraboune, S. (2008). "Infrastructure (rural road) development and poverty alleviation in Lao PDR."

PDR, L. (2012). Lao Census of Agriculture 2010/11 Highlights, Steering Committee for the Agricultural Census, Agricultural Census Office.

PDR, W. L. (2008). Food market study and preliminary household level survey on the impact of higher food prices on the household food security. V. A. M. Unit, United Nations World Food Programme.

Ravallion, M. (2011). "On multidimensional indices of poverty." Journal of Economic Inequality.

Raworth, K. (2012) "A safe and just space for humanity: can we live within the doughnut?" Oxfam Discussion Papers.

Robeyns, I. (2005). "Selecting capabilities for quality of life measurement." Social indicators research **74**(1): 191-215.

Santos, M. E. (2013). "Tracking poverty reduction in Bhutan: Income deprivation alongside deprivation in other sources of happiness." Social indicators research **112**(2): 259-290.

Schönenweger, O., A. Heinimann, et al. (2012). Concessions and Leases in the Lao PDR: Tacking Stock of Land investments. Geographica Bernensia. Bern and Vientiane, Centre for Development and Environment (CDE), University of Bern**:** 98pp.

Scott, L. (2002). "A poverty indicator system for local government." Development Southern Africa **19**(4): 483-501.

Sen, A. (1976). "Poverty: an ordinal approach to measurement." Econometrica: Journal of the Econometric Society: (44) 219-231.

Sen, A. (1980). "Equality of what?" The Tanner lectures on human values **1**: 353-369.

Sen, A. (1982). Choice, welfare and measurement. Basic Blackwell, Oxford.

Sen, A. (1992). Inequality reexamined, Clarendon Press.

Sen, A. (2001). Development as freedom, Oxford Paperbacks.

Thorbecke, E. (2007). Multidimensional poverty: conceptual and measurement issues. The Many Dimensions of Poverty. N. Kakwani and J. Silber, Palgrave Macmillan.

UN. (2014). "Country Profile: Lao People's Dem. Republic." World Urbanization Prospects, the 2014 revision, from http://esa.un.org/unpd/wup/Country-Profiles/Default.aspx.

UNDP (2003). Indicators for monitoring millenium development goals. New York, United Nations Development Program.

Vandemoortele, J. (2011). "The MDG story: intention denied." Development and Change **42**(1): 1-21.

Wagle, U. R. (2014). The counting-based measurement of multidimensional poverty: The focus on economic resources, inner capabilites, and relational resources in the United States. Social Indicators Research (115) 223-240.

Warr, P. G. (2005). Road development and poverty reduction: The case of Lao PDR, Asian Development Bank Institute.

Post-print of peer-reviewed article published in Social Indicators Research
http://link.springer.com/article/10.1007/s11205-015-0900-2