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The New Face of Poverty: How has the Composition of Poverty in Low Income and Lower Middle-Income Countries (excluding China) Changed since the 1990s?

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November 2012

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The New Face of Poverty:
How Has the Composition of Poverty in Low Income and Lower Middle-Income Countries (excluding China) Changed Since the 1990s?

Andy Sumner

Summary

To what extent do education, health and nutrition poverty rates differ by the spatial and social characteristics of households? And how has the composition of education, health and nutrition poverty changed since the 1990s in terms of the spatial and social characteristics of households? This paper provides an analysis of education, health and nutrition poverty in low-income countries (LICs) and lower middle-income countries (LMICs) by geography, education, employment and ethnicity characteristics of the household head based on the Demographic and Health Surveys (DHS) from countries with surveys in both the 1990s and 2000s. It should be noted at the outset that such an aggregated attempt to assess the changing pattern of poverty across low and lower middle-income countries would be best viewed as an indicative 'sketch' of changing patterns of poverty.

The data suggests that the composition of education, health and nutrition poverty - *by the indicators chosen in this paper* - has changed somewhat since the 1990s in terms of the spatial and social characteristics of households. This can be presented as a set of five 'stylised facts' on poverty as follows:

I. More than three-quarters of education, health and nutrition poverty in LICs and LMICs (combined) is to be found in rural areas. However, an increasing proportion of education, health and nutrition poverty is in urban areas.
II. Half of the education, health and nutrition poverty in LICs and LMICs (combined) is concentrated in those households where the head has 'no education'. However, this share has fallen since the 1990s.
III. A third of the education, health and nutrition poverty in LICs and LMICs (combined) is focused in the poorest wealth quintile (by DHS Wealth Index). And this share is increasing.
IV. A third of the education, health and nutrition poverty in LICs and LMICs (combined) is concentrated among those in households where the head is 'not in work' and a further third where the household head is working in agriculture.
V. Two-thirds of the education, health and nutrition poverty in LICs and LMICs (combined) is to be found among those households where the head is the member of an 'ethnic minority group' (meaning an ethnic group which is not the largest ethnic group). However, this finding should be viewed as tentative due to data constraints.

Further, the composition of education, health and nutrition poverty differs between LICs and LMICs quite notably. The poor in LMICs - by the indicators used - are more urban and more educated than in LICs. Indeed, there are indications of marked differences in poverty profiles.

Keywords: poverty; inequality; education; health; nutrition.

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Acronyms

DHS	Demographic and Health Surveys
HH	Household Head
IGT	intergenerational transmission of poverty
LIC	low-income country
LMIC	lower middle-income country
MIC	middle-income country
OECD	Organisation for Economic Co-operation and Development
UMIC	upper middle-income country
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WHO	World Health Organization

Introduction

To what extent do education, health and nutrition poverty rates differ by the spatial and social characteristics of household heads? And how has the composition of education, health and nutrition poverty changed since the 1990s in terms of the spatial and social characteristics of household heads?

This paper provides an analysis of education, health and nutrition poverty in low-income countries (LICs) and lower middle-income countries (LMICs) by spatial and social characteristics – geography, education, employment and ethnicity characteristics – of the household head based on the Demographic and Health Surveys (DHS) from 33 countries with surveys in both the 1990s and 2000s. The resulting dataset covers 80 per cent of the population of low-income countries (LICs) and lower middle-income countries (LMICs) together in 2007 and 70 per cent in 1998 (the median survey years).

The intended value-added of the paper is two-fold. First, the paper has a longitudinal element – such a comparative study using DHS repeated cross-sections has not previously been undertaken to the author's knowledge across these three poverty indicators and this set of 33 countries. Second, the paper contributes to ongoing discussions on poverty trends overall and debates on disparities and poverty related to discussions on the Millennium Development Goals and any post-2015 global development framework that might be agreed when the Millennium Development Goals expire (see Melamed 2012 for discussion).

To be clear at the outset: This paper does not attempt to answer causal questions. It is intended that this paper is the first of a series of papers based on the dataset generated and thus the purpose of this paper is to consider trends and the evolving composition of poverty over time by the three measures chosen in order to develop further avenues for future exploration.

It should also be noted at the outset that such an aggregated attempt to assess the changing pattern of poverty across low and lower middle income countries is an inherently imprecise exercise. Indeed, the estimates presented would be better viewed as an indicative 'sketch' rather than a precise 'photograph' of patterns of poverty.

The paper is structured as follows: section 1 discusses the overall approach of the paper and methodology. Section 2 presents findings on trends in the overall levels of education, health and nutrition poverty (by the indicators chosen) and by subgroups. Section 3 focuses on the changing composition of education, health and nutrition poverty. Section 4 concludes.

1. Poverty and social and spatial characteristics

1.1 Conceptual approach

Three conceptual strands in the research literature relate to the discussion of this paper: disparities in poverty rates between spatial and social groups, why some people remain poor and the intergenerational transmission of poverty. The following discussion does not seek to systematically review the literature. Rather, the intention is to provide reference points to the key literature reviews others have done.

1.1.1 Disparities in poverty rates between groups

The fact that most of the world's poor – by income and multi-dimensional poverty – now live in middle-income countries (MICs), who have attained MIC status through a decade or more of sustained economic growth, raises questions about who is 'left behind' (see for discussion, Alkire *et al*. 2011; Sumner 2012a).

Average mean income across LMICs is currently around $10/day per capita. In contrast income poverty at $1.25 is 25%-30% of population across the LMIC country group and 50%-60% at $2/day poverty according to World Bank Povcal data.[1]

One can ask: do the remaining poor live in provinces that are poorly connected to economic growth and/or in social groups discriminated against or to some extent excluded from the benefits of economic growth?

For example, two-thirds of India's poor live in states within India that have average income below the low-income country level, despite India's MIC status overall (Sumner 2012b). And the government of India (GoI 2012: 2) notes that rural dwelling Scheduled Tribes face poverty rates of almost 50 per cent compared to a national poverty rate of less than 30 per cent.[2]

The Demographic and Health Surveys (DHS) provide a useful set of data to explore such questions of poverty disparities across education, health and nutrition poverty in a comparable way across countries.

Interest in poverty disparities is (re)emerging in policy debates around the Millennium Development Goals (MDGs) and any post-2015 goals (see for discussion, Melamed 2012; UNDP 2010; UNICEF 2010; UN 2012; Vandemoortele and Delamonica 2010). Indeed, who the remaining poor are is an important question in itself for any successor framework to the MDGs.

A substantial set of data processed from the DHS and other datasets by UNICEF (2010) notes considerable differences between national averages and the poorest groups across various MDG related indicators such as immunisation rates and skilled attendants at birth for example.

[1] See Sumner (2012b). Lower numbers are LMICs country group excluding India.
[2] The new poverty line in India utilised in 2009–10 data, 'happens to be close to, but less than, the 2005 PPP $1.25 per day poverty norm used by the World Bank in its latest world poverty estimates' (Government of India 2009: 8), and produces a national poverty rate of 29.8 per cent or 355m poor (compared to the $1.25 data that produces a rate of 32.7 per cent or 426m poor according to PovCal (2012) and population data in WDI (2011).

Disparities by gender have also been very well documented by DHS data and for this reason are not included in the estimates in this paper here: For example, one recent major report and set of systematic estimates is that produced by UNICEF (2011) which suggested that in some cases gender disparities are worse for boys (outside Asia, under-five mortality is usually higher among boys than girls) or that gender disparities emerge clearly during adolescence (nutrition and health indicators are – in general – about the same at early ages – but adolescent girls are less likely to be literate than boys).

Numerous publications of the Chronic Poverty Research Centre (see summary of ten years of research in Shepherd 2011) note that here are a number of individuals, households and social groups *more likely* to experience chronic poverty (meaning long-run poverty). Hulme *et al*. (2001: 21) argue that these include not only gender dimensions at different life course stages but also those members of marginalised social groups, ethnicities and people living in remote rural areas.

Recent work has also explored the intersection of inequalities (see for example, Kabeer, 2010). However, such matters are not included in this paper here because although they were attempted, the proportion of valid cases produced by the exploration of intersections raised a question mark over the rigour of the endeavour.

Further, there is a wealth of research on spatial inequalities, remoteness and poverty (see for review Kanbur and Venables, 2005).

1.1.2 Why some people remain poor

The literature on longitudinal poverty analysis in developing countries is rapidly expanding (see recent edited volumes by Addison *et al*. (2009) and Baulch (2011) for example. Panel studies – with caveats – also point towards the importance of spatial and social characteristics and their association with those who *remain poor*.

For example, in their wide-ranging critical review of studies of 'poverty mobility' or movements in and out of poverty, Dercon and Shapiro (2007: 30) note that many studies point towards the movement out of poverty being associated with household endowments of education and assets and community characteristics. They note:

> In the last few years, many more panel datasets have become available from developing countries. A number have been used for the analysis of poverty mobility and its correlates. Most research has found that household and community endowments, such as assets and infrastructure, matter for allowing people to move out of poverty, while shocks and risk make and keep people poor. Nevertheless, it is difficult to generalize on which factors matter most in different contexts.

Table 1.1 presents selected studies from their review of panel datasets.

Table 1.1 Examples of determinants of escaping or falling into poverty in selected countries (from panel datasets)

Country	Years	Factors significant for escaping poverty	Factors significant for entering into poverty
Bangladesh	1987–2000	Factors related to the HH asset base e.g. asset accumulation, multiple livelihood activities, income diversification, occupational shift to off-farm activities	Factors related to lifecycle changes (number of working members, high dependency ratio, abandonment by husband) and crises and shocks e.g. illness and natural disasters
India	1970–1981	Literacy, ownership of a house, increase in cultivated area and income from livestock, better infrastructure	-
Uganda	1980–2004	Income diversification, irrigation and land improvement	Illness and health-related expenses, social and customary expenses on marriage and funerals, high-interest private loans, crop disease, drought and irrigation failure
Kenya	1997–2005	Income diversification, formal sector employment, crop diversification, social factors	High dependency ratio, illness and heavy health care expenses, drought

Source: Drawn from review of Dercon and Shapiro (2007).

In a similar vein, studies of the intergenerational transmission of poverty – albeit largely OECD country based – have also noted certain characteristics associated with the *intergenerational transmission of poverty* (as transmitted from adult to child) (see reviews of Bird 2007; Moore 2001; Smith and Moore 2006). For example, Bird's (2007) review of the empirical literature argues that there is an association in the literature between certain household characteristics such as access to productive assets, and education and skill acquisition, and extra-household influences such as class, caste and ethnicity and the intergenerational transmission of poverty.

All of the above points to the following (without any claims to be conclusive) stylised facts (meaning generalisable facts from a complex empirical literature): (i) that there are substantially different poverty rates for different spatial and social groups; (ii) that over time there may be significant changes in the composition of poverty as some people move out of poverty (and others may fall into poverty) and (iii) that those who remain poor may be more likely to have certain spatial and social characteristics than those who exit poverty. However, there are all sorts of caveats to this set of stylised facts. The intention in this paper is to make a contribution in terms of analysing poverty in these characteristics/change over time not to claim with certainty that such facts are associated with poverty which would require comparable longitudinal datasets which the DHS are not.

The DHS are repeated cross-sections rather than panel datasets. Nonetheless the DHS can be used for the purpose of exploring disparities in poverty between spatial and social groups and the evolving composition of poverty over time with caveats.

The estimates and discussion within this current paper are based on assessing education, health and nutrition poverty with a strong emphasis on children and youth. This is for two reasons: first, because these indicators of education, health and nutrition poverty cover the primary dimensions of non-income poverty (such as in the MDGs) that are available in the DHS datasets.

To reiterate, although the discussion above has focused on longitudinal factors that cannot be observed in the subsequent analysis, the purpose of the discussion of longitudinal factors is to review what studies say about factors such as household characteristics and poverty not to claim that such factors are associated with poverty for certain. The contribution of the paper here is how poverty per se differs among groups that are thought to be associated with different types of disadvantage.

1.2 Methodological approach

1.2.1 Main aspects of approach

Full methodological details are contained in the methodological annex at the end of this paper. This section summarises the main aspects.[3]

The Demographic and Health Surveys (DHS) have been conducted since the 1980s in a range of developing countries, typically those receiving US foreign aid. The DHS is a USAID-funded project implemented by ICF International (formerly Macro International).[4] The DHS is a standardised, nationally representative household survey (though based on interviewing households with a woman of reproductive age as noted above).

The DHS is intended to be comparable across countries.

Thirty-three low-income and lower middle-income countries have a DHS survey from the 1990s and 2000s making comparisons possible. As noted earlier, these are repeated cross-sections rather than panel datasets.

Three types of poverty data were estimated:

- Education poverty – the proportion of youth aged 15–24 that have not completed primary school, as a percentage of all youth aged 15–24 [all households with children aged 15–24].
- Health poverty – the proportion of children that died below the age of five (within the past five years), as a percentage of all children born within the last ten years [all households with children born within the last ten years to interviewed women 15–49].

[3] See for the DHS model questionnaire, survey organisation and other technical matters, DHS/ICF International (2011, 2012a, 2012b). For a list of DHS model questionnaires, DHS manuals and other publications see list of DHS publications at: www.measuredhs.com/publications/publication-search.cfm?type=35.

[4] For further details, see Rutstein and Rojas (2006) and/or: www.measuredhs.com.

- Nutrition poverty – the proportion of children under five years 2 standard deviations or more below WHO standard weight-for-age, as a percentage of all children under five years [all households with children born within the last ten years to interviewed women 15–49].

The estimates are produced as follows: first, an assessment of deprivations at the household level is made. The estimates generated are all population based. Household data is used then weights applied according to household size.

To assess poverty incidences for different subgroups, such as total and rural population, the covariates below are applied.

The following covariates are standardised in the DHS, with some minor alterations across countries, and available, with a few exceptions, for all countries:

- Type of place of residence: urban, rural [all households];
- Proximity: large city, small city, town, countryside [all households];
- Wealth: The DHS Wealth Index by wealth quintiles[5] [all households];
- Education of household head: no education, incomplete primary, complete primary, incomplete secondary, complete secondary, higher [all households];
- Occupation of household head: did not work; professional/technical/ managerial, clerical, sales, agriculture, household and domestic, services, skilled manual, unskilled manual, don't know/other [all households with interviewed women aged 15–49].

The following covariate is not standardised and are not available for all countries:

- Ethnicity: ethnicity of female household head or spouse of male household head [all households with interviewed women aged 15–49].

Cross-country aggregates for low and lower middle-income countries are computed. The income classifications of the 1990-decade are based on classification as of World Bank financial year 2000 (which is based on GNI per capita in 1998 as this is the median DHS survey year for the countries in the sample) and the 2000-decade are based on current World Bank classifications. Population figures are applied as weights (using the median survey years 1998 and 2007).

See Annex 1 for further details and the population coverage of the 33 countries as a proportion of the total population of LICs and LMICs, case processing summaries (valid cases), a list of countries in the dataset, the survey years, the country classifications used and significance tests.

1.2.2 Robustness and limitations

It is important to note a number of limitations with the estimates presented shortly in this paper:

[5] The DHS Wealth Index is composed of five wealth quintiles and is an index of a household's relative wealth (on a continuous scale) based on the household's ownership of certain assets such as televisions, bicycles, materials for house construction and types of water access and sanitation. For details, see Rutstein and Johnson (2004) and/or: www.measuredhs.com/topics/Wealth-Index.cfm.

First, the three types of poverty indicators - education, health and nutrition - were chosen because they represent three unequivocal proxies of ill-being - a lack of education, infant mortality and malnutrition (and are available in the DHS). The cut-offs/thresholds were applied consistent with common practice when measuring education, health and nutrition: these were age and incidence. For education poverty the threshold was completion of primary school and the age groups 15-24 years was chosen because this reflects the commonly used (MDG) indicator of universal primary education and 15-24 years are used because children are likely to have finished primary education by then if ever. For health poverty, again, the choice was based on consistency with common usage. For nutrition poverty the chosen cut off was due to the data being only available for that age group and the focus on 2SD below WHO average as this is the value commonly taken to indicate under nutrition. In light of the above, the education, health and nutrition poverty estimates do not compare the same reference group across the three indicators chosen – for example, the education poverty estimates correspond to different populations than the health poverty estimates (However, the different poverty types would seem to move in tandem most of the time which would be useful to explore further).

As is common practice with many income and multi-dimensional poverty estimates, the estimates presented below assign poverty to the whole household based on a circumstance affecting one member. The justification for, and assumption of such an approach is that the ill-being of - here - children is likely to reflect that of the household. Moreover, it can be argued that a focus on childhood and youth deprivations is a particularly apt one in itself with implications for equality of opportunity/capabilities and the future poverty profile.

Household data is used, then weights are applied according to household size. The indicators do not purely assess deprivation in a dichotomous way but consider intensity (e.g. 'one out of three children aged 15–24 did not complete primary education' means 33.3% deprivation in the case, not full deprivation). More importantly, as noted above only household with a woman of reproductive age are interviewed (justified by the focus of the DHS on health matters).

Second, the population coverage - meaning of the total population of the 33 LICs and LMICs in the full sample - as a proxy for the population of all LICs and LMICs. The rationale for a focus on LICs and LMICs is that 85% of the world's $1.25 poor live in those countries with the remainder living almost entirely in one UMICs – China (Sumner, 2012b). This coverage is good for the health and education poverty indicators, but slightly lower for nutrition poverty (see methodological annex Table A1). The sample of 33 LICs and LMICs for education and health poverty covers 80 per cent of their total population in 2007. The coverage of nutrition poverty data is lower in 2007 – 65 per cent of the population of LICs and LMICs together. All of these figures are calculated without China on the basis that China is now an UMIC (see methodological annex).

In comparison, in 1998 the population coverage is 70 per cent of the total LIC and LMIC population for education and health poverty and 60 per cent for nutrition. Thus, one should treat the nutrition data with particular caution.

Third, in the estimates below no account is taken of changes in the underlying population shares due to inadequate sub-national population data. If this were possible it would make disparities clearer. This is a potential area for future work.

Fourth, the data for ethnicity below are estimated by creating two categories as follows: (a) 'Largest ethnic group' – the one largest ethnic group for each country (based on details in the CIA World Factbook which is typically based on the last

population census) and (b) 'Ethnic minority groups' – all other ethnic groups for each country aggregated. This means the one 'largest ethnic group' may not always be more than 50 per cent of the population. And the data on ethnicity and poverty should be treated with further caution due to lower population coverage and fewer valid cases (see methodological annex tables A1 and A2): the population coverage of ethnicity data is 50–55 per cent of the total population of LICs and MICs in 2007 and 40–45 per cent of the total population of LICs and LMICs in 1998.

Fifth, with regards to the case processing summaries (the valid cases), the data for education and health poverty is reasonable (valid cases are 50 per cent or above – see methodological annex Table A4); although some caution should be taken with reference to education poverty by ethnicity and by occupation in both the 1990s and the 2000s due to the lower number of valid cases (see methodological annex Table A4). The lower number of valid cases is due to the fact that some covariates – such as ethnicity and occupation – are only elicited in interviews with women rather than at the household level; hence, if there was no such interview no assumption for the household can be made. Furthermore, education poverty estimates require that at least one child aged 15–24 lives in the household, and health and nutrition poverty estimates can only be made if a child was born into the household within the last ten, respectively five, years. Again, it can be argued that the fact that these indicator are representative of households with children and young people has value in itself.

With regards to significance testing for the changes in education, health and nutrition poverty over time the findings are statistically significant across the aggregated LICs and LMICs category levels (see annex Table A3). At a country level a small number of countries for each type of poverty do have statistically insignificant results at the country level (and these are identified in annex Table A3).

Descriptive statistics are presented in the annex (see annex table A2). The standard deviations are quite high because the poverty indicators are not normally distributed and the distribution is skewed towards the extremes (0 and 100%). This is an interesting point in itself and worthy of follow up research.[6]

The estimates generated are consistent with trends and levels in other similar published indicators of education, health and nutrition poverty at the aggregate level – specifically, in World Development Indicators (2012) for LICs, LMICs and LICs and LMICs combined and UNICEF (2010) for 'developing countries' and 'least developed countries' (See annex tables A6 and A7).

[6] From the point of view of the author a recurring theme in producing this paper has been it's not possible to do everything in one paper and as noted this is the first of several papers on the dataset generated.

2 Trends in poverty in LICs and LMICs, 1998 vs. 2007

To what extent do education, health and nutrition poverty rates differ by subgroups or the spatial and social characteristics of household heads?

How has the composition of education, health and nutrition poverty changed since the 1990s in terms of the spatial and social characteristics of household heads?

2.1 Overall trends in poverty incidence

It makes sense to start with overall trends arising from the data then to discuss poverty disparities and the evolving composition of education, health and nutrition poverty.

The incidence of poverty (% of population) by education, health and nutrition poverty has all fallen over the time period (see Table 2.1). This is consistent with MDG gains presented in the annual reports of UN agencies (e.g. UN 2012; UNICEF, 2010) and data in World Development Indicators for LICs and LMICs separately and combined (see annex table A6 and table A7).

Education poverty has fallen most notably, from almost 40 per cent to just above 30 per cent. There are smaller declines in the incidence of health poverty from 4 per cent to 3 per cent and the incidence of nutrition poverty from 37 per cent to 35 per cent.

However, underlying this is a striking trend: the incidence of education, health and nutrition poverty has been static in urban areas, and rising in 'capital cities/large cities' in particular, albeit from a low base.[7] This trend could mean either the gains from poverty reduction have been more rural-based or there is rural to urban migration of those poor by the indicators used here.

Further, although the incidence in education, health and nutrition poverty has fallen across the population, the incidence of poverty in the poorest wealth quintile (by the DHS Wealth Index) is largely static across education, health and nutrition poverty.

This could suggest that, taking this data, improvements in poverty rates are concentrated in better off groups, not the poorest people (the second, middle, fourth and highest wealth quintiles by the DHS Wealth Index).

The incidence of education and health poverty has also barely fallen among those living in a household with head employed in agriculture – traditionally thought to be among the poorest groups – and the incidence of nutrition poverty has even risen slightly in this group.

However, if one considers the incidence of education, health and nutrition poverty by the education of the household head – again traditionally thought to be related to poverty – then education, health and nutrition poverty have fallen in those groups with 'no education' and 'incomplete education'.

[7] Estimates were also made for capital/large city, small city, town and countryside. These are not presented in the tables to simplify matters on request of peer reviewers.

Finally, the estimates of poverty by ethnicity suggest – not forgetting caveats noted – that the incidence of education, health and nutrition poverty is considerably higher among ‘ethnic minority groups’ than the ‘largest ethnic group’.

And overall, the incidence of education, health and nutrition poverty in the ‘ethnic minority groups’ is double that of the ‘largest ethnic group’. Fortunately, the poverty incidence in both the ‘largest ethnic group’ and the ‘ethnic minority groups’ are falling. The analysis of the data across the set of countries is being pursued in a follow up paper.

The incidence of education, health and nutrition poverty is significantly higher in some subgroups.

For example, the incidence of education, health and nutrition poverty in the rural subgroup is much higher than in the urban subgroup.

The incidence of poverty is also – not surprisingly – much higher in the poorer wealth quintiles (by the DHS Wealth index) than the richer wealth quintiles and among those in households with a head with ‘no education’ and ‘incomplete primary school’ subgroups and in the households with head working in ‘agriculture’ or ‘not working’ (all in contrast to their comparators).

Fortunately, the incidence of education, health and nutrition poverty is – in general – falling across most subgroups. One exception is the rising poverty rates in capital/large cities (by education and nutrition poverty). This, again, could be due to migration of the rural poor to capital/large cities.

Table 2.1 Poverty in LICs and LMICs (% poor of total population), 1998 and 2007

Classification	Subgroup	Education poverty		Health poverty		Nutrition poverty	
		1998	*2007*	*1998*	*2007*	*1998*	*2007*
Population	**Total**	*37.7%*	*30.1%*	*3.6%*	*2.7%*	*37.1%*	*34.5%*
Type of place of residence	Urban	5.5%	5.2%	0.7%	0.6%	6.4%	6.2%
	Rural	32.2%	24.9%	3.0%	2.1%	30.7%	28.3%
DHS Wealth Index	Lowest	11.4%	10.4%	1.0%	0.7%	9.9%	10.6%
	Second	10.1%	8.1%	0.9%	0.7%	9.1%	8.8%
	Middle	8.0%	6.0%	0.8%	0.6%	7.9%	6.9%
	Fourth	5.7%	3.8%	0.6%	0.4%	6.5%	5.4%
	Highest	2.6%	1.8%	0.4%	0.3%	3.6%	2.8%
Education of household head	No education	21.9%	17.5%	1.7%	1.1%	17.6%	16.7%
	Incomplete primary	7.7%	6.1%	0.7%	0.5%	6.2%	4.9%
	Complete primary	3.1%	2.3%	0.4%	0.3%	3.7%	3.0%
	Incomplete secondary	3.4%	3.0%	0.5%	0.5%	5.6%	7.6%
	Complete secondary	1.0%	0.6%	0.2%	0.2%	1.9%	1.2%
	Higher	0.6%	0.4%	0.2%	0.1%	2.0%	1.1%
	DK	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%
Occupation of household head	Did not work	18.0%	10.5%	1.7%	1.0%	19.4%	14.4%
	Prof. / Tech. / Manag.	0.4%	0.4%	0.0%	0.1%	0.3%	0.4%
	Clerical	0.1%	0.1%	0.0%	0.0%	0.1%	0.2%
	Sales	2.1%	2.5%	0.3%	0.3%	1.5%	1.7%
	Agriculture	13.0%	12.1%	1.2%	0.9%	11.5%	12.1%
	Household & Domestic	0.2%	0.1%	0.0%	0.0%	0.2%	0.0%
	Services	0.4%	0.8%	0.0%	0.1%	0.2%	1.0%
	Skilled Manual	2.3%	3.1%	0.2%	0.3%	2.3%	4.4%
	Unskilled Manual	1.3%	0.3%	0.1%	0.0%	1.4%	0.2%
	DK/Other	0.1%	0.2%	0.0%	0.0%	0.1%	0.1%
Ethnicity of household head	Ethnic Minority groups	26.8%	20.6%	2.6%	1.9%	25.9%	24.9%
	Largest Ethnic group	11.0%	9.5%	1.0%	0.8%	11.1%	9.5%

Source: Estimates processed from DHS datasets.

Table 2.2 Poverty by subgroup in LICs and LMICs (% poor of subgroup), 1998 vs. 2007

Classification	Subgroup	Education poverty		Health poverty		Nutrition poverty	
		1998	*2007*	*1998*	*2007*	*1998*	*2007*
Population	***Total***	*37.7%*	*30.1%*	*3.6%*	*2.7%*	*37.1%*	*34.5%*
Type of place of residence	Urban	19.5%	16.3%	2.5%	1.9%	27.6%	24.9%
	Rural	45.0%	37.6%	4.0%	3.0%	39.9%	37.6%
DHS Wealth Index	Lowest	65.5%	57.8%	4.7%	3.5%	49.3%	46.4%
	Second	52.8%	40.9%	4.2%	3.2%	44.1%	40.5%
	Middle	39.6%	29.0%	3.7%	2.8%	40.1%	34.2%
	Fourth	27.1%	18.0%	3.0%	2.2%	32.7%	28.3%
	Highest	12.1%	8.7%	2.0%	1.7%	21.2%	17.3%
Education of household head	No education	60.4%	52.7%	4.7%	3.6%	42.2%	41.6%
	Incomplete primary	44.0%	38.8%	3.9%	2.8%	37.9%	31.3%
	Complete primary	25.0%	20.3%	3.6%	2.6%	34.8%	31.4%
	Incomplete secondary	20.2%	13.9%	2.8%	2.2%	34.7%	33.7%
	Complete secondary	11.7%	7.8%	2.1%	1.8%	25.7%	20.5%
	Higher	7.4%	5.5%	1.8%	1.3%	26.6%	18.1%
	DK	62.9%	38.8%	6.7%	4.2%	31.1%	21.3%
Occupation of household head	Did not work	36.0%	26.5%	3.3%	2.3%	36.9%	33.6%
	Prof. /Tech. / Manag.	16.0%	10.6%	1.7%	1.6%	19.5%	14.8%
	Clerical	11.0%	11.7%	2.0%	1.6%	18.5%	22.8%
	Sales	31.4%	30.9%	4.0%	3.4%	26.1%	24.6%
	Agriculture	53.1%	42.7%	4.5%	3.2%	44.8%	40.1%
	Household & Domestic	39.2%	20.7%	2.1%	1.6%	53.1%	11.1%
	Services	23.7%	20.3%	2.6%	2.6%	24.8%	33.5%
	Skilled Manual	36.1%	33.8%	3.5%	2.8%	39.8%	43.8%
	Unskilled Manual	53.2%	33.7%	3.6%	3.6%	47.4%	16.0%
	DK/Other	35.2%	73.5%	2.9%	7.7%	33.2%	24.4%
Ethnicity of household head	Ethnic Minority groups	43.3%	33.4%	4.0%	2.9%	42.2%	39.7%
	Largest Ethnic group	30.6%	31.3%	2.9%	2.8%	37.7%	35.8%

Source: Estimates processed from DHS datasets.

3 Changing patterns in the composition of poverty, 1998 vs 2007

This section presents data on the composition of education, health and nutrition poverty by the indicators chosen, and how the composition of education, health and nutrition poverty has changed between the 1990s and the 2000s by these indicators.

3.1 The changing composition of poverty, 1998 vs. 2007

Five points can be discerned:

First, education, health and nutrition poverty are (still) largely rural in nature (typically 80% of total poverty). However, an increasing proportion of education, health and nutrition poverty are to be found in urban areas, with notable increases in the proportion of total poverty to be found in the 'capital/large cities' category (albeit from a low base). Over the time period, the proportion of education, health and nutrition poverty accounted for by urban poverty has risen from about 15 per cent to about 20 per cent. This, of course, could be the result of migration.

Second, an increasing proportion of education, health and nutrition poverty in LICs and LMICs (combined) is to be found among those in the poorest two wealth quintiles (by the DHS Wealth Index).

Third, half of education, health and nutrition poverty in LICs and LMICs (combined) is to be found in those living in a household with a head with 'no education' and this proportion is largely static over time. There is, though, a growing proportion of health and nutrition poverty in LICs and LMICs (combined) to be found in the households with heads with 'incomplete secondary' schooling (this could suggest diminishing returns to that level of education).

Fourth, about a third of education, health and nutrition poverty in LICs and LMICs (combined) are to be found among those in households with heads who were 'not in work'. However, this has fallen drastically from half of education, health and nutrition poverty in the 1990s. About a third of education, health and nutrition poverty in LICs and LMICs (combined) is among those in households with heads working in agriculture.

Fifth, the estimates generated suggest that two-thirds of the education, health and nutrition poverty in LICs and LMICs (combined) are among those in households with heads who are in 'ethnic minority groups'. This would appear to be quite a significant, if tentative finding, that warrants further investigation.

3.2 The changing composition of poverty in LICs and LMICs, 1998 vs 2007

This section presents estimates for the composition of poverty in LICs versus LMICs.

The status of countries as LICs and LMICs is provided in annex table A3. The following 9 countries (of the 33 countries in the total sample) changed from LIC to LMIC in the time period under analysis: Armenia, Cameroon, Ghana, India (which of course has a significant impact), Nigeria (also significant), Pakistan (ditto), Senegal, Vietnam and Zambia.

Five points are worth noting:

First, the composition of poverty differs notably between the two. The composition of education, health and nutrition poverty in LICs in 2007 was highly rural in composition (85% of LIC poverty was rural). And this has not changed very much over the time period. That said, the proportion of education, health and nutrition poverty in the category of 'capital/large city' has increased significantly from a low base, and the proportion of poverty in 'towns' has fallen somewhat correspondingly, perhaps suggesting migration. In LMICs, the composition of poverty is notably more urban: 20–25 per cent of the LMIC poverty is urban in nature.

Second, there are some particularly visible differences in the composition of education, health and nutrition poverty in LICs and LMICs by the DHS Wealth Index, and by education and occupation of the household head. Perhaps surprisingly, 30–40 per cent of education, health and nutrition poverty is concentrated in the poorest wealth quintile (of the DHS Wealth Index) in LMICs compared to about a quarter of education, health and nutrition poverty concentrated in the poorest wealth quintile in LICs. This higher proportion could reflect the increased economic/social inequality that has accompanied economic development in LMICs and possibly increasing returns to education in LMICs.

Third, there are much higher proportions of education, health and nutrition poverty accounted for by those in households with heads with 'no education' or 'incomplete primary schooling' groups in LICs than in LMICs. Typically 75–80 per cent of education, health and nutrition poverty in LICs are accounted for by these groups. In LMICs the proportion of education, health and nutrition poverty accounted for by these groups is around 50–60 per cent (with the exception of education poverty itself which is higher).

Fourth, much higher proportions of education, health and nutrition poverty are concentrated in the households with heads who 'did not work' in LMICs than in LICs. Typically, 40–45 per cent of education, health and nutrition poverty in LMICs are accounted for by these groups. In contrast, in LICs the proportion of education, health and nutrition poverty accounted for by groups in these categories is about 20–25 per cent. And across both LICs and LMICs there have been drastic falls in the proportion of education, health and nutrition poverty among those with a household head 'not in work' over the time period. This could be indicative of more social protection in LMICs.

Fifth, there are some significant differences in the composition of poverty in LICs and LMICs in terms of agriculture. Half of education, health and nutrition poverty is concentrated among those in households with heads working in agriculture in LICs and this has increased significantly over time. In contrast, in LMICs only about a third of education, health and nutrition poverty is concentrated among those in households with heads working in agriculture but similarly this has increased significantly over time.

A discussion of how the composition of poverty is changing among different types of groups has two issues – one is how the size of the subgroup is changing, and the other is how poverty is changing amongst that group. But the first issue is only included above where it is inherent in definition (eg the bottom quintile) or mentioned in the earlier discussion in passing (increased share of urban population). As noted above, it is intended that how groups with household heads with no education (or other covariates) vary as a share of population in LICs and LMICs would be pursued as a future paper to bring greater insight into the findings above.

Table 3.1 The composition of poverty in LICs and LMICs (% poor of all poor), 1998 vs. 2007

Classification	Subgroup	Education poverty		Health poverty		Nutrition poverty	
		1998	*2007*	*1998*	*2007*	*1998*	*2007*
Population	***Total***	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
Type of place of residence	Urban	14.6%	17.3%	18.2%	21.9%	17.1%	17.9%
	Rural	85.4%	82.7%	81.8%	78.1%	82.9%	82.1%
DHS Wealth Index	Lowest	30.1%	34.5%	27.4%	27.5%	26.7%	30.8%
	Second	26.7%	26.9%	24.0%	24.3%	24.6%	25.4%
	Middle	21.3%	20.0%	20.8%	20.6%	21.3%	20.1%
	Fourth	15.1%	12.6%	17.2%	16.0%	17.6%	15.6%
	Highest	6.8%	5.9%	10.6%	11.7%	9.8%	8.1%
Education of household head	No education	58.0%	58.4%	46.2%	42.6%	47.5%	48.4%
	Incomplete primary	20.3%	20.2%	18.4%	17.1%	16.7%	14.1%
	Complete primary	8.2%	7.8%	12.4%	11.6%	9.9%	8.7%
	Incomplete secondary	9.0%	10.0%	13.4%	18.9%	15.1%	22.0%
	Complete secondary	2.5%	2.0%	5.0%	5.8%	5.2%	3.5%
	Higher	1.7%	1.4%	4.2%	3.9%	5.5%	3.3%
	DK	.3%	.2%	.3%	.2%	.2%	.1%
Occupation of household head	Did not work	47.6%	34.9%	47.1%	35.3%	52.2%	41.9%
	Prof. / Tech. / Manag.	.9%	1.3%	1.1%	2.1%	.9%	1.1%
	Clerical	.3%	.4%	.6%	.6%	.3%	.5%
	Sales	5.5%	8.2%	7.8%	10.5%	3.9%	5.0%
	Agriculture	34.5%	40.3%	32.3%	34.7%	30.9%	35.1%
	Household & Domestic	.4%	.2%	.2%	.2%	.6%	.1%
	Services	1.0%	2.6%	1.1%	3.7%	.7%	2.9%
	Skilled Manual	6.0%	10.2%	6.5%	10.4%	6.3%	12.7%
	Unskilled Manual	3.5%	1.2%	3.0%	1.5%	3.9%	.5%
	DK/Other	.3%	.8%	.2%	.9%	.3%	.3%
Ethnicity of household head	Ethnic Minority groups	70.9%	68.5%	72.1%	68.9%	69.9%	72.3%
	Largest Ethnic group	29.1%	31.5%	27.9%	31.1%	30.1%	27.7%

Source: Estimates processed from DHS datasets.

Table 3.2 The composition of poverty in low-income countries (% poor of all poor), 1998 vs. 2007

Classification	Subgroup	Education poverty		Health poverty		Nutrition poverty	
		1998	*2007*	*1998*	*2007*	*1998*	*2007*
Population	***Total***	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
Type of place of residence	Urban	14.1%	14.4%	17.1%	18.4%	17.1%	13.5%
	Rural	85.9%	85.6%	82.9%	81.6%	82.9%	86.5%
DHS Wealth Index	Lowest	29.2%	25.3%	27.0%	23.1%	26.6%	27.1%
	Second	26.7%	23.9%	24.1%	21.9%	24.6%	23.3%
	Middle	21.6%	22.1%	21.0%	21.1%	21.3%	21.4%
	Fourth	15.5%	17.9%	17.1%	18.7%	17.7%	17.9%
	Highest	7.0%	10.8%	10.7%	15.2%	9.8%	10.4%
Education of household head	No education	59.2%	53.2%	48.7%	47.1%	47.4%	50.2%
	Incomplete primary	19.3%	31.6%	17.3%	27.8%	16.7%	25.3%
	Complete primary	7.7%	7.2%	11.4%	10.7%	10.0%	9.2%
	Incomplete secondary	9.3%	5.4%	13.4%	9.5%	15.1%	10.6%
	Complete secondary	2.5%	1.1%	4.7%	2.6%	5.2%	2.2%
	Higher	1.7%	1.3%	4.2%	2.0%	5.5%	2.5%
	DK	.3%	.3%	.3%	.4%	.2%	.1%
Occupation of household head	Did not work	46.5%	22.6%	45.6%	20.4%	52.0%	24.6%
	Prof. / Tech. / Manag.	.9%	2.5%	1.1%	3.0%	.9%	2.3%
	Clerical	.3%	.6%	.5%	1.0%	.3%	.5%
	Sales	5.4%	11.3%	7.8%	11.7%	3.9%	10.3%
	Agriculture	35.5%	51.2%	33.6%	47.3%	31.1%	48.8%
	Household & Domestic	.5%	.3%	.3%	.5%	.6%	.4%
	Services	.8%	1.4%	.9%	2.2%	.7%	1.6%
	Skilled Manual	6.0%	5.5%	6.7%	6.2%	6.3%	6.3%
	Unskilled Manual	3.8%	2.5%	3.3%	4.2%	3.9%	3.1%
	DK/Other	.3%	2.3%	.3%	3.4%	.3%	2.1%
Ethnicity of household head	Ethnic Minority groups	70.6%	-	72.0%	-	69.9%	-
	Largest Ethnic group	29.4%	-	28.0%	-	30.1%	-

Source: Estimates processed from DHS datasets. Note: Empty cells if low coverage of country data (see Table A1). Different coverage leads to minor differences in estimates of combined LIC+LMIC in contrast to LICs and LMICs.

Table 3.3 The composition of poverty in lower middle-income countries (% poor of all poor), 1998 vs. 2007

Classification	Subgroup	Education poverty		Health poverty		Nutrition poverty	
		1998	*2007*	*1998*	*2007*	*1998*	*2007*
Population	***Total***	*100.0%*	*100.0%*	*100.0%*	*100.0%*	-	*100.0%*
Type of place of residence	Urban	20.3%	18.7%	28.6%	23.3%	-	19.1%
	Rural	79.7%	81.3%	71.4%	76.7%	-	80.9%
DHS Wealth Index	Lowest	39.2%	39.7%	31.3%	29.2%	-	31.7%
	Second	27.3%	28.6%	23.1%	25.2%	-	26.0%
	Middle	17.8%	18.9%	18.8%	20.4%	-	19.8%
	Fourth	10.7%	9.6%	17.3%	14.9%	-	15.0%
	Highest	5.0%	3.3%	9.5%	10.3%	-	7.6%
Education of household head	No education	45.6%	60.9%	22.7%	40.9%	-	47.9%
	Incomplete primary	31.1%	14.7%	29.2%	12.9%	-	11.2%
	Complete primary	13.4%	8.1%	22.3%	11.9%	-	8.6%
	Incomplete secondary	5.9%	12.3%	13.7%	22.5%	-	24.8%
	Complete secondary	2.5%	2.4%	7.9%	7.0%	-	3.8%
	Higher	1.5%	1.5%	4.0%	4.7%	-	3.5%
	DK	.0%	.1%	.1%	.1%	-	.1%
Occupation of household head	Did not work	59.5%	40.7%	61.6%	40.2%	-	44.3%
	Prof. / Tech. / Manag.	.9%	.7%	1.7%	1.8%	-	.9%
	Clerical	.4%	.3%	1.0%	.4%	-	.5%
	Sales	6.4%	6.7%	8.3%	10.1%	-	4.3%
	Agriculture	22.9%	35.1%	19.6%	30.5%	-	33.1%
	Household & Domestic	.2%	.2%	0.0%	.1%	-	.0%
	Services	2.9%	3.2%	2.7%	4.2%	-	3.1%
	Skilled Manual	6.0%	12.5%	4.6%	11.8%	-	13.6%
	Unskilled Manual	.6%	.5%	.4%	.6%	-	.1%
	DK/Other	.1%	.1%	.0%	.1%	-	.0%
Ethnicity of household head	Ethnic Minority groups	-	69.1%		69.6%	-	72.7%
	Largest Ethnic group	-	30.9%		30.4%	-	27.3%

Source: Estimates processed from DHS datasets. Note: Empty cells if low coverage of country data (see Table A1). Different coverage leads to minor differences in estimates of combined LIC+LMIC in contrast to LICs and LMICs.

4 Conclusions

This paper has provided an analysis of education, health and nutrition poverty by spatial and social characteristics of household heads using the Demographic and Health Surveys (DHS) from 33 LICs and LMICs. Three conclusions emerge from the data generated: First, although the incidence of education, health and nutrition poverty has fallen overall, the incidence of education, health and nutrition poverty has remained largely static over time in certain groups such as those in households with heads who are urban, who are in the poorest wealth quintile (by the DHS Wealth Index), and those in households with heads employed in agriculture. This is potentially of importance as the first group is likely increasing, the second is static in size by definition and the third one might expect to be decreasing over time.

Second, education, health and nutrition poverty rates differ substantially by the spatial and social characteristics of household heads. Notably, certain groups have significantly higher rates of education, health and nutrition poverty such as those in households with heads who are rural, who are in the poorer wealth quintiles (by the DHS Wealth Index), and in households with a head with 'no education' or 'incomplete primary education' and those in households with a head working in agriculture or 'not working' (all in contrast to their comparators).

The data suggests that the composition of education, health and nutrition poverty - *by the indicators chosen in this paper* - has changed somewhat since the 1990s. . This can be presented as a set of five 'stylised facts' on poverty as follows:

I. More than three-quarters of education, health and nutrition poverty in LICs and LMICs (combined) is to be found in rural areas. However, an increasing proportion of education, health and nutrition poverty is in urban areas.
II. Half of the education, health and nutrition poverty in LICs and LMICs (combined) is concentrated in those households where the head has 'no education'. However, this share has fallen since the 1990s.
III. A third of the education, health and nutrition poverty in LICs and LMICs (combined) is focused in the poorest wealth quintile (by DHS Wealth Index). and this share is increasing.
IV. A third of the education, health and nutrition poverty in LICs and LMICs (combined) is concentrated among those in households where the head is 'not in work' and a further third where the household head is working in agriculture.
V. Two-thirds of the education, health and nutrition poverty in LICs and LMICs (combined) is to be found among those households where the head is the member of an 'ethnic minority group' (meaning an ethnic group which is not the largest ethnic group). However, this finding should be viewed as tentative.

Further, the composition of education, health and nutrition poverty differs between LICs and LMICs quite notably. The poor in LMICs - by the indicators used - are more urban and more educated than in LICs. Indeed, there are indications of marked differences in poverty profiles, with potentially interesting insights for how nature of poverty changes at different points of economic development. In terms of future work, there is obviously so much more that could be done with the dataset generated so far. Three priority aspects that are particularly important are (i) population changes in total population by the covariates in order to compare with changes in poverty; (ii) questions about cross-country variance and LICs versus LMIC poverty profiles (iii) questions arising about ethnicity and poverty. All of these would seem to have some interesting insights into policy choices and into where growth has been more and less 'pro-poor' according to the selected indicators.

Methodological Annex

The DHS is a standardised, nationally representative household survey conducted mainly in countries that receive aid from USAID (plus some beneficiaries of the World Bank and UNDP). DHS is mainly directed at women aged 15–49 but can generate most data for all household members. A limitation of the computations is that not every variable used is available for all households. The assessments of poverty incidence are based on subsamples which are still assumed to be representative (for case processing summaries see Table A4 below).

The data provides estimates for poverty incidence with respect to education, health, and nutrition, comparing figures from 1998 (1992–2001, survey closest to ten years prior to second survey) to 2007 (2002–2011).

Indicators are constructed at a household level as this is the unit DHS is randomised over. These indicators are calculated from a subsample in each household (e.g. under-5-year-olds) and the extent of deprivation is then taken as an indicator for the poverty incidence of the complete household:

- Education poverty – the proportion of youth aged 15–24 that have not completed primary school, as a percentage of all children aged 15–24 [all households with children aged 15–24].

- Health poverty – the proportion of children that died below the age of five (within the past five years), as a percentage of all children born within the last ten years [all households with children born within the last ten years to interviewed women 15–49].

- Nutrition poverty – the proportion of children under five years 2SD or more below WHO standard weight-for-age, as a percentage of all children under five years [all households with children born within the last ten years to interviewed women 15–49].

The construction of these measures is comparable to the Oxford OPHI methodology in the sense that these poverty indicators only cover households with children.

The estimates are produced as follows: first, an assessment of deprivations at the household level is made. The estimates generated are all population based. Household data is used, then weights are applied according to household size. The indicators do not purely assess deprivation in a dichotomous way but consider intensity (e.g. ‘one out of three children aged 15–24 did not complete primary education’ means 33.3% deprivation in the case, not automatically full deprivation).

Missing values and reweighting: in the computations, cases with missing values have been excluded pairwise. To compensate for the excluded cases the remaining cases were reweighed. Weights of excluded cases were redistributed equally in two steps: first, to remaining cases in the same sampling unit (either single-stage or multi-stage, depending on DHS survey design); and second, to remaining cases in the same region/state. Any weights of excluded cases not redistributed in this process were dismissed. There was a limitation in the reweighting of remaining cases to 200 per cent of their original weight. In calculating international aggregates and correlates, only those countries which have a 25 per cent or higher coverage for the aggregated variable are included.

The following covariates are standardised in the DHS, with some minor alterations across countries, and available, with a few exceptions, for all countries:

- Type of place of residence: urban, rural [all households]; *The DHS defines urban areas as large cities (capital cities and cities with over 1 million population), small cities (population over 50,000), and towns (other urban areas), and all rural areas are assumed to be countryside* (see DHS Recode Manual, p13).
- Proximity: large city, small city, town, countryside [all households];
- Wealth: division into DHS Wealth Index quintiles [all households]; *The DHS Wealth Index is standardised across countries with minor specifications* (For details, see Rutstein and Johnson (2004).
- Education of household head: no education, incomplete primary, complete primary, incomplete secondary, complete secondary, higher [all households].
- Occupation of household head: Did not work, Prof. / Tech. / Manag., Clerical Sales, Agriculture (self-employed), Services, Skilled Manual, Unskilled Manual, DK (don't know) [all households with interviewed women aged 15–49].

The following covariate is not standardised and are not available for all countries:

- Ethnicity: ethnicity of female household head or spouse of male household head [all households with interviewed women aged 15–49].

Presentation of national and sub-national poverty incidences: the poverty incidences are presented in three different formats:

- % poor of subgroup: proportion of poor in subgroup as percentage of all in subgroup;
- % poor of all poor: proportion of poor in subgroup as percentage of poor of total population;
- % poor of total: proportion of poor in subgroup as percentage of total population.

The assessment of poverty incidence varies from official DHS estimates as follows: first, in addition to the weights provided and applied by the DHS, household size is incorporated as a second weight. This must necessarily lead to deviations from DHS results. Nevertheless the findings are in line with DHS estimates when one cross-references specific countries. Greater deviations only occur with the health poverty indicator, which is for methodological reasons. For the health indicator it is necessary to use a method similar to computing under-5 mortality rates. However, the denominator is only half of the one used in the DHS method, as the estimates here focus on actual death occurrences not on estimates of mortality rates. In addition, DHS averages over rates in different age groups, which leads to an incorporation of deaths before the analysed timeframe, when mortality rates have usually been higher. This has the consequence that the health poverty incidences are usually less than half the mortality rates provided by the DHS. Note also that there is a natural incident of undernutrition (2.3% of children below 2SD in a well-nourished society). This natural variation has not been subtracted from the nutrition poverty estimates.

Analogous to the national aggregates, missing cases are ignored in the computation of international aggregates. These aggregates are only offered for covariates that are standardised (residence, proximity, wealth, education, occupation). In a few surveys

these standardised variables are slightly altered: proximity is only assessed over three values (this is ignored); self-employment and employment in agriculture are not distinguished (both categories are merged for all countries); and additional occupation categories are used, i.e. 'armed forces', 'others' (these are pooled under 'don't know/other'). Ethnicity is transformed into a standardised bivariate variable (largest ethnic group vs. all other ethnic groups) through identifying the ethnic from the CIA World Factbook.

In calculating international aggregates and correlates only those countries are incorporated which have a 25 per cent or higher coverage for the aggregated variable and the coverage estimates in tables A1 and A2 do not include countries with a below 25 per cent national coverage.

Data are also removed if the total for the international aggregate has population coverage in Table A1 of below 33 per cent and data are also removed from tables if valid cases in Table A4 are below 33 per cent (with exceptions made for five cases of 32%).

Groupings: cross-country aggregates are computed. The income classifications of the 1990-decade are based on classification as of World Bank financial year 2000 (which is based on GNI per capita in 1998) and the 2000-decade are based on current World Bank classifications. Population figures are applied as weights (with the mean survey year of the respective decade as median survey years: 1998 and 2007).

Correlations: Correlations were prepared for education, health and nutrition poverty and three covariates – residence, wealth quintile and education of household head for all countries in the sample and LICs and LMICs separately (see tables A5). The estimates are as might be expected although some are weaker than one might anticipate. Overall, education poverty has a positive correlation with place of residence, and a negative correlation with wealth quintile and education of household head. Interestingly, there is no large difference between LICs and LMICs across the correlations prepared (although the correlation with wealth quintile appears to be moving in different directions in LICs and LMICs – getting weaker in LICs and stronger in LMICs). Education poverty is as strongly correlated to wealth as it is to the education of the household head. Nutrition poverty is correlated with the three covariates although not as strongly as education. Perhaps surprisingly, health poverty has weaker correlations to place of residence, wealth quintile and household head. This may be due to the construction of the health poverty indicator, as poverty variance across households is smaller than for the other two poverty indicators. One should note that the usual caveats apply: correlation does not imply causality, the different correlations are simple bivariate, and covariances between different covariates are highly likely. Regression analysis could be undertaken in future work to control for covariance.

Table A1 Total population coverage of 33 countries (% of total population of LICs and LMICs)

	LICs + LMICs			LICs			LMICs		
	Education poverty	Health poverty	Nutrition poverty	Education poverty	Health poverty	Nutrition poverty	Education poverty	Health poverty	Nutrition poverty
1998									
All	70.8%	71.1%	59.4%	78.2%	78.6%	74.9%	49.0%	49.0%	13.3%
Type of residence	70.8%	71.1%	59.4%	78.2%	78.6%	74.9%	49.0%	49.0%	13.3%
Proximity	70.8%	71.1%	59.4%	78.2%	78.6%	74.9%	49.0%	49.0%	13.3%
Region	70.8%	71.1%	59.4%	78.2%	78.6%	74.9%	49.0%	49.0%	13.3%
Education	70.8%	70.8%	59.4%	78.2%	78.2%	74.9%	49.0%	49.0%	13.3%
Wealth	67.0%	71.1%	59.4%	73.1%	78.6%	74.9%	49.0%	49.0%	13.3%
Ethnicity	43.5%	44.2%	39.3%	55.0%	56.0%	52.5%	9.4%	9.4%	0.0%
Occupation	67.3%	68.6%	59.4%	74.0%	75.2%	74.9%	47.5%	49.0%	13.3%
2007									
All	82.0%	76.1%	63.5%	68.6%	68.6%	66.1%	86.2%	78.5%	62.6%
Type of residence	82.0%	76.1%	63.5%	68.6%	68.6%	66.1%	86.2%	78.5%	62.6%
Proximity	61.4%	55.5%	53.5%	46.5%	46.5%	46.5%	66.1%	58.3%	55.8%
Region	82.0%	76.1%	63.5%	68.6%	68.6%	66.1%	86.2%	78.5%	62.6%
Education	82.0%	76.1%	63.5%	68.6%	68.6%	66.1%	86.2%	78.5%	62.6%
Wealth	76.8%	76.1%	63.5%	68.6%	68.6%	66.1%	79.4%	78.5%	62.6%
Ethnicity	53.9%	53.9%	49.1%	25.4%	25.4%	25.4%	62.9%	62.9%	56.6%
Occupation	68.1%	68.8%	58.9%	48.5%	49.8%	47.3%	74.2%	74.9%	62.6%

Note: Coverage defined as population covered by DHS sample divided by population in respective country grouping (e.g. LICs); coverage estimates for the respective variables based on all of the 33 countries which provide data for at least 25% of households (for ethnicity, Cameroon, Mozambique and Nepal are excluded as no clear DHS coding for 'largest ethnic group' could be determined). Coverage calculated without China on the basis that China is now a UMIC.

Table A2 Descriptive statistics, 1998 and 2007

		1998		2007	
		Mean	Std. Deviation	Mean	Std. Deviation
LICs+LMICs	Education poverty	37,7420	44,74905	30,0690	42,70468
	Health poverty	3,6293	12,79385	2,6909	11,34045
	Nutrition poverty	37,0726	45,65565	34,4828	43,63544
LICs	Education poverty	41,7892	45,37731	50,0515	46,67767
	Health poverty	3,9853	13,28271	3,4585	12,60131
	Nutrition poverty	38,9993	46,07689	27,7089	40,94424
LMIC	Education poverty	18,6636	35,97719	24,5400	39,80421
	Health poverty	1,9425	9,99244	2,4785	10,95646
	Nutrition poverty	4,9999	18,72830	36,7463	44,26799

Table A3 List of countries in dataset, survey years, country classifications and non-parametric tests

Country	**Year of survey**		**Country classification**		**Non-parametric tests**		
	1998	**2007**	**1998**	**2007**	**Education**	**Heath**	**Nutrition**
Armenia	2000	2010	L	LM	**.235**	.002	.007
Bangladesh	1997	2007	L	L	.000	.000	.000
Benin	1996	2006	L	L	.000	.000	.000
Burkina Faso	1993	2003	L	L	.000	**.605**	.000
Bolivia	1998	2008	LM	LM	.000	.000	.000
Cambodia	2000	2010	L	L	.000	.000	.000
Cameroon	1991	2004	L	LM	.000	**.105**	.047
Chad	1997	2004	L	L	.000	.011	**.764**
Egypt	2000	2008	LM	LM	.000	.000	.000
Ethiopia	2000	2011	L	L	.000	.000	.000
Ghana	1998	2008	L	LM	.000	.000	.000
Guinea	1999	2005	L	L	.000	.000	.006
Haiti	1995	2006	L	L	.000	.000	.000
India	1999	2006	L	LM	.000	.000	.000

Indonesia	1997	2007	LM	LM	.000	.000	n.a
Kenya	1998	2009	L	L	.000	.000	.044
Madagascar	1997	2009	L	L	.000	.000	n.a
Malawi	2000	2010	L	L	.000	.000	.000
Mali	1996	2006	L	L	.000	.000	.000
Morocco	1992	2004	LM	LM	**.054**	.000	**.079**
Mozambique	1997	2003	L	L	.000	.005	.000
Nepal	2001	2011	L	L	.000	.000	.000
Niger	1998	2006	L	L	.000	.000	.000
Nigeria	1999	2008	L	LM	**.106**	.000	.002
Pakistan	1991	2007	L	LM	.000	.398	n.a
Philippines	1998	2008	LM	LM	.000	.000	n.a
Rwanda	2000	2011	L	L	.000	.000	.000
Senegal	1997	2005	L	LM	n.a	.000	n.a
Tanzania	1999	2010	L	L	.000	.000	.000
Uganda	1995	2006	L	L	.000	.012	**.475**
Vietnam	1997	2002	L	LM	.000	.001	n.a
Zambia	1996	2007	L	LM	.000	.000	.000
Zimbabwe	1999	2011	L	L	.000	.001	**.290**
Median survey year	*1998*	*2007*					
LICs					.000	.000	.000
LMICs					.000	.000	.000

Source: DHS datasets. Notes: Non-parametric tests for Independent samples, Mann-Whitney U test. Significance level .05 (bolded).

Table A4 Case processing summaries (valid cases)

	LICs + LMICs						LICs						LMICs					
	Education poverty		Health poverty		Nutrition poverty		Education poverty		Health poverty		Nutrition poverty		Education poverty		Health poverty		Nutrition poverty	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1998																		
All	187,913	52.4%	213,960	59.4%	109,874	100.0%	147,895	52.5%	167,404	60.4%	95,497	100.0%	40,018	48.7%	46,556	57.4%	14,377	100.0%
Residence	187,913	52.4%	213,960	59.4%	109,874	100.0%	147,895	52.5%	167,404	60.4%	95,497	100.0%	40,018	48.7%	46,556	57.4%	14,377	100.0%
Proximity	187,913	52.4%	213,960	59.4%	109,874	100.0%	147,895	52.5%	167,404	60.4%	95,497	100.0%	40,018	48.7%	46,556	57.4%	14,377	100.0%
Region	187,913	52.4%	213,960	59.4%	109,874	100.0%	147,895	52.5%	167,404	60.4%	95,497	100.0%	40,018	48.7%	46,556	57.4%	14,377	100.0%
Education	187,307	52.1%	209,645	59.2%	109,499	99.7%	147,330	52.3%	163,120	60.0%	95,142	99.7%	39,977	48.6%	46,525	57.4%	14,357	99.9%
Wealth	186,114	52.4%	212,683	59.4%	109,439	100.0%	146,096	52.5%	166,127	60.4%	95,062	100.0%	40,018	48.7%	46,556	57.4%	14,377	100.0%
Ethnicity	73,538	35.5%	106,239	55.7%	54,228	87.7%	69,917	36.0%	100,301	56.0%	54,228	87.7%	3,621	14.6%	5,938	23.9%	0	0 %
Occupation	117,908	33.2%	175,939	50.9%	88,897	85.6%	91,670	33.6%	134,732	51.1%	76,711	85.8%	26,238	32.2%	41,207	50.0%	12,186	84.9%
2007																		
All	317,377	50.2%	282,884	57.6%	147,346	100.0%	114,366	50.7%	137,647	61.0%	74,347	100.0%	203,011	49.6%	145,237	52.2%	72,999	100.0%
Residence	317,377	50.2%	282,884	57.6%	147,346	100.0%	114,366	50.7%	137,647	61.0%	74,347	100.0%	203,011	49.6%	145,237	52.2%	72,999	100.0%
Proximity	218,106	52.3%	167,068	60.7%	98,143	100.0%	64,784	51.4%	79,647	63.3%	45,973	100.0%	153,322	53.5%	87,421	56.3%	52,170	100.0%
Region	317,377	50.2%	282,884	57.6%	147,346	100.0%	114,366	50.7%	137,647	61.0%	74,347	100.0%	203,011	49.6%	145,237	52.2%	72,999	100.0%
Education	316,545	50.1%	282,020	57.4%	146,788	99.7%	114,054	50.5%	137,261	60.8%	74,100	99.7%	202,491	49.4%	144,759	52.0%	72,688	99.5%
Wealth	257,786	49.8%	282,884	57.6%	147,346	100.0%	114,366	50.7%	137,647	61.0%	74,347	100.0%	143,420	48.6%	145,237	52.2%	72,999	100.0%
Ethnicity	90,459	33.8%	127,102	53.2%	73,942	84.2%	37,443	35.3%	63,561	59.0%	37,529	87.9%	53,016	31.5%	63,541	44.6%	36,413	77.4%
Occupation	143,957	32.4%	232,768	51.1%	115,343	80.0%	66,395	32.6%	115,868	53.6%	58,612	82.6%	77,562	32.1%	116,900	46.5%	56,731	75.6%

Note: N = Number of households; % = Average coverage of all countries in respective aggregate sample; coverage estimates for the respective variables based on all of the 33 countries which provide data for at least 25% of households (for ethnicity, Cameroon and Nepal are excluded in both time periods and Mozambique in the 1990s as no clear DHS coding for 'largest ethnic group' could be determined). Low rates due to response rate as ethnicity and occupation are only elicited in interviews with women not at household level; hence, if there was no such interview no assumption for the household can be made, and further, health and nutrition estimates here are only assessed if a child was born into the household within the last five years and education estimate requires that at least one 15–24-year-old child lives in the household.

Table A5 Correlates of poverty, 1998 vs. 2007

LICs+MICs							
Covariate	Correlation	Education poverty		Health poverty		Nutrition poverty	
		1998	2007	1998	2007	1998	2007
Place of residence	Pearson Correlation	.240**	.196**	.050**	.040**	.128**	.122**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
	N	192,163	281,106	220,338	167,068	111,219	98,143
Wealth quintile	Pearson Correlation	-.415**	-.394**	-.072**	-.060**	-.202**	-.222**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
	N	188,497	257,786	215,936	282,884	109,910	147,346
Education of household head	Pearson Correlation	-.436**	-420**	-.079**	-.063**	-.118**	-.144**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
	N	190,646	315,764	214,974	281,322	110,196	146,556
LICs							
Covariate	Correlation	Education poverty		Health poverty		Nutrition poverty	
		1998	2007	1998	2007	1998	2007
Place of residence	Pearson Correlation	.233**	.152**	.046**	.019**	.115**	.075**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
	N	152,145	64,784	173,781	79,647	96,842	45,973
Wealth quintile	Pearson Correlation	-.447**	-.339**	-.074**	-.032**	-.216**	-.146**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
	N	148,479	114,366	169,379	137,647	95,533	72,999
Education of household head	Pearson Correlation	-.447**	-.421**	-.075**	-.064**	-.122**	-.132**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000
	N	150,710	113,520	168,490	136,698	95,871	73,920
LMICs							
Covariate	Correlation	Education poverty		Health poverty		Nutrition poverty	
		1998	2007	1998	2007	1998	2007
Place of residence	Pearson Correlation	.184**	.197**	.032**	.044**	-	.138**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	-	0.000
	N	40,018	153,322	46,556	87,421	-	52,170
Wealth quintile	Pearson Correlation	-.332**	-.432**	-.064**	-.069**	-	-.244**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	-	0.000
	N	40,018	143,420	46,556	145,237	-	74,347
Education of household head	Pearson Correlation	-.337**	-.400**	-.057**	-.057**	-	-.163**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	-	0.000
	N	39,936	202,244	46,484	144,624	-	72,636

Note: N = household; ** Correlation is significant at the 0.01 level (2-tailed); * Correlation is significant at the 0.05 level (2-tailed). Nutrition, 1990s, cells are empty because estimates generated are based on too low coverage of country data (see Table A1).

Table A6 World Bank estimates of education, health and nutrition poverty indicators in LICs and MICs, 1998 vs 2007

	1998	2007
LICs+LMICs		
Primary completion rate, total (% of relevant age group)	78.4	87.2
Mortality rate, under-5 (per 1,000 live births)	84.0	64.3
Malnutrition prevalence, weight for age (% of children under 5)	22.6	20.2
LICs		
Primary completion rate, total (% of relevant age group)	48.0	61.0
Mortality rate, under-5 (per 1,000 live births)	141.1	107.7
Malnutrition prevalence, weight for age (% of children under 5)	31.0	27.0
LMICs		
Primary completion rate, total (% of relevant age group)	72.9	88.2
Mortality rate, under-5 (per 1,000 live births)	92.5	70.5
Malnutrition prevalence, weight for age (% of children under 5)	31.1	27.9

Source: World Development Indicators (WDI). Note: Malnutrition data for 2000 and 2005.

Table A7 UNICEF estimates of underweight prevalence in children under five (%) in developing countries and Least Developed Countries, 2003–2009

	Total	Urban	Rural	Poorest 20%	Richest 20%
Developing countries	23	14	28	40 *	15 *
LDCs	28	20	30	34	18

Source: UNICEF (2010, p. 51). Note: * = Poorest and Richest 20% data for developing countries is excluding China.

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