Who are the poor?

New regional estimates of the composition of education and health 'poverty' by spatial and social inequalities

Andy Sumner

Working Paper 378

Results of ODI research presented in preliminary form for discussion and critical comment

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New regional estimates of the composition of education and health 'poverty' by spatial and social inequalities

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What are the characteristics of poor households and how are they different across regions and time? This paper proposes and operationalises a method for estimating the composition of poverty. The paper takes two measures of poverty – child mortality and primary school non-completion – from the internationally comparable, and nationally representative, Demographic and Health Surveys (DHS) to produce estimates of the composition of health and education poverty. The approach is operationalised in 33 countries and estimates of the composition of 'poverty' by the two indicators are made for sub-Saharan Africa, South Asia and Southeast Asia for 1998 and 2007 based on a total sample of over a million households. Those estimates generated are, in 1998 and 2007, largely consistent across the two measures used in terms of the characteristics of poor households. The estimates suggest 'poverty' is overwhelmingly concentrated in: (i) rural households; (ii) in households where the head of the household has 'no education' or 'incomplete primary education'; (iii) in households where the head of the household is 'not in work' or 'working in agriculture'. However, there are some differences across regions. The strengths and weaknesses of the approach are also discussed.

Keywords: poverty; disparities; education; health

1 Introduction

What are the characteristics of poor households and how are they different across regions and time? This paper proposes and operationalises a method for estimating the composition of poverty.[2] The paper takes two measures of poverty – child mortality and primary school non-completion – from the internationally comparable, and nationally representative, Demographic and Health Surveys (DHS) to produce estimates of the composition of health and education poverty.

The intended contribution of the paper is two-fold. First, to contribute to the literature on the characteristics of households (by household heads) associated with poverty. Second, to propose and operationalise a method to construct estimates for the composition of health and education 'poverty' using the same nationally representative and internationally comparable surveys.[3]

The paper operationalises the approach in the 33 countries that have a DHS survey data point for the 1990s and 2000s, in order to make estimates of the total and regional composition of 'poverty' in sub-Saharan Africa, South Asia and Southeast Asia based on a total sample of over a million households. The sample countries are equal to 80% of the total population of low and lower middle-income countries in 2007 and 70% of the total population of low and lower middle-income countries in 1998.

The paper is structured as follows: Section 2 discusses the proposal for estimating poverty using child mortality and primary school non-completion in the household. Section 3 operationalises the approach. Section 4 discusses the estimates generated across time and regions. Section 5 concludes and the strengths and weaknesses of the approach are then discussed.

[2] Special thanks to Bastian Becker for research assistance. Many thanks for comments on various earlier drafts to Emma Samman, Sabina Alkire, Edoardo Masset, Keetie Roelen, Xavier Cirera, Claire Melamed, Andy Norton, Jennifer Leavy, Duncan Green and Martin Evans.

[3] The DHS are available for almost 70 developing countries since 2000. 67 countries have a DHS since 2000, of which 61 are in the public domain (3 are not in the public domain, 2 have restricted access, 1 is not yet available). Most countries have more than one data point in the 2000s.

2 The Approach

2.1 Conceptualisation of poverty

That poverty is multidimensional beyond income has a long history dating from Seers (1969; 1972) or earlier and the "basic needs" approach (see Hicks and Streeten, 1979; Streeten, 1984) and later the work of Amartya Sen and the UNDP Human Development Report itself since 1990. Most recently, the Multidimensional Poverty measures of Alkire and Foster (2011a; 2011b) have gained considerable attention.

Sen (see in particular 1999) argued that attention should be to the capabilities –means, opportunities or substantive freedoms – which permit the achievement of a set of "functionings" – things which human beings value in terms of "being" and "doing". Income is *only* an instrumental freedom – it helps to achieve other constitutive freedoms. Sen does not ignore income; rather he argues that too much emphasis can be placed on this dimension of development. In short, development is not based on utility or consumption measured by a proxy for income – GDP per capita – as this does not take sufficient evaluative account of the physical condition of the individual and of a person's capabilities.[4]

There have been numerous attempts at constructing "sets" of capabilities (see for review of various attempts Alkire, 2005). Sen himself though steered clear of constructing sets. And although the actual identification of sets of "capabilities" and "functionings" remains unresolved after two decades, the ten dimensions of the Multidimensional Poverty Index (MPI) (UNDP, 2010) might be viewed as some kind of practical set, albeit based on data availability.

Two domains that are generally cited in any discussion of multidimensional poverty are child mortality and primary schooling (these are both included in the MPI for example). Such measures are typically, but not always, available from governments' own socioeconomic, health or education surveys. An alternative source, that is nationally representative and internationally comparable in a way that national government official statistics data may not be are the Demographic and Health Surveys (DHS). The DHS have the advantage in this sense that the instrument and sampling is, to a considerable extent, similar in different countries and thus internationally comparable.

2.2 The Demographic and Health Surveys

The DHS have been conducted since the 1980s in a range of developing countries, typically those receiving US foreign aid as the DHS is a USAID-funded project implemented by the company ICFI (formerly known as Macro International).[5] As noted the DHS are internationally comparable, standardised, nationally representative household surveys that can generate most data for all household members though the DHS are based on interviewing households with a woman of reproductive age (defined as 15-49 years). [6]

The approach proposed here and operationalised below thus produces two indicators of 'poverty' for comparison of the composition of that 'poverty' over time from comparable survey data, in order to overcome different practices in data production in different countries in national or "official" socioeconomic statistics. However, it is important to note that as with any comparative research

[4] This is particularly true for child poverty.
[5] For further details, see in particular, Rutstein and Rojas (2006).
[6] See for the DHS model questionnaire, survey organisation and other technical matters, DHS/ICFI (2011, 2012a, 2012b).

across time and countries the DHS are subject to small changes in the instrument or sampling or other aspects that make comparisons imperfect.[7]

It is possible to generate from the DHS survey data two indicators – one of health poverty and one of education poverty. The former, child mortality, is an indicator of health poverty measured as the mortality of a child under five in the household. This is taken as a proxy for 'poverty' in a household. Although the death of an under five year old child may not always hold as a proxy of 'poverty' for a household, under five child mortality is one of the most widely used poverty measures as it relates to nutrition, health and other aspects of poverty (see for discussion, Alkire, 2012 versus Ravallion, 2011).[8]

Given that many estimates of household poverty are based on adults – most notably in measures of income/expenditure poverty – the use of child poverty within the household to proportionally assess household 'poverty' is a potential new avenue for exploration. In the later discussion the strengths and weaknesses of such an approach are discussed in both a general sense and with the specific operationalisation of the approach in this paper.

The cut-offs/thresholds used were applied consistent with common practice when measuring education and health (age and incidence – for education poverty the threshold was completion of primary school and the age group 15-24 years was chosen because this reflects the commonly used (MDG) indicator of universal primary education). The age group 15-24 years is 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. The death of a child under five or non-completion of primary school of a household youth is thus a proxy for household 'poverty' by, respectively, health or education poverty.[9]

It is common practice with income and some multidimensional poverty estimates to assign poverty to the whole household based on a circumstance affecting one member, with weighting for incidence. The approach taken below does not purely assess deprivation in a dichotomous way but considers intensity too. If one of three children in the household aged 15–24 did not complete primary education, this is recorded as a 33.3% deprivation in that case rather than full – meaning 100% – deprivation.

The justification for, and assumption of such an approach is that the ill-being of children and youth is likely to reflect that of the household. Moreover, it can be argued here that a focus on childhood and youth deprivations is a particularly apt one when considering the composition of poverty as there are implications for future poverty in terms of equality of opportunity/capabilities (e.g. completion of primary schooling) and thus the future poverty profile of a country. Childhood poverty has significant consequences – mortality in the extreme – or lasting consequences into adulthood of late or non-school enrolment and completion, malnutrition and so forth which can affect a person's entire life (Bird, 2007; Corak, 2006; Smith and Moore, 2006).

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[7] One example would be that some earlier DHS such as India only interviewed ever-married women, and later ones all women (to capture children born to unmarried mothers). Furthermore, primary schooling lasts for a different number of years in different countries (3 to 8 years internationally) and in some cases, the number of years of primary school has changed between surveys in the DHS.

[8] Fukuda-Parr and Greenstein (2010, p. 5, fn 7) argue that child mortality is likely a good proxy for poverty because child mortality, 'reflects a number of circumstances, such as accessibility of clean water, sanitation facilities, the education of women, maternal-child health support, provision of primary healthcare facilities, provisioning for food security and others'.

[9] 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 (based on all households with children born within the last ten years to interviewed women 15–49 years in the DHS) and the proportion of youth that have not completed primary school, as a percentage of all youth aged 15–24 (based on all households with children aged 15–24 years).

The case for a focus on children and youth in the household might be further made by the fact that children and youth account for almost half of the total population of developing countries (see Table 1). In the poorest countries – meaning the 'Least Developed Countries' category – this rises to 60% and in sub-Saharan Africa it is just short of two-thirds of the population.[10]

Table 1: Infant, Child and Youth as a proportion of total population

	Under 5 years	Under 15 years	Under 18 years	Under 24 years	15-24 years
Developing regions	10%	29%	34%	47%	18%
Least Developed Countries	15%	40%	46%	60%	20%
Sub-Saharan Africa	16%	42%	49%	62%	20%
Asia	9%	26%	31%	44%	18%

Source: UN Population Division (2010).

[10] Specifically UN DESA (2012) notes: 'The United Nations, for statistical purposes, defines 'youth', as those persons between the ages of 15 and 24 years, without prejudice to other definitions by Member States. This definition was made during preparations for the International Youth Year (1985), and endorsed by the General Assembly (see A/36/215 and resolution 36/28, 1981). All United Nations statistics on youth are based on this definition, as illustrated by the annual yearbooks of statistics published by the United Nations system on demography, education, employment and health. By that definition, therefore, children are those persons under the age of 14. It is, however, worth noting that Article 1 of the United Nations Convention on the Rights of the Child defines 'children' as persons up to the age of 18'.

3 Operationalising the approach

3.1 Countries in sample

In order to operationalise the approach, countries with data points in both the 1990s and the 2000s were taken (generating median survey years of 1998 and 2007 which were used for population data) (see annex Table A1 for survey years for each country). The list of countries includes the following 33 countries: in sub-Saharan Africa – Benin, Burkina Faso, Cameroon, Chad, Ethiopia, Ghana, Guinea, Kenya, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Rwanda, Senegal, Tanzania, Uganda, Zambia and Zimbabwe; in South Asia – Bangladesh, India, Nepal, and Pakistan; in Southeast Asia – Cambodia, Indonesia, Philippines and Vietnam; and in other regions (which are in the 'total' but for which no regional estimates are made due to insufficient population coverage of respective regions): Armenia, Bolivia, Egypt, Haiti and Morocco.

The population coverage of the 'total' aggregate relates to the population of all 33 countries in the full sample – as a proxy for the population of all low and lower middle-income countries on the basis that low and lower middle-income countries are home to 85% of the world's extreme income/expenditure ($1.25) poor.[11] If one accepts this justification, the coverage is reasonable for the health and education poverty indicators: 80% of the total population of low and lower middle-income countries in 2007 and 70% for 1998 (See annex table A2). As is standard practice with health and education indicators the closest survey is taken to the baseline years without interpolation/extrapolation on the basis that there is no agreed way to adjust health and education data, and linear interpolation and extrapolation would be crude at best for education and health.

The approach to generating estimates is as follows: first, an assessment of deprivations at the household level is made. 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 or 15-24 year olds) and the extent of deprivation is then taken as an indicator for the 'poverty' incidence of the *complete* household as noted above. The estimates generated are all population based. Household data is used, then weights applied according to household size.[12] Aggregates are presented for covariates that are standardised in the DHS.[13] Disparities by gender have been very well documented by DHS data and for this reason are not included in the estimates in this paper.[14]

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[11] The remainder of the world's $1.25 poor live virtually entirely in one upper middle-income country – China (Sumner, 2012b).

[12] In the computations below, 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 aggregates only those countries which have a 25 per cent or higher coverage for the aggregated variable are included. Analogous to the national aggregates, missing cases are ignored in the computation of total and regional aggregates.

[13] The following covariates are standardized in the DHS: (a) Place of residence: 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, p.13, DHS/ICF International (2012a)); (b) Education of household head; (c) Occupation of household head; (d) The DHS Wealth Index quintiles which are composed of five wealth quintiles 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). In a few surveys these standardised variables are slightly altered: self-employment and employment in agriculture are not distinguished (both categories are merged for all countries into 'working in agriculture'); and additional occupation categories are used, i.e. 'armed forces', 'others' (these are pooled under 'don't know/other').

[14] See for example, the major report and set of systematic estimates that is produced by UNICEF (2011).

A limitation of the computations is that not every variable used is available for all households, thus the assessments of poverty incidence are based on sub-samples (see annex Table A3 for case processing summaries). The data for education and health poverty is reasonable (valid cases were typically 50% or above) although some caution should be taken with reference to education poverty by occupation in both the 1990s and the 2000s due to the lower number of valid cases.[15]

Basic descriptive data is presented (annex Table 4) and significance tests in (Annex Table A5). The standard deviations are quite high. This is not surprising because the poverty indicators are not normally distributed and the distribution is skewed towards the extremes (0 and 100%). With regards to significance testing for the changes in education and health poverty over time, the findings are statistically significant across the aggregate groupings. Finally, the estimates generated are consistent with trends and levels in other similar published indicators of education and health poverty at the aggregate level – specifically, in World Bank (2012) for low income and lower middle-income aggregates (see Sumner, 2012).

Changes in poverty by groups must be interpreted alongside the population share of those groups across the time periods. For example, urban poverty may increase in part because of rural-urban migration of the poor. The tables in section 4 below and annex table A6) thus assess changes in the composition of poverty next to changes in the composition of the underlying population by residence, education and occupation by the indicators used in this paper (asset quintiles are static at 20%). The changes in the composition of poverty may be due to changes in group size (as a result of demography or migration), or changes in poverty rates. From the DHS data it is not possible to distinguish which because the DHS are cross-sectional not panel datasets. Full 'total' and regional aggregate tables are placed in the annex (tables A7-A10).

[15] In calculating aggregates only those countries are incorporated which have a 25 per cent or higher coverage for the aggregated variable. Countries with a below 25 per cent national coverage were removed. Data are also removed if the total for the aggregate has population coverage of below 33 per cent and data are also removed from tables if valid cases were below 33 per cent with exceptions made for five cases of 32% (See annex table A3). In estimating regional aggregates, population figures are applied as weights (with the mean survey year of the respective decade as median survey years: 1998 and 2007)

4 The composition of poverty

4.1 Estimates by urban/rural composition

What does the data say? According to the DHS population data, the population in the sample has become less rural across all regions although such a pattern is less evident in sub-Saharan Africa.[16] There is a small urbanisation of poverty since 1998. Indeed, the composition of poverty in 2007 remains overwhelmingly rural by either poverty indicator. There has been a clear decline in rural poverty rates whilst urban poverty rates have remained more or less static. However, rural poverty rates are typically twice the level of urban poverty rates (although health poverty rates show less difference). There are some regional differences. For example, South Asia has the highest rural proportion of poverty and Southeast Asia the least.

Table 2: Estimates of rural proportion of education poverty and health poverty, by region, 1998 and 2007

	Population (% rural)		Composition of Poverty (% of poor who are rural dwelling)			
			Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007
Total	72.9	68.0	84.3	82.4	80.0	77.9
South Asia	74.7	69.4	85.9	83.5	83.9	80.6
Southeast Asia	69.1	61.2	85.8	79.3	76.3	70.1
sub-Saharan Africa	75.4	73.0	85.7	83.1	81.1	77.6

Source: Author's estimates based on DHS datasets.

Table 3: Estimates of poverty rates by subgroup for education poverty and health poverty, by region, 1998 and 2007

	% poor, urban				% poor, rural			
	Education Poverty		Health Poverty		Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007	1998	2007
Total	19.3	18.4	2.5	2.1	42.5	37.8	3.8	3.0
South Asia	20.1	20.3	2.3	1.7	45.2	37.8	3.9	2.8
Southeast Asia	7.3	6.4	1.4	1.0	20.9	16.5	1.9	1.4
sub-Saharan Africa	32.5	33.8	4.7	4.1	64.8	62.7	6.5	5.0

Source: Author's estimates based on DHS datasets.

[16] The proportion of population in the sample used here who are rural dwellers is higher than aggregates one can derive from World Development Indicators. For comparison, the DHS data for sub-Saharan Africa is 75.4% rural in 1998 and 73.0% rural in 2007 and this compares with WDI data of 68.7% for 1998 and 65.2% for 2007. The DHS data for South Asia of 69.1% in 1998 and 61.2% in 2007 compares with WDI data of 73.2% in 1998 and 70.5% in 2007. The Southeast Asia aggregate is not available in World Development Indicators (which has the aggregate, East Asia and Pacific). It is not immediately clear how to interpret the fact that the 'all population' data estimated from the DHS surveys here is not directly comparable to data in World Development Indicators in terms of aggregate groups because the population data here are constructed from the 33 countries in the set of sample countries. If one makes the assumption that the WDI data is 'correct' then the sample here has a rural bias. On the other hand any estimate of 'urban' and 'rural' population is subject to numerous caveats.

4.2 Estimates by education attainment

According to the DHS population data, table 4 shows that the population overall who lived in a household with a head that had 'no education' has fallen across all regions although that pattern is more evident in Southeast Asia and sub-Saharan Africa. In terms of the composition of poverty, table 4 shows that about half of education poverty and half of health poverty is to be found in those living in a household with a head with 'no education' and this proportion has risen slightly over time across regions (with the exception of one region, which is Southeast Asia).

Table 4: Estimates of proportion of poverty in households with head with 'no education' or 'incomplete primary education', by region, 1998 and 2007

	Population (% population in category)		Composition of Poverty (% of total 'poor', by categories)			
			Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007
No education						
Total	36.6	34.3	55.7	59.0	42.1	42.4
South Asia	40.4	39.4	60.9	63.5	49.6	46.5
Southeast Asia	10.9	8.1	23.9	21.7	12.5	10.1
sub-Saharan Africa	46.3	39.7	59.4	55.4	50.5	44.4
Incomplete primary						
Total	17.3	15.5	22.3	18.8	20.3	16.5
South Asia	14.2	11.6	15.9	12.8	14.4	12.2
Southeast Asia	26.1	21.3	45.8	46.6	33.5	26.3
sub-Saharan Africa	19.2	21.4	24.0	27.6	21.2	21.1

Source: Author's estimates based on DHS datasets.

Table 5: Estimate of proportion of education poverty and health poverty in households with head with 'no education' by country, 1998 and 2007

	% poor, household with head with no education				% poor, household with head with incomplete education			
	Education Poverty		Health Poverty		Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007	1998	2007
Total	56.9	52.8	4.3	3.5	43.6	35.9	3.9	2.7
South Asia	59.2	47.9	4.2	3.0	43.2	31.7	3.6	2.5
Southeast Asia	36.2	30.6	2.7	2.0	28.2	22.0	2.4	1.6
sub-Saharan Africa	73.9	72.4	7.1	5.7	69.9	65.7	6.5	4.4

Source: Author's estimates based on DHS datasets.

There has been a clear decline in poverty rates amongst those living in a household with a head with 'no education' or 'incomplete primary' (See table 5) although the declines are small in sub-Saharan Africa. Poverty rates are noticeably higher amongst those living in a household where the head has 'no education' compared to those living in households with a head with 'incomplete primary schooling'.

Regional differences are again evident (See tables 4 and 5): Southeast Asia has much smaller proportions of education and health poverty among those living in a household with a head with 'no education'. However, if one adds together the categories of 'no education' and 'incomplete primary' regional differences are far less pronounced.

4.3 Estimates by employment

According to the DHS population data, table 6 shows that the population in the sample who lived in a household with a head that 'did not work' fell substantially between 1998 and 2007 across all regions. In contrast, the population who lived in a household with a head that was 'working in agriculture' rose slightly in all regions.

Regional differences are quite visible in terms of the 'not in work' category (see table 6). For example, the proportion of poverty in households with heads 'not in work' is much higher in South Asia than in sub-Saharan Africa across both education and health poverty. There is far less regional differentiation by the 'working in agriculture' category.

In terms of the composition of poverty, table 6 shows that there was a substantial fall in the 'not in work' category by both indicators and a less substantial rise in the 'working in agriculture' category. In 2007, about a third of education poverty or health poverty was to be found among those in households with heads who were 'not in work'. However, this has fallen from half of education poverty and health poverty in the 1990s.

About a third of education and health poverty is among those in households with heads working in agriculture. This, however, appears to have risen between 1998 and 2007.

There has been little decline in poverty rates in households with heads 'not in work' overall (See table 7). In contrast, the poverty rates for households with heads 'working in agriculture' do show clear declines.

Surprisingly perhaps, poverty rates for those in a household with a head 'working in agriculture' are higher than those in a household with a head 'not in work'.

Regional differences are evident too. For example, table 6 shows that the poverty rates in sub-Saharan Africa for those in a household with a head 'not in work' or 'working in agriculture' are both about 60%. In contrast in Southeast Asia the poverty rates in both are much lower.

Table 6: Estimates of proportion of education poverty and health poverty in households with head who 'did not work' or 'working in agriculture', by region, 1998 and 2007

	Population (% population in category)		**Composition of Poverty (% of total 'poor', by categories)**			
			Education Poverty		**Health Poverty**	
	1998	**2007**	**1998**	**2007**	**1998**	**2007**
'Did not work'						
Total	50.6	40.7	49.8%	36.4%	49.6%	35.4%
South Asia	57.0	47.3	52.6%	38.9%	55.3%	43.5%
Southeast Asia	45.7	36.0	39.9%	29.7%	51.8%	35.3%
sub-Saharan Africa	31.2	22.9	35.7%	26.6%	31.4%	23.4%
Working in agriculture						
Total	26.4	29.6	32.4%	39.0%	30.1%	34.6%
South Asia	26.0	29.8	32.2%	39.7%	30.0%	34.4%
Southeast Asia	22.2	24.1	38.0%	44.4%	27.8%	32.0%
sub-Saharan Africa	33.5	37.6	40.1%	43.3%	36.4%	37.0%

Source: Author's estimates based on DHS datasets.

Table 7: Estimates of proportion of education poverty and health poverty in households with head 'not in work' or 'working in agriculture, 1998 and 2007

	% poor, household with head not in work				% poor, household with head working in agriculture			
	Education Poverty		Health Poverty		Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007	1998	2007
Total	34.7	33.0	3.2	2.5	48.9	41.9	4.1	3.2
South Asia	35.2	22.7	3.1	2.2	50.5	36.8	3.9	2.7
Southeast Asia	14.9	8.9	2.0	1.2	28.8	18.6	2.6	1.9
sub-Saharan Africa	66.3	62.0	6.2	4.7	73.5	64.1	6.4	4.6

Source: Author's estimates based on DHS datasets.

4.4 Estimates by assets

The DHS wealth index can be used to make estimates of the distribution of poverty across the five DHS wealth 'classes' and poverty rates in each class. There is a noticeable increase, between 1998 and 2007 in the proportion of education and health poverty to be found in the poorest wealth quintile (see table 8).

Regional differences are more pronounced by education poverty. Table 8 shows that sub-Saharan Africa only a quarter of the poor are in households in the poorest wealth quintile. In Southeast Asia half of the poor are in households in the poorest wealth quintile. Such differences are not evident to such an extent by health poverty.

Poverty rates have fallen between 1998 and 2007 in the poorest wealth quintile across all regions (see table 9). However, there are significant regional differences in poverty rates ranging from very high poverty rates in the two poorest wealth quintiles in sub-Saharan Africa to very low poverty rates in the two poorest wealth quintiles in Southeast Asia.

Table 8: Estimates of proportion of education poverty and health poverty in households in lowest quintiles, by region, 1998 and 2007

	Population (% population in category)		Composition of Poverty (% of total 'poor', by categories)			
			Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007
Lowest wealth quintile						
Total	20.0	20.0	31.7	36.2	28.1	27.7
South Asia	20.0	20.0	31.2	37.2	28.8	29.5
Southeast Asia	20.0	20.0	42.6	51.8	33.0	30.3
sub-Saharan Africa	20.0	20.0	22.8	27.6	23.3	24.1
Second lowest wealth quintile						
Total	20.0	20.0	26.8	27.5	23.9	24.4
South Asia	20.0	20.0	28.4	28.9	25.2	25.3
Southeast Asia	20.0	20.0	25.1	24.0	22.8	24.3
sub-Saharan Africa	20.0	20.0	22.9	24.6	21.6	22.8

Source: Author's estimates based on DHS datasets.

Table 9: Estimates of proportion of education poverty and health poverty by poorest two wealth quintiles, 1998 and 2007

	% poor, lowest wealth quintile				% poor, second lowest wealth quintile			
	Education Poverty		Health Poverty		Education Poverty		Health Poverty	
	1998	2007	1998	2007	1998	2007	1998	2007
Total	63.7	58.5	4.5	3.6	50.6	41.6	4.0	3.2
South Asia	71.6	60.2	4.8	3.5	56.9	40.9	4.3	3.1
Southeast Asia	37.3	29.9	2.8	1.8	21.8	13.2	2.0	1.5
sub-Saharan Africa	83.7	76.9	6.9	5.6	78.6	64.6	7.0	5.4

Source: Author's estimates based on DHS datasets.

Linking these findings to the wider literature, one can say that the estimates generated resonate with the literature on longitudinal poverty analysis (see, for example, Addison et al., 2009; Baulch, 2011; Hulme et al., 2001; Shepherd, 2011) although the DHS surveys are repeated cross-sections, not longitudinal panel data.

Panel studies – with caveats – point towards the importance of spatial and social characteristics and their association with poverty (however measured – income or non-income). 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. 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.

5 Concluding discussion

This paper has proposed an approach to estimating the composition of household poverty using child mortality and non-completion of primary school and comparable, cross-country datasets.

The methodological approach taken has strengths and weaknesses. There are two general limitations of the approach: first, some households are missing in the DHS. As noted earlier, only households with a woman of reproductive age are interviewed. Relatedly, education poverty estimates require that at least one child aged 15–24 lives in the household, and health poverty estimates can only be made if a child was born into the household within the last ten years. It can alternatively be argued that these indicators are representative of households with children and young people and that has value in itself.

Second, the approach taken means that one does not compare the same reference group across the two 'poverty' 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.

The estimates generated suggest that the composition of education poverty and health poverty has changed in some ways since the late 1990s but in many ways remains largely the same. There are four findings: first, the data suggests more than three-quarters of 'poverty' is to be found in rural areas. Second, half of 'poverty' is concentrated in those households where the head has 'no education' and this rises to three-quarters if one adds those households where the head has 'incomplete primary education'. Third, one third of the poverty 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'. Finally, one third of poverty is focused in the poorest wealth quintile (by DHS Wealth Index) and this share has increased.

These findings would suggest public policy priorities for the poor remain: support to agriculture and rural livelihoods, as the poor are still largely rural and agricultural based; primary education expansion; and employment generation. One policy-related value-added of the approach of this paper could be to focus on areas where either education or health based services are either lacking or where some people are unable to access them easily. In other words, this type of analysis may give us a stronger sense of where social service provision would make a difference (in contrast to profiles where the concern is with income poverty).

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Appendices: Data

Table A1. List of countries in dataset and survey years

Country	Year of survey	
Armenia	2000	2010
Bangladesh	1997	2007
Benin	1996	2006
Burkina Faso	1993	2003
Bolivia	1998	2008
Cambodia	2000	2010
Cameroon	1991	2004
Chad	1997	2004
Egypt	2000	2008
Ethiopia	2000	2011
Ghana	1998	2008
Guinea	1999	2005
Haiti	1995	2006
India	1999	2006
Indonesia	1997	2007
Kenya	1998	2009
Madagascar	1997	2009
Malawi	2000	2010
Mali	1996	2006
Morocco	1992	2004
Mozambique	1997	2003
Nepal	2001	2011
Niger	1998	2006
Nigeria	1999	2008
Pakistan	1991	2007
Philippines	1998	2008
Rwanda	2000	2011
Senegal	1997	2005
Tanzania	1999	2010
Uganda	1995	2006
Vietnam	1997	2002
Zambia	1996	2007
Zimbabwe	1999	2011
Median survey year	*1998*	*2007*

Source: DHS datasets.

Table A2. Coverage of 'total' and regional aggregates of 'total' and regional populations, 1998 and 2007

		Total		South Asia		South East Asia		Sub-Saharan Africa	
		Educ.	Health	Educ.	Health	Educ.	Health	Educ.	Health
1998	All covariates	70.8	71.1	96.7	96.7	73.3	73.3	66.4	67.8
	Residence	70.8	71.1	96.7	96.7	73.3	73.3	66.4	67.8
	Education	70.8	70.8	96.7	96.7	73.3	73.3	66.4	66.4
	Wealth	67.0	71.1	96.7	96.7	73.3	73.3	47.8	67.8
	Occupation	67.3	68.6	96.7	96.7	58.4	58.4	63.5	67.8
2007	All covariates	82.0	76.1	96.6	86.1	73.8	73.8	68.1	65.3
	Residence	82.0	76.1	96.6	86.1	73.8	73.8	68.1	65.3
	Education	82.0	76.1	96.6	86.1	73.8	73.8	68.1	65.3
	Wealth	76.8	76.1	86.1	86.1	73.8	73.8	68.1	65.3
	Occupation	68.1	68.8	76.9	76.9	58.9	58.9	65.3	65.3

Source: Author's estimates based on DHS datasets. Note: Coverage defined as population covered by DHS sample divided by population in respective country grouping; coverage estimates for the respective variables based on all of the countries which provide data for at least 25% of households.

Table A3. Case processing summaries: 'total' and regional aggregates (valid cases), 1998 and 2007

	Total				South Asia				South East Asia				Sub-Saharan Africa			
	Educ.		Health		Educ.		Health		Educ.		Health		Educ.		Health	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1998																
All covariates	187,913	52.4	213,960	59.4	64,312	55.9	67,728	66.1	27,294	47.8	32,424	56.4	73,288	52.5	88,949	60.9
Residence	187,913	52.4	213,960	59.4	64,312	55.9	67,728	66.1	27,294	47.8	32,424	56.4	73,288	52.5	88,949	60.9
Education	187,307	52.1	209,645	59.2	64,274	55.7	67,688	66.0	27,272	47.8	32,411	56.3	72,787	52.3	84,728	60.5
Wealth	186,114	52.4	212,683	59.4	64,312	55.9	67,728	66.1	27,294	47.8	32,424	56.4	69,622	52.6	87,672	60.9
Occupation	117,908	33.2	175,939	50.9	40,678	33.7	52,761	52.3	16,330	33.6	25,620	48.3	45,654	34.5	77,098	53.0
2007																
All covariates	317,377	50.2	282,884	57.6	126,073	55.3	64,258	53.5	35,552	46.4	40,591	52.8	124,103	49.7	147,682	60.9
Residence	317,377	50.2	282,884	57.6	126,073	55.3	64,258	53.5	35,552	46.4	40,591	52.8	124,103	49.7	147,682	60.9
Education	316,545	50.1	282,020	57.4	125,951	55.3	64,198	53.5	35,518	46.4	40,569	52.7	123,449	49.5	146,910	60.8
Wealth	257,786	49.8	282,884	57.6	66,482	50.3	64,258	53.5	35,552	46.4	40,591	52.8	124,103	49.7	147,682	60.9
Occupation	143,957	32.4	232,768	51.1	36,485	30.2	44,414	38.9	20,190	29.4	32,014	46.3	77,825	31.7	131,900	54.3

Source: Author's estimates based on DHS datasets.

Table A4. Descriptive Data, 1998 and 2007

	1998		2007	
Indicators	Education	Health	Education	Health
Total				
Mean	35.94	3.47	31.67	2.72
Standard Error	0.14	0.04	0.10	0.03
Confidence interval (95%) Upper limit	36.21	3.54	31.88	2.77
Lower limit	35.68	3.40	31.47	2.66
Standard Deviation	43.00	12.45	41.83	11.36
Unweighted Count	192215	220346	317406	282991
South Asia				
Mean	38.49	3.47	29.45	2.49
Standard Error	0.17	0.05	0.12	0.04
Confidence interval (95%) Upper limit	44.20	12.55	41.59	11.13
Lower limit	38.82	3.57	29.69	2.57
Standard Deviation	38.16	3.37	29.21	2.41
Unweighted Count	64312	67728	126073	64258
Southeast Asia				
Mean	16.51	1.77	10.76	1.23
Standard Error	0.19	0.05	0.15	0.04
Confidence interval (95%) Upper limit	34.56	9.79	28.41	8.44
Lower limit	16.88	1.87	11.05	1.31
Standard Deviation	16.14	1.67	10.47	1.15
Unweighted Count	31551	38803	35562	40609
Sub-Saharan Africa				
Mean	56.73	6.05	51.13	4.74
Standard Error	0.18	0.05	0.13	0.04
Confidence interval (95%) Upper limit	46.89	15.67	47.17	14.01
Lower limit	57.08	6.15	51.38	4.82
Standard Deviation	56.38	5.95	50.88	4.66
Unweighted Count	71381	86745	124110	145096

Source: Author's estimates based on DHS datasets. Note: Unweighted Count equals number of households in respective sample.

Table A5. Significance tests

	Education	Heath
Total	0.000	0.000
South Asia	0.000	0.000
Southeast Asia	0.000	0.000
Sub-Saharan Africa	0.000	0.000

Source: Author's estimates based on DHS datasets. Note: Non-parametric tests for Independent samples, Mann-Whitney U test. Significance level .05

Table A6. Overview of changes in underlying population, 1998 vs 2007, % population by categories

	Urban	Rural	No Education	Incomplete primary	Did not work	Agriculture
1998						
Total	27.1	72.9	36.6	17.3	50.6	26.4
South Asia	25.3	74.7	40.4	14.2	57.0	26.0
Southeast Asia	30.9	69.1	10.9	26.1	45.7	22.2
Sub-Saharan Africa	24.6	75.4	46.3	19.2	31.2	33.5
2007						
Total	32.0	68.0	34.3	15.5	40.7	29.6
South Asia	30.6	69.4	39.4	11.6	47.3	29.8
Southeast Asia	38.8	61.2	8.1	21.3	36.0	24.1
Sub-Saharan Africa	27.0	73.0	39.7	21.4	22.9	37.6

Source: Author's estimates based on DHS datasets. Note: All estimates weighed according to provided sample weights and household size.

Table A7. The composition of 'total' poverty (% poor of all poor), 1998 vs. 2007

Classification	Subgroup	Education		Health	
		1998	2007	1998	2007
Population	*Total*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
Type of place of residence	Urban	15.7%	17.6%	20.0%	22.1%
	Rural	84.3%	82.4%	80.0%	77.9%
DHS Wealth Index	Lowest	31.7%	36.2%	28.1%	27.7%
	Second	26.8%	27.5%	23.9%	24.4%
	Middle	20.7%	19.6%	20.5%	20.6%
	Fourth	14.3%	11.6%	17.2%	15.8%
	Highest	6.5%	5.1%	10.4%	11.5%
Education of household head	No education	55.7%	59.0%	42.1%	42.4%
	Incomplete primary	22.3%	18.8%	20.3%	16.5%
	Complete primary	9.1%	7.9%	14.1%	11.6%
	Incomplete secondary	8.4%	10.7%	13.5%	19.4%
	Complete secondary	2.5%	2.1%	5.5%	5.9%
	Higher	1.7%	1.4%	4.2%	4.0%
	Don't Know	.2%	.1%	.3%	.2%
Occupation of household head	Did not work	49.8%	36.4%	49.6%	35.4%
	Prof. / Tech. / Manag.	.9%	1.1%	1.2%	2.1%
	Clerical	.3%	.4%	.7%	.6%
	Sales	5.6%	7.8%	7.9%	10.5%
	Agriculture	32.4%	39.0%	30.1%	34.6%
	Household & Domestic	.4%	.2%	.2%	.2%
	Services	1.3%	2.7%	1.3%	3.7%
	Skilled Manual	6.0%	10.8%	6.2%	10.5%
	Unskilled Manual	3.0%	1.0%	2.5%	1.5%
	Don't Know/Other	.2%	.6%	.2%	.9%

Source: Author's estimates based on DHS datasets.

Table A8. The composition of poverty in South Asia

Classification	Subgroup	Education		Health	
		1998	2007	1998	2007
Population	*Total*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
Type of place of residence	Urban	14.1%	16.5%	16.1%	19.4%
	Rural	85.9%	83.5%	83.9%	80.6%
DHS Wealth Index	Lowest	31.2%	37.2%	28.8%	29.5%
	Second	28.4%	28.9%	25.2%	25.3%
	Middle	21.7%	20.4%	20.9%	21.0%
	Fourth	14.1%	10.1%	15.9%	14.6%
	Highest	4.6%	3.4%	9.2%	9.7%
Education of household head	No education	60.9%	63.5%	49.6%	46.5%
	Incomplete primary	15.9%	12.8%	14.4%	12.2%
	Complete primary	7.3%	6.9%	9.8%	8.2%
	Incomplete secondary	10.9%	13.4%	15.4%	26.3%
	Complete secondary	2.9%	1.8%	5.4%	3.4%
	Higher	2.1%	1.4%	5.4%	3.3%
	Don't Know	.1%	.1%	.0%	.2%
Occupation of household head	Did not work	52.6%	38.9%	55.3%	43.5%
	Prof. / Tech. / Manag.	.8%	.4%	.9%	.8%
	Clerical	.1%	.4%	.4%	.4%
	Sales	1.4%	2.6%	1.4%	2.7%
	Agriculture	32.2%	39.7%	30.0%	34.4%
	Household & Domestic	.6%	0.0%	.3%	0.0%
	Services	.5%	3.5%	.4%	4.2%
	Skilled Manual	6.9%	14.2%	7.2%	13.8%
	Unskilled Manual	4.7%	.2%	3.9%	.1%
	Don't Know/Other	.3%	.0%	.2%	.1%

Source: Author's estimates based on DHS datasets.

Table A9. The composition of poverty in Southeast Asia

Classification	Subgroup	Education		Health	
		1998	2007	1998	2007
Population	*Total*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
Type of place of residence	Urban	14.2%	20.7%	23.7%	29.9%
	Rural	85.8%	79.3%	76.3%	70.1%
DHS Wealth Index	Lowest	42.6%	51.8%	33.0%	30.3%
	Second	25.1%	24.0%	22.8%	24.3%
	Middle	16.8%	12.1%	17.7%	19.4%
	Fourth	10.0%	7.8%	17.3%	13.2%
	Highest	5.4%	4.2%	9.2%	12.8%
Education of household head	No education	23.9%	21.7%	12.5%	10.1%
	Incomplete primary	45.8%	46.6%	33.5%	26.3%
	Complete primary	16.8%	16.0%	25.2%	21.8%
	Incomplete secondary	10.4%	10.6%	19.2%	19.7%
	Complete secondary	1.9%	3.3%	6.5%	15.1%
	Higher	1.1%	1.7%	3.1%	6.8%
	Don't Know	.0%	.1%	0.0%	.0%
Occupation of household head	Did not work	39.9%	29.7%	51.8%	35.3%
	Prof. / Tech. / Manag.	1.1%	2.3%	1.2%	5.1%
	Clerical	.5%	.4%	.6%	.8%
	Sales	9.9%	9.2%	10.1%	14.5%
	Agriculture	38.0%	44.4%	27.8%	32.0%
	Household & Domestic	0.0%	1.8%	0.0%	1.1%
	Services	4.0%	4.4%	3.2%	6.6%
	Skilled Manual	6.4%	7.1%	5.2%	2.8%
	Unskilled Manual	.2%	.7%	.1%	1.0%
	Don't Know/Other	.1%	.0%	0.0%	.7%

Source: Author's estimates based on DHS datasets.

Table A10. The composition of poverty in sub-Saharan Africa

Classification	Subgroup	Education		Health	
		1998	2007	1998	2007
Population	*Total*	*100.0%*	*100.0%*	*100.0%*	*100.0%*
Type of place of residence	Urban	14.3%	16.9%	18.9%	22.4%
	Rural	85.7%	83.1%	81.1%	77.6%
DHS Wealth Index	Lowest	22.8%	27.6%	23.3%	24.1%
	Second	22.9%	24.6%	21.6%	22.8%
	Middle	21.4%	21.1%	20.8%	20.5%
	Fourth	19.9%	17.0%	19.9%	18.5%
	Highest	13.0%	9.7%	14.4%	14.1%
Education of household head	No education	59.4%	55.4%	50.5%	44.4%
	Incomplete primary	24.0%	27.6%	21.2%	21.1%
	Complete primary	7.2%	8.5%	12.0%	14.6%
	Incomplete secondary	5.4%	5.0%	9.3%	9.2%
	Complete secondary	2.1%	1.8%	3.6%	6.4%
	Higher	1.2%	1.5%	2.6%	4.0%
	Don't Know	.8%	.2%	.9%	.3%
Occupation of household head	Did not work	35.7%	26.6%	31.4%	23.4%
	Prof. / Tech. / Manag.	1.2%	2.1%	1.5%	2.9%
	Clerical	.6%	.4%	.8%	.8%
	Sales	14.4%	15.4%	19.8%	19.5%
	Agriculture	40.1%	43.3%	36.4%	37.0%
	Household & Domestic	.3%	.3%	.2%	.3%
	Services	1.5%	1.4%	1.8%	2.7%
	Skilled Manual	4.6%	6.4%	6.4%	8.3%
	Unskilled Manual	1.6%	2.3%	1.5%	3.2%
	Don't Know/Other	.2%	1.8%	.3%	2.1%

Source: Author's estimates based on DHS datasets.

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