FRL Project: Are we there yet? Using the Bristol Approach to examine trends in absolute poverty in sub Saharan Africa between 1995 and 2015. ES/K001809/1

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Summary

This document sets out the rationale behind a series of indicators used to assess the extent of severe deprivation of basic human need, and the extent of absolute poverty in low and middle income countries. Since it is not permitted to archive the source data - from the USAID-funded demographic and health survey (DHS) and UNICEF's Multiple Indicator Cluster Survey (MICS) platforms - this document explains the conceptual framework behind the indicators, and gives details of how indicators of severe deprivation of basic human need were developed and used. This information can then be used either with the data from DHS/MICS or with data harmonised by the IPUMS-DHS Integrated Demographic and Health Surveys project, which can be downloaded, at no cost from: https://www.idhsdata.org/idhs/about.shtml

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Introduction

Given growing international interest in the multidimensional nature of poverty, and in how this impacts particular groups in society, for example children, there is a wide body of work which examines how people define, experience and cope with poverty in all its guises, and how it can impact people across the life-course (Seager and De Wet, 2003, Lyytikainen et al., 2006, Harper et al., 2003, Ennew and Miljeteig, 1996, Dolev and Habib, 1997). In my project, I used household survey micro-data, collected at individual and household level, to assess the extent to which people were deprived of their most basic needs, and who could thus be said to be living in absolute poverty.

Assumptions and Conceptual Framework

Social indicators are increasingly being used to examine people's (and in particular, children's) wellbeing (Moore, 1995, Bradshaw et al., 2007, Ben-Arieh and Wintersberger, 1997) and poverty (Gordon et al., 2003, Kyrili and Mckinley, 2008, Lyytikainen et al., 2006). Conventional money-metric indicators have been criticised as being inappropriate for assessing poverty, and particularly so in developing countries given the difficulty of collecting meaningful income (and expenditure) data, and making such data internationally comparable using purchasing power parities. The upwards revision (by 40%) of global estimates of absolute poverty based on the World Bank's 'dollar a day' indicator (Chen and Ravallion, 2008) is an example of the potential pitfalls awaiting even experienced and well-resourced researchers.

The approach to assessing poverty adopted by this project used the 1995 World Summit on Social Development definition of absolute poverty, which sees poverty as unmet basic needs. It borrows from the earlier Basic Needs Approach (BNA) developed in the 1970s (International Labour Organization, 1976, Stewart, 1985, Ghosh, 1984), and argues that the BNA provides a meaningful way of examining poverty in developing countries. Rather than taking a set income threshold for a poverty line, the approach taken here suggests there are certain minimum standards of shelter, healthcare, education and basic services which people not only need but to which they are entitled. This call, for a "minimum core obligation" to be met by states, is based on and reflected in international agreements like the International Covenant on Economic, Social and Cultural Rights (ICESCR) and the 1989 UNCRC (Van Bueren, 2002). Thus, for example, Article 13 of the ICESCR states that everyone has the right to education and, to achieve the full realisation of this right, "*primary education must be compulsory and available free to all*" (United Nations General Assembly, 1966). Article 28 of the UNCRC obliges states to "*make primary education compulsory and available*

free to all" (United Nations, 1989). International monitoring bodies like the Committee on the Rights of the Child have, on some occasions, refused to accept the "non-affordability" claims made by states to justify their non-realisation of such obligations (Pemberton et al., 2007). In one example, citing the funding of defence budgets, the governments of Indonesia and Egypt were invited to justify their failure to make significant progress in implementing the UNCRC (Van Bueren, 1999).

In 1990, the Office of the High Commissioner for Human Rights made the following comment on states' duties to provide for peoples basic needs:

> *"The Committee is of the view that a minimum core obligation to ensure the satisfaction of, at the very least, minimum essential levels of each of the rights is incumbent upon every State party. Thus, for example, a State party in which any significant number of individuals is deprived of essential foodstuffs, of essential primary health care, of basic shelter and housing, or of the most basic forms of education is, prima facie, failing to discharge its obligations under the Covenant. If the Covenant were to be read in such a way as not to establish such a minimum core obligation, it would be largely deprived of its raison d'être. By the same token, it must be noted that any assessment as to whether a State has discharged its minimum core obligation must also take account of resource constraints applying within the country concerned. Article 2 (1) obligates each State party to take the necessary steps "to the maximum of its available resources". In order for a State party to be able to attribute its failure to meet at least its minimum core obligations to a lack of available resources it must demonstrate that every effort has been made to use all resources that are at its disposition in an effort to satisfy, as a matter of priority, those minimum obligations."* (Office of the High Commissioner for Human Rights, 1990, paragraph 10)

If one applies the principles behind this 'minimum core' of obligations, it should be safe to assume that people should not have to live in overcrowded dwellings, constructed from poor quality materials; that they should have access to effective, affordable and appropriate healthcare when needed; that all children should receive an education which prepares them for later life; and that they should be able to access sufficient food to keep them healthy. States in which significant numbers of people are deprived of such basic needs are, according to the UNHCHR, failing to discharge their obligations (UN Committee on Economic Social and Cultural Rights, 1990).

Deprivation relates to a range of states or categories of deprivation which

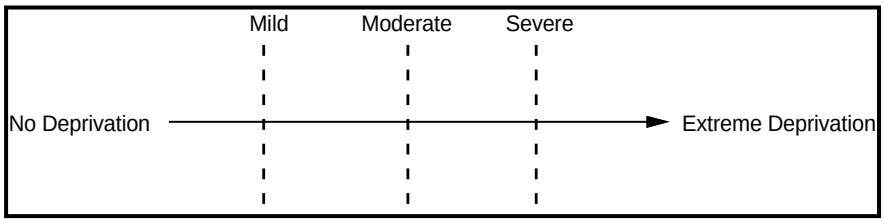
"*are loosely regarded as unsatisfactory and undesirable circumstances, whether material, emotional, physical or behavioural, as recognised by a fair degree of societal consensus.*" (Brown and Madge, 1982: 39)

While poverty in most rich countries is considered and assessed in relative terms, in developing countries where the degree and extent of deprivations are considerably greater and more prevalent, one could view poverty in more absolute terms, using thresholds which reflect the clearly unmet minima of standards and obligations. This project therefore assumes people severely deprived of the basic needs highlighted in the WSSD definition are likely to be living in poverty. Such deprivations have a deleterious impact on their lives and affect their daily functioning (Gordon et al., 2003).

Using the Concept of Deprivation to Assess Poverty

Deprivation has been conceptualised as a continuum (see Figure 1), ranging from none to extreme deprivation with people experiencing different degrees of deprivation depending on their circumstances (Gordon, 2002).

Figure 1: Continuum of Deprivation



Take food deprivation as an example. At one extreme, a person whose food needs are all met is clearly not food deprived. A person whose resources restrict him/her to a bland or poor diet or who goes hungry on occasion might be said to be mildly or moderately deprived. Severe food deprivation could be said to occurring when a person lacks sufficient quantities of food which results in severe malnutrition, reflected by a low body mass index or poor anthropometric outcomes for children. A person experiencing extreme food deprivation would be in danger of starvation and death. Similar gradations of deprivation might also be made for other basic needs (Table 1), although determining clear thresholds is laden with problems, not least because people have differing notions as to what constitutes 'deprivation' and its degree.

There are few binding international agreements which set out standards of access to services which ensure basic needs can be met. The setting of development targets like the Millennium Development Goals (MDGs) do call for certain minimum levels of provision and should (hopefully) ensure that some basic needs (e.g. for water, sanitation) are met. However they have been criticised for not going far enough and for being little more than rhetorical cover for neoliberal economic and political interests (Amin, 2006, Attaran, 2005).

Table 1: Operational Definitions of Severe Deprivation of Basic Needs

Deprivation	Mild	Moderate	Severe	Extreme
Food	Bland diet of poor nutritional value	Going hungry on occasion	Malnutrition	Starvation
Safe drinking water	Not having enough water on occasion due to lack of sufficient money	No access to water in dwelling but communal piped water available within 200 meters of dwelling or less than 15 minutes walk away	Long walk to water source (more than 200 meters or longer than 15 minutes). Unsafe drinking water (e.g. open water)	No access to water
Sanitation facilities	Having to share facilities with another household	Sanitation facilities outside dwelling	No sanitation facilities in or near dwelling	No access to sanitation facilities
Health	Occasional lack of access to medical care due to insufficient money	Inadequate medical care	No immunisation against diseases. Only limited non-professional medical care available when sick	No medical care
Shelter	Dwelling in poor repair. More than 1 person per room	Few facilities in dwelling, lack of heating, structural problems. More than 3 people per room	No facilities in house, non-permanent structure, no privacy, no flooring, just one or two rooms. Five or more persons per room	Roofless – no shelter
Education	Inadequate teaching due to lack of resources	Unable to attend secondary but can attend primary education	Child is 7 or older and has received no primary or secondary education	Prevented from learning due to persecution and prejudice
Information	Unable to afford newspapers or books	No television but can afford a radio	No access to radio, television or books or	Prevented from gaining

			newspapers	access to information by government, etc.
Basic Social Services	Health and education facilities available but occasionally of low standard	Inadequate health and education facilities nearby (e.g. less than 1 hour travel)	Limited health and education facilities a day's travel away	No access to health or education facilities

In 2003 an attempt was made to develop and apply indicators of severe deprivation for the basic human needs set out in the WSSD which could then be used to estimate the extent of child poverty in developing countries (Gordon et al., 2003). The criteria used are set out in Table 1, and have since been extensively peer reviewed by the UN Expert Group on Poverty Statistics (Rio Group, 2006), and formed the basis of other academic research (Noble et al., 2004, Dupraz et al., 2006, Van der Gaag and Dunkelberg, 2004). They have also been used by international organisations like UNICEF (UNICEF, 2004, Delamonica and Minujin, 2006, Minujin et al., 2005) as part of its ongoing global study on child poverty and disparities in over forty developing countries.

While acknowledging there are no perfect indicators of deprivation, some of the indicators used and thresholds set could be questioned. For example, using malnutrition as a single indicator of food deprivation is problematic since it is possible for a person to be malnourished for other reasons – e.g. an untreated bout of severe diarrhoea in a young child would result in rapid weight loss, which would be picked up by anthropometric indicators of malnutrition. Similarly, one could argue for shelter deprivation that the threshold for overcrowding (five or more people per room) is too restrictive,[1] resulting in an underestimate of conditions which are known to have negative impacts on people's health. With such concerns in mind, what these indicators provide are sign posts to potential deprivation. Additional indicators, which reflect wider aspects of child poverty and wellbeing might also be used (e.g. to reflect child protection), but such an expansion is not without problems. For example, lumping together a wide range of disparate indicators related to a person's wellbeing or poverty is methodologically complex with not much extra information being garnered in the final index. That, plus the fact the WSSD definition is clear on which basic human needs should be focussed on, and this is what the indicators in Table 1 reflect. It is for this reason

[1]Charles Booth in his *Life and Labour of the People in London* (1895) used a threshold of four people per room to indicate overcrowding.

and those mentioned above (regarding peer review and validation), that this project has used the indicators developed by Gordon et al. (2003).

Developing Indicators of Severe Deprivation

The 1995 WSSD definition listed seven basic needs which, if deprived of, a person could be said to be living in absolute poverty. This section details the importance of these needs. It provides evidence to justify the thresholds used to delineate severe deprivation.

Food

A person's ability to command sufficient resources to meet his/her basic nutritional needs provides the basis of many poverty indicators, including those used by the Economic Commission for Latin America and the Caribbean (ECLAC) (Altimir, 1979, Altimir, 1981, ECLAC, 2008, Reddy, 2008). The impact of insufficient food on wellbeing and development is well documented, with people severely food deprived being at much greater risk of morbidity and mortality (Nandy et al., 2005, Pelletier et al., 1995, Chen et al., 1980). Food deprivation has been linked to poorer learning outcomes, with sick children more likely to miss school (Leathers and Foster, 2004). This disrupts their education, which in later life can affect their chances of securing work so limiting their chances to escape poverty. Undernutrition may occur as a result of illness, and young children with diarrhoea or dysentery are liable to lose weight in the short term. Undernutrition, whether it is caused by a lack of food or poor health, is clearly linked to poverty (Osmani, 1992, Svedberg, 2000).

There are two main methods used to assess nutritional status. The first, used by the Food and Agriculture Organisation (FAO) of the UN, relies on survey data which looks at the calories consumed by households and estimates whether the level of consumption is sufficient to cover nutrition needs, usually a minimum of 2,500 calories per adult per day. This approach has been criticised (Svedberg, 1999, Svedberg, 2000) not least because it makes little adjustment for the calorie needs of children. Other limitations such as the very real problem of collecting such data accurately have also been raised, but are not discussed here.

The second method compares anthropometric data (i.e. heights and weight) against an international reference population, which provides the norms for growth (WHO, 1995a). Concerns have been raised about the suitability of the reference population (known as the National Centre for Health Statistics, or NCHS, reference population), since it was based on data from formula-fed infants in the United States (de Onis et al., 1997, Victora et al., 1998, Garza and de Onis, 1999). The WHO has developed a new international reference population (2006), with data collected on

breast-fed infants from several countries (de Onis et al., 2006, de Onis et al., 2001), which (it is hoped) are more appropriate for assessing the nutritional status of children in developing countries.

Anthropometric data are used to construct three main indices of nutritional status for children:

- Wasting – low weight for height – which reflects acute or short-term undernutrition;
- Stunting – low height for age – which reflects chronic or more long-term undernutrition; and
- Underweight – low weight for age, which is used as an aggregate indicator of stunting and wasting, but about which questions have been raised (Nandy and Jaime Miranda, 2008).

Distinct thresholds are set using the z-scores (i.e. the standard deviation from the reference population median) for wasting, stunting and underweight. Children whose measurements fall below these thresholds are classified as being mildly/moderately (<-2 z-scores) or severely (<-3 z-scores) undernourished. These indicators are regularly used by governments and organisations to assess the prevalence of undernutrition among children (WHO, 1995a).

It should be noted that when used individually, each indicator provides a different profile of undernutrition in a population. If we take estimates of stunting, wasting and underweight in India as an example, from a survey conducted in 1998/99, the prevalence rates of undernutrition among children 0-3 years are 45%, 16% and 47% respectively (IIPS and ORC Macro, 2000). While each indicator provides useful information on distinct biological processes, what policy makers and planners require is a picture of the overall extent of the problem. Given a degree of overlap between each indicator, it is possible for children who are stunted to also be underweight, for some children who are underweight not be stunted but experience wasting, etc. Swedish development economist Peter Svedberg suggested this results in undernutrition being underestimated, as no single indicator completely identifies all undernourished children (Svedberg, 2000). He proposed a new aggregate indicator - the composite index of anthropometric failure (CIAF) - which could show the overall prevalence of stunting, wasting and underweight simultaneously. Gordon et al. (2003) operationalised the CIAF, and using it were able to present estimates of the overall prevalence of undernutrition for the first time. Applying the CIAF to the data for India mentioned above shows that undernutrition, in all its guises, affected nearly 60% of children (Nandy et al., 2005). Realising its advantages researchers have increasingly begun to use the CIAF in countries like Kenya, Tajikistan and India (Berger et al., 2006, Seetharaman et al., 2007, Baschieri and Falkingham, 2007).

For this project, children are considered severely food deprived if their z-scores for stunting, wasting and/or underweight are below -3 SD i.e. they are either severely stunted, severely wasted and/or severely underweight.

Water

The importance of water to people's lives cannot be overstated, and yet every day hundreds of millions of people lack access to sufficient quantities of water to meet this most basic of human needs. The 2000 *Global Water Supply and Sanitation Assessment* (GWSSA) estimated around 1.1 billion people were without access to 'improved' water – i.e. water considered suitable for human consumption, from pipes, protected wells and protected springs (WHO et al., 2000).

The relationship between water and health has long been recognised. The work of Victorian campaigners like Edwin Chadwick noted the link between the conditions of poverty and poor health and called for the clearing of slums, the provision of clean water and basic sanitation (Chadwick, 1842). Mortality rates in Europe and north America fell rapidly in the nineteenth century after governments improved public water supplies and installed sewers (Szreter, 1988). A large literature details the impact of water quality on child health and survival (Checkley et al., 2004, Burstrom et al., 2005, Mulreany et al., 2006, Teixeira and Heller, 2006, Gundry et al., 2004, Wright et al., 2004), and also the relationship between poverty and poor access to water (Bosch et al., 2001, Feachem et al., 1978). What emerges is that the poor are often the least likely to have adequate access to safe water, and this in turn affects their health. Governments and private providers are often unable (or unwilling) to provide the necessary capital infrastructure to areas in which the poor are live - urban slums, peri-urban shanty towns, rural areas. Rapid rural to urban migration in many countries has meant cities are overcrowded and having to deal with the needs of much larger populations than before. In the absence of public provision, private water vendors (whose water quality is often poor) supply poorer areas, charging much higher rates to those least able to afford them (Satterthwaite et al., 1996, U.N. HABITAT, 2003).

The prospect of safe piped water into every dwelling remains a distant one, and every day millions of people have to walk long distances to collect water from rivers, ponds and other 'unimproved' sources. Organisations like UNICEF and the WHO recommend minimum quantities of water required to meet people's drinking, cooking, and washing needs, ranging between 20 and 50 litres per person per day (WHO et al., 2000, UNICEF, 1995). It has been suggested, based on empirical studies, that to meet people's basic needs, a standard of 5 litres per capita per day (lcd) be set for drinking, 10 lcd for cooking and food preparation, 15 lcd for bathing and 20 lcd for sanitation and

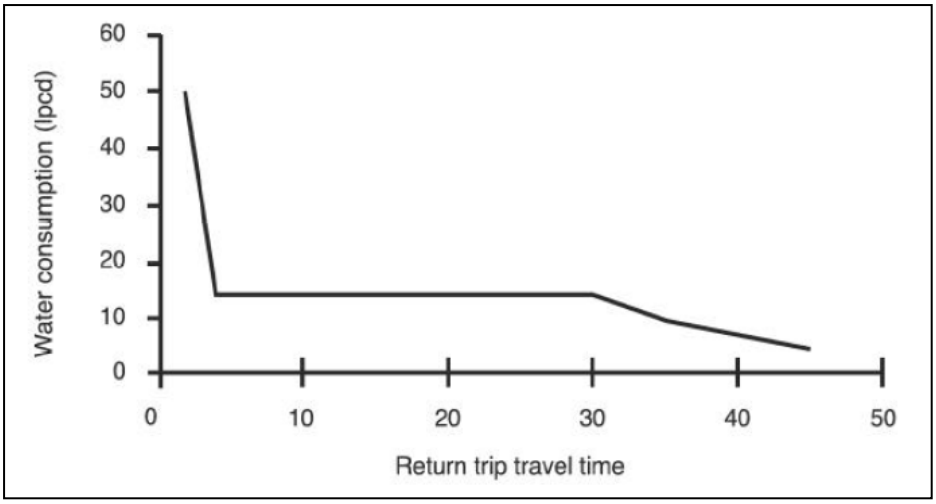
hygiene (Gleick, 1996). These quantities are not considerable when compared to the almost 350 lcd used (on average) by people in north America and Japan, and 200 lcd in Europe.[2] Some developing countries have enshrined in legislation a right to water. The Government of South Africa has even stated explicitly the minimum quantity of potable water to which all individuals are entitled within a set distance of their homes:

> *The minimum standard for basic water supply services is:*
>
> *(a) the provision of appropriate education in respect of effective water use; and*
>
> *(b) a minimum quantity of potable water of 25 litres per person per day or 6 kilolitres per household per month -*
>
> *(i) at a minimum flow rate of not less than 10 litres per minute;*
>
> *(ii) within 200 metres of a household; and*
>
> *(iii) with an effectiveness such that no consumer is without a supply for more than seven full days in any year.* (Government of the Republic of South Africa, 2001)

The quantity of water used by an individual is directly related to its availability and ease of use, and water piped cheaply into homes will be used with greater abandon than water which one has to be collected from a long distance away, at greater personal and sometimes financial cost. Distance to water is an essential element in assessing access to water, and yet international reports like the 2000 GWSSA did not consider distance in their estimates. Access was based on the household's main source of drinking water. As one would expect, the quantity of water used decreases the further away its source is located and there are many studies which show the relationship between per capita use and distance to source (Cairncross, 1987), illustrated in Figure 2.

[2] www.worldwatercouncil.org/index.php?id=25&L=1%20%3E%20water%20coucil [Accessed 22-October-2016].

Figure 2: Water Use and Collection Time



Source: (WELL, 1998)

An extensive review of water quality and use in developing countries noted

> *"Once the time taken to collect water source exceeds a few minutes (typically around 5 minutes or 100m from the house), the quantities of water collected decrease significantly. This graph contains a well-defined 'plateau' of consumption that appears to operate within boundaries defined by distances equivalent to around 100 to 1000m or 5 to 30 minutes collection time. There is little change in quantity of water collected within these boundaries... Beyond distance of one kilometre or more than 30 minutes total collection time, quantities of water will be expected to further decrease, in rural areas to a bare minimum where only consumption needs can be met. In urban areas, where water supplies may be close but total collection times are very high, greater volumes may be collected that will support hygiene, although the overall impact on household poverty is significant."* (Howard and Bartram, 2003: 18)

The same review examined the relationship between water provision and family health, showing how there is a gradient between access to water and corresponding health problems.

Table 2: Summary of Requirement for Water Service Level to Promote Health

Service level	Access Measure	Needs met	Level of health concern
No access (quantity collected often below 5 l/c/d)	More than 1000mtrs or 30 minutes total collection time	Consumption – cannot be assured Hygiene – not possible (unless practised at source)	Very high
Basic access (average quantity unlikely to exceed 20 l/c/d)	Between 100 and 1000m or 5 to 30 minutes total collection time	Consumption – should be assured Hygiene – hand washing and basic food hygiene possible; laundry/bathing difficult to assure unless carried out at source	High
Intermediate access (average quantity about 50 l/c/d)	Water delivered through one tap on plot (or within 100m or 5 minutes total collection time	Consumption – assured Hygiene – all basic personal and food hygiene assured; laundry and bathing should also be assured	Low
Optimal access (average quantity 100 l/c/d and above)	Water supplied through multiple taps continuously	Consumption – all needs met Hygiene – all needs should be met	Very low

Source: (Howard and Bartram, 2003: 22)

Households with a 30 minute collection time were considered to not have access, since the low volumes of water would not be sufficient to guarantee basic consumption or meet basic hygiene needs (Table 2). Thus, following the recommendations of the WHO, households who either used unsafe sources of surface water (such as rivers and ponds) or who had a round trip of more than thirty minutes to collect their water, were defined as being severely water deprived.[3]

Sanitation

Many of the issues around water deprivation and poverty relate to sanitation deprivation, from the historical lessons learnt from Chadwick, to the interaction between illness and the conditions of poverty. Once again a sizeable literature details the relationship between child survival and

[3] It should be noted that current WHO/UNICEF estimates of the numbers of people with 'access to improved sources of water' do not consider distance to water source as a dimension of access.

sanitation, particularly since diarrhoeal diseases account for many millions of child deaths in developing countries (Esrey and Habicht, 1986, Biddulph, 1993, UNICEF, 1995, Lee et al., 1997, Bosch et al., 2001, Moraes et al., 2003, Checkley et al., 2004, Khosla et al., 2005, Vaid et al., 2007). The poor often live in homes which lack even basic forms of sanitation. The GWSSA estimates that around 2.6 billion people lacked adequate sanitation in 2004. Rural populations are particularly badly provided, with around 60% of households lacking access to adequate sanitation compared to 20% of urban households.

As with water deprivation, the reasons why such large numbers of people lack access to basic sanitation are many. The infrastructure of cities in most developing countries struggles to cope with existing demand and rural to urban migration and the rapid growth of slums and shanty towns means the problem may get worse. In some places 'flying toilets' are a problem, where people defecate into plastic bags at night and then throw them into the street (UNDP, 2006). The cost of expanding existing or installing new sewage systems is too high for individual communities, although low-cost, appropriate solutions do exist and have been used to great effect in some countries (Black and Fawcett, 2008); the provision of public toilet and washing facilities in some Indian cities by the Sulabh International Social Service Organisation is one example (Mara, 1996, U.N. HABITAT and UNEP, 2002).

The quality and effectiveness of sanitation facilities varies, from proper plumbing connected to a public sewage system, to drop-pit latrines overhanging ponds or rivers. The 2000 GWSSA considers improved sanitation facilities to be those connected to a public sewer or septic system, pour-flush, simple pit and ventilated improved pit latrines. Unimproved sanitation facilities include public or shared latrines, open pit latrines and bucket latrines. As this project focused on severe deprivation, more stringent criteria were adopted, so households with no toilet facilities within or around the home are considered severely deprived. Members were have to defecate in the open, e.g. in fields, bushes or along railway tracks (a common sight in south Asia).

Shelter

As with water and sanitation, the importance of shelter is obvious and the impact of poor housing on people's health is well documented (Marsh et al., 1999, Satterthwaite, 1993, Evans and Kantrowitz, 2002).

The reasons for shelter deprivation vary. There may be an insufficient supply of affordable or quality housing, which in turn can lead to homelessness or to households doubling or tripling up, to

live together in what become very overcrowded conditions. Overcrowding has been linked to health problems, such as the resurgence of tuberculosis in both rich and poor countries (Walls and Shingadia, 2004, Datta and Swaminathan, 2001, Jacobs and Eisenach, 1993), and children and women living in such conditions are at greater risk of experiencing violence and abuse (Dickstein, 1988, Amobi, 1983). In many developing countries the limited provision of even basic public housing (and a lack of enforced building regulations) has meant people either have to construct their own homes or have homes built by contractors often using poor quality materials. The urban slums, which characterise many major cities, consist of houses built from basic or rudimentary materials which offer little privacy or protection against the elements (Aldrich and Sandhu, 1995, Chaudhuri, 2004). In rural areas, the main building materials for poor households include mud, thatch and straw, with families sharing one or two rooms (UNDESA, 1976). Flooring materials are particularly relevant to young children, since they spend time crawling and playing on the floor. Close contact with the floor and the short distance between it and their mouths is a major cause of ill health. Children are more likely to pick up dangerous pathogens from floors made of earth or dung. Child incontinence also plays a role in spreading illness, since mud floors are difficult to keep clean of pathogens.

This project uses two components to assess severe shelter deprivation - overcrowding and quality of the dwelling. The United Nations Centre for Human Settlements has shown that levels of overcrowding vary with income, with richer countries having on average less than one person per room, middle income countries having just less than two people per room, and low income countries having just under three people per room (UNCHS, 1996). UNHABITAT considers more than two people per room to be overcrowded;[4] Gordon et al. (2003) used a more stringent threshold of five or more people per room to reflect conditions of severe overcrowding. Floor material is used as a proxy indicator for the quality of building materials, so households living in dwellings with mud, dung or earth floors are counted as deprived. This approach is taken by other studies of housing quality in developing countries (Fiadzo et al., 2001, Arias and DeVos, 1996, Murison and Lea, 1979, UNCHS and ILO, 1995). Thus, household living in dwellings with floors made of natural materials or where there are five or more people per room are considered severely shelter deprived.

[4] http://unhabitat.org/wp-content/uploads/2003/07/GRHSB1.pdf [Accessed 22nd October, 2016].

Education

Education is often singled out as the key determinant of people's wellbeing and also an important driver of national development and poverty reduction (Colclough, 1982, Psacharopoulos, 1972, Psacharopoulos, 1988). While the right to an education is one of the most fundamental, enshrined in the 1948 Universal Declaration of Human Rights, in the 1966 International Covenant on Economic, Social and Cultural Rights, and in the 1989 UN Convention on the Rights of the Child, it has been noted that "*…no human right has been so systematically or extensively violated by governments than the right of their citizens to basic education…*" (Watkins, 2000: 1).

People who do not receive an education are disadvantaged in many ways. Children of illiterate parents are more likely to have poorer health, to drop out of school themselves, and work instead of attending school (DFID, 2002). The 1990 World Conference on Education for All pledged universal access to education (UNESCO, 1990), with focus placed on the need to increase the participation of girls and women. A decade later however, at the World Education Forum in Senegal, it was clear universal access even to primary education had not been achieved, and that millions of children were still being denied even a basic education, most of whom were girls (World Education Forum, 2000).

Education deprivation takes different forms, from an absolute lack of provision, to the provision of education of such poor quality that students choose to spend their time following more productive pursuits, often working. In most developing countries, children do work, and there have been efforts made by organisations like UNESCO and UNICEF to design curricula and schools which accommodate the very real needs of some children to help support their families (e.g. tending herds, collecting water, etc). When children do attend school, resources are sometime insufficient to pay teacher salaries, leading to staff absenteeism as teachers find other paying work. The impact of HIV/AIDS on the education sector in parts of Africa has been well documented (Amone and Bukuluki, 2004, Coombe, 2002), with an entire generation of teachers almost wiped out in some countries.

Education can be a key tool for reducing poverty and preventing it in the future. It is a fundamental human right, which all governments are obliged to fulfil. Conventional education indicators refer to enrolment and completion rates, or to the attainment of certain expected skill levels. This project uses a more stringent measure for education deprivation, one which identifies only those children of school age (aged 7-17 years) who have not received any primary or secondary education – i.e. children who have never attended school.

Health

The focus on food, water, shelter and sanitation needs reflects their importance to people's lives. Health is strongly linked to poverty, with the poor unsurprisingly experiencing the greatest burden of morbidity and mortality (WHO and World Bank, 2002). In 2000, around 11 million children under the age of 5 died from mostly preventable causes; of these, 99% lived in developing countries (Black et al., 2003). Underlying most of these deaths were undernutrition (Caulfield et al., 2004) and the conditions associated with living in poverty – drinking unsafe water, living in overcrowded housing and playing by polluted environments.

Poverty explains why people do not have enough to eat, why they lack access to healthcare or other basic services, and why they live (or at best survive?) in dangerous and unhealthy conditions. The impact of poverty on people's health in both rich and poor countries is well documented (Wood, 2003, Korenman et al., 1995, Chopra and Sanders, 2005, Spencer, 2003, Kretchmer, 1969, Pollitt, 1981, Wise and Meyers, 1988). In 1995 the WHO states

> *"The world's biggest killer and greatest cause of ill health and suffering across the globe is listed almost at the end of the International Classification of Diseases. It is given code Z59.5 – extreme poverty."* (WHO, 1995b: 1)

Most childhood diseases are preventable with relatively cheap technologies, which have been available for decades. The most effective solutions would be improving access to sufficient quantities of nutritious food, safe drinking water, proper sanitation and decent housing. Beyond this, health interventions such as anti-malarial drugs, insecticide-treated bed nets and immunisations against 'big killers' such as measles, tetanus, tuberculosis and whooping cough, would save millions of lives and drastically reduce the burden of morbidity. Use of oral rehydration salts (ORS) or therapy (ORT) to treat diarrhoea is effective and cheap (Ueli, 1993, Misra, 1981). Health education by community health workers helps prevent many illnesses and accurate information about infant feeding (in the face of heavily marketed breast milk substitutes) helps protect babies from birth.

Many of these interventions were recommended at the 1978 Health for All by the Year 2000 conference. The ensuing Alma Ata declaration noted "*governments have a responsibility for the health of their people which can be fulfilled only by the provision of adequate health and social measures*" and that primary health care, based on practical, scientifically sound and socially acceptable methods and technology

> *"…should be made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination."* (WHO, 1978)

In the years which followed, however, the capacity of health services around the world were undermined by international economic crises and structural adjustment policies (SAPs) (Logie and Rowson, 1998, Lugalla, 1995, Phillips and Verhasselt, 1994). International donors, like the World Bank, promoted the use of selective (rather than comprehensive) primary health care strategies which relied on vertical interventions, such as immunisation campaigns (Rifkin, 1986). These meant countries were unable to develop successful health *systems*, and instead relied on donor funds and projects to provide basic health care. Unsurprisingly, qualified health and medical staff unable to work in their own countries migrated north and west, to staff the health services of rich countries, like the U.K. (Anyangwe et al., 2006, Kirigia et al., 2006, Marchal and Kegels, 2003). With increasing costs of health care and shortages in staff and equipment, it should come as no surprise that epidemics like HIV/AIDS hit many countries hard (Nandy et al., 2000).

Health has many meanings, so assessing 'health' deprivation can be difficult. Different indicators have been used to reflect the effectiveness of health systems (e.g. the proportion of children fully immunised or the proportion of mothers receiving assistance during child birth, etc.), and while none are perfect, what they provide are signals as to whether those in need of care or treatment are receiving it (Bowling, 2002). The WHO and UNICEF launched the GOBI strategy (**G**rowth monitoring, **O**ral rehydration, **B**reast feeding, and **I**mmunisation) in the 1980s with the aim of using simple, selective, preventive measures to avert unnecessary child and maternal deaths (Phillips and Verhasselt, 1994). Under the Expanded Programme of Immunisation (EPI), all children were to be given immunisations against major diseases and provided primary health care when in need. The strategy was successful as hundreds of millions of children were vaccinated and the incidence of the big killers such as measles and whooping cough declined, but critics pointed to the fact that at the end of the twentieth century many poor countries still lacked effective health systems (Banerji, 2003). Both GOBI and the EPI were central elements of selective rather than comprehensive primary health care strategies.

The indicator for severe health deprivation in this project focuses on children and has two components: whether they have been immunised and whether they have received medical care when ill. Children not receiving *any* immunisations against the main EPI diseases, or who failed to

receive care when sick (i.e. children experiencing a recent episode of diarrhoea for which they did not receive treatment or advice) are counted as deprived.

Information

By including information in the list of basic needs the 1995 WSSD definition raised an issue which hitherto had not been part of most notions of poverty. While its importance is self-evident, information deprivation was never really something anyone had attempted to measure. When one considers the different sources of information available, and the problems of privileging some sources over others, it is not surprising no attempts were made. While statistics on numbers of radios or televisions per 1000 people are used to assess exposure to mass media (UNDP, 2001), one could argue that possession of a radio or television per se does not guarantee the quality of information. State censorship or control of the airwaves determines what people get to hear or see.

Unequal access to sources of information within the home is another issue to consider. The 1999 *Human Development Report*, with regards to use of the Internet, notes

> "…*women accounted for 38% of users in the United States, 25% in Brazil, 17% in Japan and South Africa, 16% in Russia, only 7% in China and a mere 4% in the Arab States. The trend starts early: in the United States five times as many boys as girls use computers at home, and parents spend twice as much on technology products for their sons as they do for their daughters."* (UNDP, 1999: 62)

Most urban areas of most countries are well served by radio and television, and increasingly the internet, making the quantity of information available greater than ever. Beyond these urban areas, access to such technologies declines and costs rise. Rural populations may be denied information on important events and, more importantly for farmers and households, the differences in prices for the crops they grow and sell. Non-governmental organisations, like the Grameen Bank in Bangladesh, have begun to address the need for information as part of their anti-poverty policies, providing rural women with the funds and technologies (i.e. mobile phones and access to a network) to run small businesses in their communities (Richardson et al., 2000). In other countries, community radio networks provide people with information on a range of issues, from new farming methods, public health messages and even adult education (Pepall et al., 2007).

In this project, people living in households which neither possess nor have access to a radio, television, computer, telephone, or newspapers are considered information deprived. The intention is not to underplay or undervalue the contribution of other sources of information, but

rather to reflect the degree to which people might live with little or no access to information about the world beyond their immediate communities.

Constructing an Indicator of Absolute Poverty

Once indicators of severe deprivation for the seven basic needs are developed, they can be used to assess the extent of absolute poverty in developing countries. People severely deprived of one or more basic needs are classed as 'severely deprived'' those experiencing two or more deprivations, i.e. who are multiply deprived, are classed as living in absolute poverty. The use of multiple deprivations as a threshold to reflect poverty is informed by the literature (Townsend, 1979, Whelan, 2007, Bradshaw and Finch, 2003, Gordon and Pantazis, 1997) and by the fact that the experience of certain individual deprivations in some instances might be due to reasons other than poverty e.g. the education deprivation of girls in some countries may be the result of cultural beliefs and prejudices.

The use of very stringent thresholds for each deprivation indicator also means it is unlikely people will voluntarily choose to live in such conditions of deprivation. Some argue this 'two-plus' threshold is too restrictive as it will understate the extent of poverty, and that people experiencing even a single deprivation should be counted as living in absolute poverty (Delamonica and Minujin, 2006). This is based on the assumed indivisibility of people's rights, with someone considered poor if they suffer any rights violations.

Data

Over the last few decades considerable advances have been made in sampling and survey methods. The development of Geographic Information Systems (GIS) and Global Positioning Systems (GPS) using satellite technologies has meant populations can be mapped and surveyed with much greater accuracy. As a result, the number of surveys conducted has increased and their quality improved. Researchers and development organisations now have a wide range of data sources which they can use to assess the effectiveness of aid programmes and interventions (Vaessen, 1996).

This project used data from two main sources: the demographic and health survey (DHS) programme run by USAID (Vaessen, 1996) and UNICEF's Multiple Indicator Cluster Surveys, or MICS. The DHS developed from two earlier survey programmes - the World Fertility Survey (WFS) and the Contraceptive Prevalence Survey (CPS) (Cleland and Scott, 1987), whose main focus was on fertility, family planning, and child and maternal mortality. Since 1984 the DHS programme has conducted hundred of surveys in over 80 countries using standardised questionnaires and

methodologies, and multi-stage random cluster sampling (Aliaga and Ren, 2006, Rutstein and Rojas, 2003, Ties Boerma, 1996). Each survey has between 150 and 300 clusters, with an average of 200 clusters. Cluster sizes are around 2-3 km, and are smaller in urban areas (Gordon, 2002, Gerland, 1996). DHS surveys collect data at community, household, and individual level, and are representative both nationally and sub-nationally.

The DHS provided the model for UNICEF's Multiple Indicator Cluster Surveys (MICS). These emerged during the 1990s, in response to UNICEF's need for data to allow it to track progress toward the goals set at the 1990 World Summit for Children. Five rounds of surveys have been conducted. The MICS also use multi-stage stratified random cluster samples and, like the DHS, are nationally and sub-nationally representative. Access to the raw data is relatively straightforward, although some countries do not allow public access.[5] The questionnaires are based on the DHS format, with additional questions on children's rights and specific needs.

The DHS and MICS all provide information on households' standards of living, access to health care, individual nutritional and health status, and access to basic services (e.g. drinking water, sanitation, education, etc). More details about the questionnaires for each survey are provided in the appendix. The tables below show the questions used from each survey to form indicators of deprivation. The consistency of questions across each survey and round indicates that the measures developed are comparable.

Table 3: Questions Used to Construct Deprivation Indicators in early rounds of DHS

DEPRIVATION	DHS 3 Questionnaire B (low contraceptive prevalence countries)
Water	What is the main source of drinking water for members of your household? [Piped water, Well water, Surface water, Rainwater, Tanker truck, Bottled water, Other] How long does it take to go there, get water, and come back? [Minutes]
Shelter	How many rooms in your household are used for sleeping? Main material of the floor? [Natural floor (earth, sand, dung), Rudimentary floor, Finished floor]

[5] Data from MICS II for some large countries like India, Pakistan China have never been made available, and it is unclear as to whether these countries will run MICS surveys in the future.

Sanitation	What kind of toilet facility does your household have? [Flush toilet, Pit toilet/latrine, No facility/bush/field]
Information	Does your household have: A radio? [Yes, No] A television? [Yes, No] A telephone? [Yes, No] Asked of women aged 15-49 Do you usually read a newspaper or magazine at least once a week? [Yes, No] Do you usually listen to a radio every day? [Yes, No] Do you usually watch television at least once a week? [Yes, No] Does your household have: A radio? [Yes, No] A television? [Yes, No] A telephone? [Yes, No]
Education	Asked of members 6 years or older. Has (name) ever been to school? [Yes, No] If attended school: What is the highest level of school (name) attended? [Primary, Secondary, Higher] What is the highest grade (name) completed at that level? If age <25 years, Is (name) still in school?
Food	Height (in cm) Weight (in kilograms)

Health	Diarrhoea Has (name) had diarrhoea in the last two weeks? Was anything given to treat the diarrhoea? Did you seek advice or treatment for the diarrhoea? Vaccinations Do you have a card where (name's) vaccinations are written down? Copy vaccination dates (day, month, year) for each vaccine from card: BCG, Polio 0 (at birth), Polio 1, Polio 2, Polio 3, DPT 1, DPT 2, DPT 3, Measles. Has (name) received any vaccinations that are not recorded on this card? (Record YES only if respondent mentions BCG, Polio 0-3, DPT 1-3, and/or Measles vaccines. Please tell me if (name) received any of the following vaccinations: A BCG vaccination against tuberculosis that is an injection in the left arm or should that caused a scar? Polio vaccine, that is, drops in the mouth? How many times? When was the first polio vaccine given, just after birth or later? DPT vaccination, that is, an injection usually given at the same time as polio drops? How many times? An injection to prevent measles?

Table 4: Questions Used to Construct Deprivation Indicators in later rounds

Deprivation	DHS IV Questionnaire B	MICS 2
Water	What is the main source of drinking water for members of your household? [Piped water, Well water, Surface water, Rainwater, Tanker truck, Bottled water, Other] How long does it take to go there, get water, and come back? [Number of minutes]	What is the main source of drinking water for members of your household? [Piped into dwelling, Piped into yard or plot, Public tap, Tube well/borehole with pump, Protected dug well, Protected spring, Rainwater collection, Bottled water, Unprotected dug well, Unprotected spring, Pond, river or stream, Tanker-truck, vendor, Other (*specify*) How long does it take to go there, get water, and come back? [Minutes]
Shelter	How many rooms in your household are used for sleeping? Main material of the floor? [Natural floor (earth, sand, dung), Rudimentary floor, Finished floor]	Number of rooms in dwelling: __ __ How many are used for sleeping? Material of dwelling floor? [Wood/tile, Planks/concrete, Dirt/straw]
Sanitation	What kind of toilet facility does your household have? [Flush toilet, Pit toilet/latrine, No facility/bush/field]	What kind of toilet facility does your household use? [Flush to sewage system or septic tank, Pour flush latrine (water seal type), Improved pit latrine (e.g., VIP), Traditional pit latrine, Open pit, Bucket, Other (*specify*), No facilities or bush or field

Information	Does your household have: A radio? [Yes, No] A television? [Yes, No] A telephone? [Yes, No] *Asked of women aged 15-49* Do you read a newspaper or magazine almost every day, at least once a week, less than once a week or not at all? Do you usually listen to a radio almost every day, at least once a week, less than once a week or not at all? Do you usually watch television almost every day, at least once a week, less than once a week or not at all? Does your household have: A radio? [Yes, No] A television? [Yes, No] A telephone? [Yes, No]	Which of the following do you have in this Household: Radio? Television?
Education	Asked of household members 5+ years: Has (name) ever attended school? What is the highest level of school (name) has attended? What is the highest grade (name) completed at that level? Is (name) currently attending school?	For children 5+ years: Has (name) ever attended school? What is the highest level of school (name) attended? What is the highest grade (name) completed at this level? [Level: primary, secondary, higher, non-standard curriculum, dk] Is (name) currently attending school?
Food	Height (in cm) Weight (in kilograms)	Height (in cm) Weight (in kilograms)

Health	Diarrhoea Has (name) had diarrhoea in the last 2 weeks? Was anything given to treat the diarrhoea? Did you seek advice or treatment for the diarrhoea? Vaccinations Do you have a card where (name's) vaccinations are written down? Copy vaccination date (day, month, year) for each vaccine from the card: BCG, Polio 0 (Polio given at birth), Polio 1-3, DPT 1-3, Measles. Has (name) received any vaccinations that are not recorded on this card, including vaccinations received in a national immunisation campaign? [Record 'Yes' only if respondent mentions BCG, Polio 0-3, DPT 1-3, and/or Measles]. Please tell me if (name) received any of the following vaccinations: BCG vaccination against tuberculosis that is, an injection in the arm or shoulder that usually causes a scar? Polio vaccine, that is, drops in the mouth? *When was the first polio vaccine received, just after birth or later? How many times was the polio vaccine received? A DPT vaccination, that is, an injection given in the thigh or buttocks, sometimes at the same time as polio drops? How many times? An injection to prevent measles?	Diarrhoea Has (*name*) had diarrhoea in the last two weeks, that is, since (*day of the week*) of the week before last? During this last episode of diarrhoea, did (*name*) drink any of the following: [ORS]. Vaccinations Did you seek advice or treatment for the illness outside the home? Is there a vaccination record for (*name*)? BCG, OPV0, OPV1, OPV2, OPV3, DPT1, DPT2, DPT3, MEASLES Has (*name*) ever been given a BCG vaccination against tuberculosis – that is, an injection in the left shoulder that caused a scar? Has (*name*) ever been given any "vaccination drops in the mouth" to protect him/her from getting diseases – that is, polio? How old was he/she when the first dose was given – just after birth or later? How many times has he/she been given these drops? Has (*name*) ever been given "vaccination injections" – that is, an injection in the thigh or buttocks – to prevent him/her from getting tetanus, whooping cough, diphtheria? (sometimes given at the same time as polio) How many times? Has (*name*) ever been given "vaccination injections" – that is, a shot in the arm at the age of 9 months or older - to prevent him/her from getting measles?

Post-stratification Population Weighting

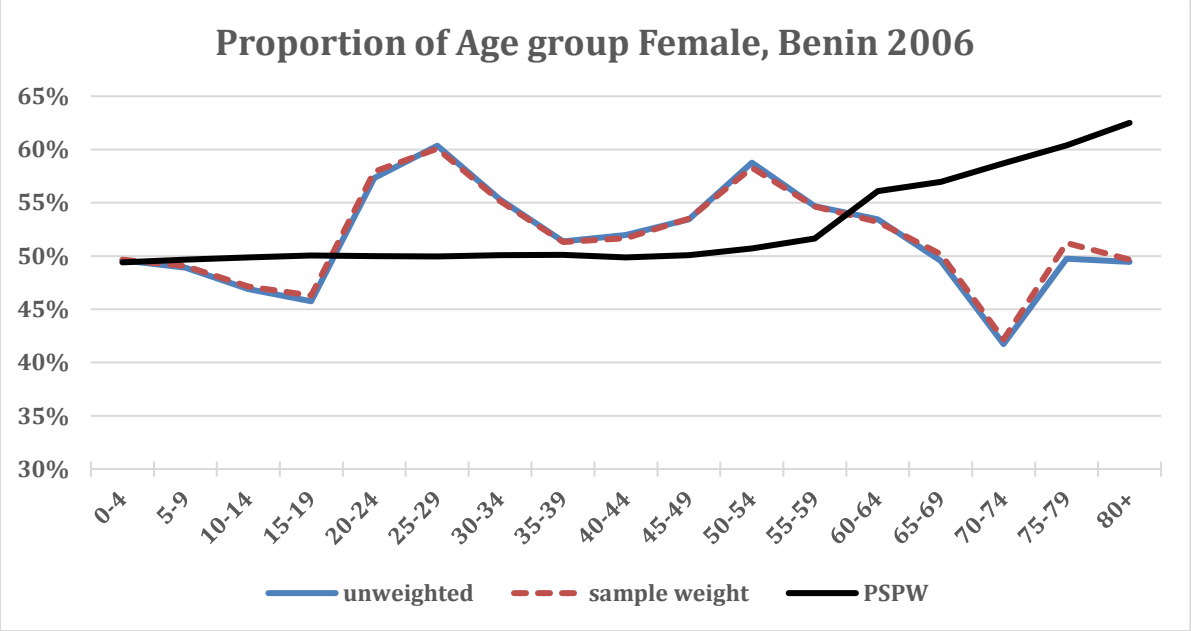
In many social surveys certain groups are sometimes of particular interest to researchers e.g. with the DHS and MICS these groups include women of child bearing

age and young children. As a result such groups can either be over or under sampled.[6] This is important to know, since not adjusting for over/under-sampling bias leads to statistical procedures giving greater weight to over-sampled groups. Ideally what is needed is a representative sample of the population in question as this can be used to correct for over/under-sampling mathematically.

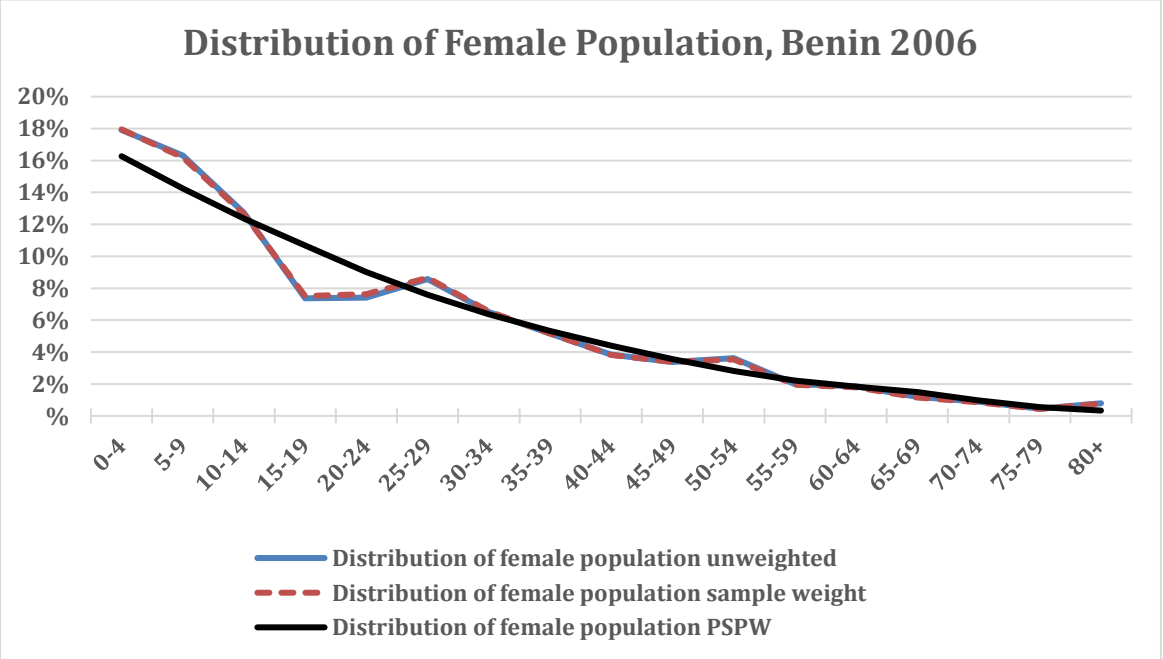
A common method is to calculate *post-stratification weights*, where external data on the distribution of different groups in a population (e.g. from a census) are used to re-weight the sample data (Elliot, 1991, Gelman and Carlin, 2001). By comparing the distribution of demographic characteristics (such as age, education, race, sex, etc.) in the sample to the 'correct', external data, one can gauge the degree of difference between the sample and the true population. If the distributions are similar, there is little need to calculate post-stratification weights. However, if there are large differences (i.e. more than a few percentage points), then one can re-weight the sample survey data. This is called *post*-stratification weighting as it is only done once the data are collected. *Stratification* refers to the fact that various known *strata* (such as age group or sex distribution) of the population are used to adjust the sample data, to better conform to the 'correct' population parameters. The population division of the UN Department of Economic and Social Affairs provides detailed estimates and forecasts of national populations by age group and gender (UNPOP, 2006) which can be used to calculate post-stratification weights for different years.

The following charts illustrate the issues at hand. Using data from the 2006 DHS for Benin, we can plot the proportion of the sample that are female, by age. These data can be shown unweighted (solid blue line), weighted using the sample weights provided by the DHS (dotted red line), and what the distribution is according to UN Population Division data. Given the focus of the DHS programme, on demographic, health and fertility issues, it is unsurprising that a larger than expected share of the same are women aged 15-59 years.

[6] Certain 'hard to reach' groups e.g. high mountain or forest dwellers, the homeless, nomadic groups, etc are frequently under-sampled; post stratification helps reduce bias introduced by their exclusion, to make the sample better fit 'known' aspects of the population.



In a similar way, PSPW can be used to smooth the distribution (by age and gender) of the sample, so that it more accurately reflects the population as a whole. Thus in the following chart, the oversampled group of young girls can be re-weighted to reflect their distribution in the population more accurately, based on UN Population data for the country as a whole.



DHS and MICS data can be re-weighted relatively simply, using information on age group and gender from the survey, in combination with population data from the UN Population statistics division. One can compute a weight which grosses up the sample

numbers to the national population of a given year (e.g. 2010), and these gross weights can then be normalised, to weight the sample size back down to the original number, but this time correcting for the populations age and sex distribution for a given year. The key source of data on population used for this project was the *World Population Prospects: The 2012 Revision* database [https://esa.un.org/unpd/wpp/], file: *WPP2012_DB04_Population_By_Sex_Annual.csv - Population by five-year age group and by sex, major area, region and country, annually for 1950-2100 (Estimates and Medium-fertility variants with AIDS mortality and without) in thousands.* Appendix 1 provides the SPSS syntax which can be used to create PSPW for DHS and MICS data, using an example of data from the 2006 DHS for Zimbabwe.

Data Harmonisation

While the DHS and MICS are similar platforms (e.g. using comparable questionnaires and sampling methods), it remains the case that researchers interested in pooling data from MICS/DHS for different countries need to note significant differences, not only with regards the name of variables, but also (and more importantly) with regards to value labels. To this end considerable effort needs to be made to harmonise value labels and (if desired) variable names. Thus, to take an example, the variables for a household's main source of water on the DHS and MICS are shown below:

DHS Value labels

10 PIPED WATER

11 Piped into dwelling

12 Piped into yard /plot

13 Public tap

20 OPEN WELL WATER

21 Open well in dwelling

22 Open well in yard /plot

23 Open public well

30 COVERED WELL/BOREHOLE

31 Protected well / borehole in dwelling

32 Protected well / borehole in yard /plot

33 Protected public well / borehole

40 SURFACE WATER

41 Spring

42 River / stream

43 Pond / lake

44 Dam

51 Rainwater

61 Tanker truck

62 Water vendor

71 Bottled water

96 Other

From the MICS, the same variable (Household's main source of water)

1 Piped into dwelling

2 Piped into yard or plot

3 Public tap

4 Tubewell/borehole with pump

5 Protected dug well

6 Protected spring

7 Rainwater collection

8 Bottled water

9 Unprotected dug well

10 Unprotected spring

11 Pond, river or stream

12 Tanker truck vendor

13 Other

97 Missing

The harmonisation process thus takes the value labels from each countries data file, creates a new derived variable (e.g. "watsrce"), and recodes the value labels from each MICS/DHS into a list that incorporates all possible water sources listed in the DHS or MICS.

10 Piped

11 Piped into residence

11 Piped into residence

12 Public tap

23 Borehole/ covered well

23 Borehole/covered well

20 Wells

27 Protected well

24 Open well

30 Surface

31.1 Protected spring

31.2 Unprotected spring

32 river/stream

41 Rainwater

51 Tanker truck

80 Other

61 Bottled

80 Other

32 river/stream

33 pond/ lake

31 Spring water

10 Piped

10 Piped	*23 Borehole/covered well*
24 Open well	*23 Borehole/covered well*
24 Open well	*28 Protected well in residence*
32 River/stream	*27 Protected well*
80 Other	*25 Open well in residence*
61 Bottled	*26 Open public well*
41 Rainwater	*32 river/ stream*
41 Rainwater	*33 pond/ lake*
20 Wells	*34 Dam*
10 Piped	*80 Other*
10 Piped	

The harmonisation process requires similar actions to be done with regards the variables of interest (e.g. sanitation, dwelling construction materials – floors, walls, roofs, education received); a sample of SPSS syntax used to do this is provided in the appendix.

Once the MICS and DHS data are harmonised, derived binary variables are created to reflect the thresholds of severe deprivation for each basic human need set out in Table 1, to identify individuals as either deprived or not with regards their need for water, sanitation, shelter, information, food, health and education. The number of deprivations for each individual are added together, and those experiencing two or severe deprivations are classed as being in absolute poverty. Given the thresholds set for each individual indicator of deprivation are so severe, it is likely the experience of even a single deprivation will impact a person's standard of living, but in erring on the side of caution and based on evidence from the literature about poverty being better identified by the experience of multiple deprivations, those experiencing one or more deprivations are identified as severely deprived but not as being in absolute poverty.

Update: IPUMS-DHS collaboration

Whilst this project was underway, an agreement was reached between DHS and the Integrated Public Use Microdata Series project (IPUMS-International) to harmonise and make available comparable DHS data for 21 countries, including India, Egypt and 19 African countries [see: https://www.idhsdata.org/idhs/about.shtml]. A first release in April 2014 provided data for Egypt, Ethiopia, Ghana, India, Kenya, Malawi, Mali, Nigeria, and Zimbabwe. A second release, in April 2015, provided data for Benin, Burkina Faso, Cote d'Ivoire, Guinea, Mozambique, Niger, Tanzania, Uganda, and Zambia. A third release, in May 2015, provided DHS data for Cameroon, Madagascar, and Rwanda.

References

ALDRICH, B. & SANDHU, R. 1995. *Housing and the urban poor: Policy and practice in developing countries,* London, Zed Books.

ALIAGA, A. & REN, R. 2006. Optimal sample sizes for two-stage cluster sampling in demographic and health surveys. *DHS Working Paper Series.* Calverton: MEASURE DHS.

ALTIMIR, O. 1979. La dimensión de la pobreza en América Latina. *Cuadernos de la CEPAL.* Santiago: CEPAL.

ALTIMIR, O. 1981. Poverty in Latin America. A Review of Concepts and Data. *CEPAL Review,* 13.

AMIN, S. 2006. The Millennium Development Goals: a Critique from the South. *Monthly Review,* 57.

AMOBI, I. 1983. Nigeria: child health. *Nurs Times,* 79**,** 51-3, 56.

AMONE, J. & BUKULUKI, P. 2004. The impact of HIV/AIDS on the education sector in Uganda. International Institute for Educational Planning (IIEP), UNESCO.

ANYANGWE, S. C., MTONGA, C. & CHIRWA, B. 2006. Health inequities, environmental insecurity and the attainment of the millennium development goals in sub-Saharan Africa: the case study of Zambia. *Int J Environ Res Public Health,* 3**,** 217-27.

ARIAS, E. & DEVOS, S. 1996. Using housing items to indicate socio-economic status: Latin America. *Social Indicators Research,* 38**,** 53-80.

ATTARAN, A. 2005. An immeasurable crisis? A criticism of the Millennium Development Goals and why they cannot be measured. *PLoS Med,* 2**,** e318.

BANERJI, D. 2003. Reflections of an Indian scholar. *Int J Health Serv,* 33**,** 163-9.

BASCHIERI, A. & FALKINGHAM, J. 2007. Child poverty in Tajikistan: Report for the UNICEF country office. Southampton: University of Southampton.

BEN-ARIEH, A. & WINTERSBERGER, H. 1997. *Monitoring and Measuring the State of Children - Beyond Survival,* Vienna, European Centre for Social Welfare Policy and Research.

BERGER, M. R., HOLLENBECK, C. B. & FIELDS-GARNER, C. 2006. Prevalence of malnutrition in HIV/AIDS orphans in the Nyanza province of Kenya: a comparison of conventional indices with a composite index of anthropometric failure (CIAF). *Journal of the American Diatetic Association,* 106**,** A20.

BIDDULPH, J. 1993. Priorities and practice in tropical paediatrics. *J Paediatr Child Health,* 29**,** 12-5.

BLACK, M. & FAWCETT, B. 2008. *The Last Taboo: Opening the Door on the Global Sanitation Crisis,* London, Earthscan.

BLACK, R., MORRIS, S. & BRYCE, J. 2003. Where and why are 10 million children dying every year? *The Lancet,* 361**,** 2226-34.

BOSCH, C., HOMMANN, K., RUBIO, G., SADOFF, C. & TRAVERS, L. 2001. Water, sanitation and poverty. *Poverty Reduction Strategy Sourcebook.* Washington D.C.: World Bank.

BOWLING, A. 2002. *Research Methods in Health: Investigating health and health services,* Maidenhead, Open University Press.

BRADSHAW, J. & FINCH, N. 2003. Overlaps in Dimensions of Poverty. *Journal of Social Policy,* 32**,** 513-525.

BRADSHAW, J., HOELSCHER, P. & RICHARDSON, D. 2007. An Index of Child Well-being in the European Union. *Social Indicators Research,* 80**,** 133-177.

BROWN, M. & MADGE, N. 1982. *Despite the welfare state: a report on the SSRC/DHSS programme of research into transmitted deprivation,* London, Heinemann Educational Books.

BURSTROM, B., MACASSA, G., OBERG, L., BERNHARDT, E. & SMEDMAN, L. 2005. Equitable child health interventions: the impact of improved water and sanitation on inequalities in child mortality in Stockholm, 1878 to 1925. *Am J Public Health,* 95**,** 208-16.

CAIRNCROSS, S. 1987. The benefits of water supply. *In:* PICKFORD, J. (ed.) *Developing World Water.* London: Grosvenor Press.

CAULFIELD, L. E., DE ONIS, M., BLOSSNER, M. & BLACK, R. E. 2004. Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. *Am J Clin Nutr,* 80**,** 193-8.

CHADWICK, E. 1842. Report on the sanitary conditions of the labouring population if Great Britain. London.

CHAUDHURI, N. 2004. Interventions to improve children's health by improving the housing environment. *Rev Environ Health,* 19**,** 197-222.

CHECKLEY, W., GILMAN, R. H., BLACK, R. E., EPSTEIN, L. D., CABRERA, L., STERLING, C. R. & MOULTON, L. H. 2004. Effect of water and sanitation on childhood health in a poor Peruvian peri-urban community. *Lancet,* 363**,** 112-8.

CHEN, L., CHOWDHURY, A. & HUFFMAN, S. 1980. Anthropometric assessment of energy-protein malnutrition and subsequent risk of mortality among preschool aged children. *American Journal of Clinical Nutrition,* 33**,** 1836-1845.

CHEN, S. & RAVALLION, M. 2008. The developing world is poorer than we thought, but no less successful in the fight against poverty. Washington D.C.: World Bank.

CHOPRA, M. & SANDERS, D. 2005. Child Health and Poverty. London: Childhood Research and Policy Centre.

CLELAND, J. & SCOTT, C. 1987. *The World Fertility Survey: An Assessment,* Oxford, Oxford University Press.

COLCLOUGH, C. 1982. The impact of primary schooling on economic development: a review of the evidence. *World Development,* 10.

COOMBE, C. 2002. Mitigating the impact of HIV/AIDS on education supply, demand and quality. *In:* CORNIA, G. (ed.) *AIDS, public policy and child well-being.* Florence: UNICEF Innocenti Research Centre.

DATTA, M. & SWAMINATHAN, S. 2001. Global aspects of tuberculosis in children. *Paediatr Respir Rev,* 2**,** 91-6.

DE ONIS, M., GARCA, C. & HABICHT, J. P. 1997. Time for a new growth reference. *Pediatrics,* 100**,** 5.

DE ONIS, M., ONYANGO, A. W., BORGHI, E., GARZA, C. & YANG, H. 2006. Comparison of the World Health Organization (WHO) Child Growth Standards and the National Center for Health Statistics/WHO international growth reference: implications for child health programmes. *Public Health Nutr,* 9**,** 942-7.

DE ONIS, M., VICTORA, C., GARZA, C., FRONGILLO, E. & COLE, T. 2001. A new international growth reference for young children. *In:* DASGUPTA, P. & HAUSPIE, R. (eds.) *Perspectives in Human Growth, Development and Maturation.* Dordrecht: Kluwer Academic Publishers.

DELAMONICA, E. & MINUJIN, A. 2006. Incidence, Depth and Severity of Children in Poverty. *Social Indicators Research,* 82**,** 361-374.

DFID 2002. Improving livelihoods for the poor: the role of literacy', DFID Background Briefing. London: Department for International Development.

DICKSTEIN, L. J. 1988. Spouse abuse and other domestic violence. *Psychiatr Clin North Am,* 11**,** 611-28.

DOLEV, T. & HABIB, J. 1997. A Conceptual Framework for Developing Indicators. *Eurosocial Reports,* 62**,** 65-80.

DUPRAZ, J., HANDLEY, G. & WILLIS, O. 2006. Childhhod poverty in Mozambique: A situation and trends analysis. Maputo: UNICEF, Mozambique.

ECLAC 2008. Social Panorama of Latin America 2008. Santiago: Economic Commission for Latin America and the Caribbean.

ELLIOT, D. 1991. *Weighting for non-response,* London, OPCS.

ENNEW, J. & MILJETEIG, P. 1996. Indicators for children's rights: progress report on a project *International Journal of Children's Rights,* 4**,** 213-236.

ESREY, S. A. & HABICHT, J. P. 1986. Epidemiological evidence for health benefits from improved water and sanitation in developing countries *Epidemiologic Reviews,* 8**,** 117-128.

EVANS, G. W. & KANTROWITZ, E. 2002. Socioeconomic status and health: the potential role of environmental risk exposure. *Annu Rev Public Health,* 23**,** 303-31.

FEACHEM, R., BURNS, E., CAIRNCROSS, S., CRONIN, A., CROSS, P. & CURTIS, D. 1978. *Water, Health and Development,* London, Tri-Med Books.

FIADZO, E. D., HOUSTON, J. E. & GODWIN, D. 2001. Estimating housing quality for poverty and policy analysis: CWIQ in Ghana. *Social Indicators Research,* 53**,** 137-162.

GARZA, C. & DE ONIS, M. 1999. A new international growth reference for young children. *Am J Clin Nutr,* 70**,** 169S-172S.

GELMAN, A. & CARLIN, J. B. 2001. Poststratification and weighting adjustments. *In:* GROVES, R., ELTINGE, J. & LITTLE, R. J. A. (eds.) *Survey Nonresponse.* New York: Wiley.

GERLAND, P. Socio-economic data and GIS: datasets, databases, indicators and data integration issues. 3rd Workshop on Use of GIS in Agricultural Research (UNEP/CGIAR Cooperation), 1996 Arendal, Norway. United Nations Statistics Division.

GHOSH, P. K. 1984. *Third World Development: A Basic Needs Approach,* Westport. Conn., Greenwood Press.

GLEICK, P. 1996. Basic water requirements for human activities: Meeting basic needs. *Water International,* 21**,** 83-92.

GORDON, D. 2002. The international measurement of poverty and anti-poverty policies. *In:* TOWNSEND, P. & GORDON, D. (eds.) *World Poverty: new policies to defeat an old enemy.* Bristol: The Policy Press.

GORDON, D., NANDY, S., PANTAZIS, C., PEMBERTON, S. A. & TOWNSEND, P. 2003. *Child Poverty in the Developing World,* Bristol, The Policy Press.

GORDON, D. & PANTAZIS, C. 1997. Measuring poverty: Breadline Britain in the 1990s. *In:* GORDON, D. & PANTAZIS, C. (eds.) *Breadline Britain in the 1990s.* Aldershot: Ashgate Publishing.

GOVERNMENT OF THE REPUBLIC OF SOUTH AFRICA 2001. Regulations relating to compulsory national standards and measures to conserve water – Water Services Act, 1997. *In:* DEPARTMENT OF WATER AFFAIRS AND FORESTRY (ed.). Pretoria: Government Gazette.

GUNDRY, S. W., WRIGHT, J. A. & CONROY, R. 2004. A systematic review of the health outcomes related to household water quality in developing countries. *Journal of Water and Health,* 2**,** 1-14.

HARPER, C., MARCUS, R. & MOORE, K. 2003. Enduring Poverty and the Conditions of Childhood: Lifecourse and Intergenerational Poverty Transmissions. *World Development,* 31**,** 535-554.

HOWARD, G. & BARTRAM, J. 2003. Domestic Water Quantity, Service, Level and Health. Geneva: World Health Organisation.

IIPS & ORC MACRO 2000. National Family Health Survey (NFHS-2) 1998-99: India. Mumbai: IIPS.

INTERNATIONAL LABOUR ORGANIZATION 1976. *Employment, growth and basic needs: a one-world problem,* Geneva, ILO.

JACOBS, R. F. & EISENACH, K. D. 1993. Childhood tuberculosis. *Adv Pediatr Infect Dis,* 8**,** 23-51.

KHOSLA, R., BHANOT, A. & KARISHMA, S. 2005. Sanitation: a call on resources for promoting urban child health. *Indian Pediatr,* 42**,** 1199-206.

KIRIGIA, J. M., GBARY, A. R., MUTHURI, L. K., NYONI, J. & SEDDOH, A. 2006. The cost of health professionals' brain drain in Kenya. *BMC Health Serv Res,* 6**,** 89.

KORENMAN, S., MILLER, J. E. & SJAASTAD, J. E. 1995. Long-term poverty and child development in the United States: Results from the National Longitudinal Survey of Youth. *Children and Youth Services Review,* 17**,** 127-51.

KRETCHMER, N. 1969. Child health in the developing world. *Pediatrics,* 43**,** 4-11.

KYRILI, K. & MCKINLEY, T. 2008. Identifying Global Trends in Child Poverty: Save the Children's New Child Development Index. *Development Viewpoint* London: Centre for Development Policy and Research, SOAS.

LEATHERS, H. D. & FOSTER, P. 2004. *The World Food Problem: Tackling the Causes of Undernutrition in the Third World,* Boulder, CO., Lynne Rienner Publishers.

LEE, L. F., ROSENZWEIG, M. R. & PITT, M. M. 1997. The effects of improved nutrition, sanitation, and water quality on child health in high-mortality populations. *Journal of Econometrics,* 77**,** 209-236.

LOGIE, D. & ROWSON, M. 1998. Poverty and Health: Debt Relief Could Help Achieve Human Rights Objectives. *Health Hum Rights,* 3**,** 82-97.

LUGALLA, J. L. 1995. The impact of structural adjustment policies on women's and children's health in Tanzania. *Rev Afr Polit Econ,* 22**,** 43-53.

LYYTIKAINEN, K., JONES, N., HUTTLY, S. & ABRAMSKY, T. 2006. Childhood poverty, basic services and cumulative disadvantage: An international comparative analysis. Young Lives Working Paper No.33. London: Young Lives and Save the Children, UK.

MARA, D. 1996. *Low Cost Urban Sanitation,* Chichester, John Wiley & Sons.

MARCHAL, B. & KEGELS, G. 2003. Health workforce imbalances in times of globalization: brain drain or professional mobility? *Int J Health Plann Manage,* 18 Suppl 1**,** S89-101.

MARSH, A., GORDON, D., PANTAZIS, C. & HESLOP, P. 1999. *Home sweet home? The impact of poor housing on health,* Bristol, The Policy Press.

MINUJIN, A., DELAMONICA, E., GONZALEZ, E. D. & DAVIDZIUK, A. Children Living in Poverty: A Review of Child Poverty Definitions, Measurements and Policies. Children & Poverty: Global Context, Local Solutions, 2005 New School University, New York City, USA.

MISRA, B. S. 1981. Diarrhoeal disease control. *Swasth Hind,* 25**,** 92-3.

MOORE, K. A. 1995. New social indicators of child well-being. Eurosocial Report No. 56. Vienna: European Centre.

MORAES, L. R., CANCIO, J. A., CAIRNCROSS, S. & HUTTLY, S. 2003. Impact of drainage and sewerage on diarrhoea in poor urban areas in Salvador, Brazil. *Trans R Soc Trop Med Hyg,* 97**,** 153-8.

MULREANY, J. P., CALIKOGLU, S., RUIZ, S. & SAPSIN, J. W. 2006. Water privatization and public health in Latin America. *Rev Panam Salud Publica,* 19**,** 23-32.

MURISON, H. S. & LEA, J. P. 1979. *Housing in Third World Countries: Perspectives on Policy and Practice,* Basingstoke, The MacMillan Press, Ltd.

NANDY, S., IRVING, M., GORDON, D., SUBRAMANIAN, S. V. & DAVEY-SMITH, G. 2005. Poverty, Child Undernutrition and Morbidity: New Evidence from India. *Bulletin of the World Health Organisation,* 83**,** 210-216.

NANDY, S. & JAIME MIRANDA, J. 2008. Overlooking undernutrition? Using a composite index of anthropometric failure to assess how underweight misses and misleads the assessment of undernutrition in young children. *Social Science and Medicine,* 66**,** 1963-1966.

NANDY, S., SCOTT, R., LOGIE, D. E. & BENATAR, S. R. 2000. Realistic priorities for AIDS control. *Lancet***,** 1525.

NOBLE, M., RATCLIFFE, A. & WRIGHT, G. 2004. Conceptualizing, Defining and Measuring Poverty in South Africa: An Argument for a Consensual Approach. Oxford: Centre for the Analysis of South African Social Policy, University of Oxford.

OFFICE OF THE HIGH COMMISSIONER FOR HUMAN RIGHTS 1990. The nature of States parties obligations (Art. 2, par.1): 14/12/90. C.E.S.C.R. General Comment 3. . Geneva: UNHCHR.

OSMANI, S. 1992. *Nutrition and poverty,* Oxford, Clarendon Press.

PELLETIER, D. L., FRONGILLO, E. A., SCHROEDER, D. G. & HABICHT, J. P. 1995. The effects of malnutrition on child mortality in developing countries. *Bulletin- World Health Organization,* 73**,** 443.

PEMBERTON, S., GORDON, D., NANDY, S., PANTAZIS, C. & TOWNSEND, P. 2007. Child Rights and Child Poverty: Can the International Framework of Children's Rights Be Used to Improve Child Survival Rates? *Plos Medicine,* 4**,** 1567-1570.

PEPALL, E., EARNEST, J. & JAMES, R. 2007. Understanding community perceptions of health and social needs in a rural Balinese village: results of a rapid participatory appraisal. *Health Promot Int,* 22**,** 44-52.

PHILLIPS, D. R. & VERHASSELT, Y. 1994. *Health and Development,* London, Routledge.

POLLITT, E. 1981. Child poverty in South America: reflections on its magnitude, and the basic-need developmental approach. A retrospect on the International Year of the Child. *Arch Latinoam Nutr,* 31**,** 235-49.

PSACHAROPOULOS, G. 1972. *The returns to education: an international comparison,* Amsterdam, Elsevier.

PSACHAROPOULOS, G. 1988. Education and development: a review. *World Bank Res Obs,* 3**,** 99-116.

REDDY, S. 2008. Counting the Poor. *Americas Quarterly,* Spring**,** 37-41.

RICHARDSON, D., RAMIREZ, R. & HAQ, M. 2000. Grameen Telecom's Village Phone Programme in Rural Bangladesh: a Multi-Media Case Study. Ottawa: CIDA.

RIFKIN, S. B. 1986. Why health improves: defining the issues concerning "comprehensive primary health care" and "selective primary health care". *Social Science & Medicine,* 23**,** 559-565.

RIO GROUP 2006. Compendium of Best Practices in Poverty Measurement. Rio de Janeiro: Expert Group on Poverty Statistics, IBGE.

RUTSTEIN, S. O. & ROJAS, G. 2003. Guide to DHS Statistics. Calverton, Maryland: ORC Macro.

SATTERTHWAITE, D. 1993. The impact on health of urban environments. *Environ Urban,* 5**,** 87-111.

SATTERTHWAITE, D., HART, R., LEVY, C., MITLIN, D., ROSS, D. A., SMIT, J. & STEPHENS, C. 1996. *The Environment for Children: Understanding and acting on the environmental hazards that threaten children and their parents,* London, Earthscan Publications Ltd.

SEAGER, J. & DE WET, T. 2003. Establishing large panel studies in developing countries: the importance of the 'Young Lives' pilot phase. London: Save the Children.

SEETHARAMAN, N., CHACKO, T. V., SHANKAR, S. L. R. & MATTHEW, A. C. 2007. Measuring malnutrition - the role of z-scores and the composite index of anthropometric failure (CIAF). *Indian Journal of Community Medicine,* 32.

SPENCER, N. 2003. Social, Economic, and Political Determinants of Child Health. *Pediatrics,* 112**,** 704-706.

STEWART, F. 1985. *Planning to meet basic needs,* London, Macmillan.

SVEDBERG, P. 1999. 841 million undernourished? *World Development,* 27.

SVEDBERG, P. 2000. *Poverty and Undernutrition: Theory, Measurement and Policy,* New Delhi, Oxford India Paperbacks.

SZRETER, S. 1988. The importance of social intervention in Britain's mortality decline (1850-1914): a reinterpretation of the role of public health. *Social History of Medicine,* 1.

TEIXEIRA, J. C. & HELLER, L. 2006. Impact of water supply, domiciliary water reservoirs and sewage on faeco-orally transmitted parasitic diseases in children residing in poor areas in Juiz de Fora, Brazil. *Epidemiol Infect,* 134**,** 694-8.

TIES BOERMA, J. 1996. *Child Survival in Developing Countries: Can Demographic and Health Surveys Help to Understand the Determinants?,* Amsterdam, Royal Tropical Institute.

TOWNSEND, P. 1979. *Poverty in the United Kingdom,* Harmondsworth, Penguin Books Ltd.

U.N. HABITAT 2003. *Water and sanitation in the world's cities: Local action for global goals,* London, Earthscan.

U.N. HABITAT & UNEP 2002. Sulabh sanitation movement restoring dignity to 'scavengers'. *Water for Cities Newsletter*.

UELI, B. 1993. Oral rehydration therapy--qualitative studies of balance between pragmatism and scientific rigour in managing diarrhoea. *Soc Sci Med,* 36**,** 525-31.

UN COMMITTEE ON ECONOMIC SOCIAL AND CULTURAL RIGHTS 1990. General Comment No.3: The Nature of States Parties' Obligations. Geneva: UNCESCR.

UNCHS 1996. *An urbanising world: Global report on human settlements,* Oxford, Oxford University Press.

UNCHS & ILO 1995. *Shelter Provision and Employment Generation,* Nairobi/Geneva, United Nations Centre for Human Settlements (Habitat)/International Labour Organisation.

UNDESA 1976. The Significance of Rural Housing in Integrated Rural Development. New York: United Nations Department of Economic and Social Affairs.

UNDP 1999. *Human Development Report 1999: Globalization with a Human Face,* New York Oxford University Press.

UNDP 2001. *Human Development Report 2001: Making new technologies work for human development,* New York, Oxford University Press.

UNDP 2006. Beyond scarcity: Power, poverty and the global water crisis. UNDP.

UNESCO. World Declaration on Education for All: Meeting Basic Learning Needs 5-9 March, 1990 1990 Jomtien, Thailand.

UNICEF 1995. *Strategies in water and environmental sanitation,* New York, UNICEF.

UNICEF 2004. *The State of the World's Children Report 2005: Childhood Under Threat,* New York, UNICEF.

UNITED NATIONS 1989. *Convention on the Rights of the Child,* New York, United Nations Department of Publications.

UNITED NATIONS GENERAL ASSEMBLY 1966. International Covenant on Economic, Social and Cultural Rights *In:* UNITED NATIONS GENERAL ASSEMBLY (ed.). New York.

UNPOP 2006. World Population Prospects: The 2006 Revision. UNPOP.

VAESSEN, M. 1996. The Potential of the Demographic and Health Surveys (DHS) for the Evaluation and Monitoring of Maternal and Child Health Indicators. *In:* KHLAT, M. (ed.) *Demographic Evaluation of Health Programmes - Proceedings of a Seminar in Paris.* Paris: CICRED, UNFPA.

VAID, A., MAMMEN, A., PRIMROSE, B. & KANG, G. 2007. Infant mortality in an urban slum. *Indian J Pediatr,* 74**,** 449-53.

VAN BUEREN, C. 1999. Combating Child Poverty - Human Rights Approaches. *Human Rights Quarterly,* 21**,** 680-706.

VAN BUEREN, G. 2002. The Minimum Core Obligations of States Under Article 10(3) of the International Covenant on Economic, Social and Cultural Rights. *In:* CHAPMAN, A. & SAGE, R. (eds.) *Core Obligations: Building a Framework for Economic, Social and Cultural Rights.* Washington DC: AAAS-HURIDOCS.

VAN DER GAAG, J. & DUNKELBERG, E. 2004. Measuring child well-being in the Mediterranean countries - towards a comprehensive child welfare index. Amsterdam: Amsterdam Institute for International Development.

VICTORA, C. G., MORRIS, S. S., BARROS, F. C., DE ONIS, M. & YIP, R. 1998. The NCHS reference and the growth of breast- and bottle-fed infants. *J Nutr,* 128**,** 1134-8.

WALLS, T. & SHINGADIA, D. 2004. Global epidemiology of paediatric tuberculosis. *J Infect,* 48**,** 13-22.

WATKINS, K., . 2000. The Oxfam Education Report. Oxford: OXFAM.

WELL 1998. Guidance manual on water supply and sanitation programmes. Loughborough: WEDC.

WHELAN, C. T. 2007. Understanding the Implications of Choice of Deprivation Index for Measuring Consistent Poverty in Ireland Working Paper No. 181. Dublin: Economic and Social Research Institute.

WHO 1978. *Declaration of Alma Ata*

WHO 1995a. Expert Committee on Nutrition and Physical Status: Uses and Interpretation of Anthropometry. Geneva: World Health Organization.

WHO 1995b. World Health Report 1995: Bridging the Gaps. Geneva: WHO.

WHO, UNICEF & WSSCC 2000. *The Global Water Supply and Sanitation Assessment,* Geneva, World Health Organisation.

WHO & WORLD BANK 2002. *Better health for Poor children,* Geneva, World Health Organisation.

WISE, P. H. & MEYERS, A. 1988. Poverty and child health. *Pediatr Clin North Am,* 35**,** 1169-86.

WOOD, D. 2003. Effect of Child and Family Poverty on Child Health in the United States. *Pediatrics,* 112**,** 707-711.

WORLD EDUCATION FORUM 2000. *Final Report - World Education Forum, Dakar, Senegal, 26-28 April 2000,* Paris, UNESCO.

WRIGHT, J. A., GUNDRY, S. W. & CONROY, R. 2004. Household drinking water in developing countries - a systematic review. *Tropical Medicine and International Health,* 9**,** 106 -117.

Appendix: Model SPSS Syntax

**********.

Household Facilities Harmonisation.

**********.

**Drinking water source.*

fre hv201.

compute watsrce=hv201.

recode watsrce (10=10) (11=11) (12=11) (13=12) (20=24) (21=23) (30=20) (31=27) (32=24) (40=30) (41=31.1) (42=31.2) (43=32) (51=41) (61=51) (62=80) (71=61) (96=80) (99=sysmis).

variable labels watsrce 'Source of drinking water'.

value labels watsrce 10'Piped' 11'Piped into residence' 12'Public tap'

20'Wells' 21'Well in residence' 22'Public well' 23'Borehole/ covered well' 23.1'Well manually pumped' 23.2'Well electronically pumped' 24'Open well' 25'Open well in residence' 26'Open public well' 27'Protected well' 28'Protected well in residence' 29 'Protected public well' 30'Surface' 31'Spring water' 31.1'Protected spring' 31.2'Unprotected spring' 32'river/ stream' 33'pond/ lake' 34'Dam' 35'Dugout' 41'Rainwater' 51'Tanker truck' 61'Bottled' 80'Other' -98'DK'.

crosstab hv201 by watsrce.

**Round trip time to drinking water source.*

compute wattime=hv204.

recode wattime (999=sysmis) (else=copy).

variable labels wattime 'Round trip time to water source'.

value labels wattime 996'Water on premesis'.

EXECUTE.

**Water treatment - to make drinking water safe.*

compute treatwater=hv237.

variable labels treatwater 'Treat water to make it safe'.

value labels treatwater 0'No' 1'Yes' 999'No data'.

EXECUTE.

**Who collects the water.*

compute getwater=hv236.

recode getwater (5=1) (6,7,8=6) (else=copy).

variable labels getwater 'Who collects the water for the household'.

value labels getwater 1'Adult Woman' 2'Adult Man' 3'Girl under 15' 4'Boy under 15' 6'Other' 999'No data'.

cro hv236 by getwater.

**Toilet facility.*

compute toilet=hv205.

recode toilet (11 thru 15=10) (21=22) (22=24) (23=25) (31=30) (41=80) (42=40) (43=43) (96=80) (99=sysmis) (sysmis=sysmis) (else=copy).

variable labels toilet 'type of toilet facility'.

value labels toilet 10'Flush toilet' 11'Own flush toilet' 12'Shared flush toilet' 13'Septic tank' 20'Pit latrine' 21'Traditional pit' 22'Ventilated improved pit' 23'Pour flush latrine' 24'Covered pit latrine' 25'Open pit latrine' 30'No facility' 31'Bush' 40'Bucket' 43 'Hanging toilet' 80'Other'.

cro toilet by hv205.

**Shared toilet with other households.*

compute looshare=hv225.

recode looshare (9=sysmis).

Variable Labels looshare 'Share toilet with other households'.

value labels looshare 0'No' 1'Yes'.

EXECUTE.

cro looshare by hv225.

*Floor material.

compute floormat=hv213.

recode floormat (10=10) (11=12) (12=11) (20=20) (21=21) (22=22) (30=30) (31=31) (32=32) (33=33) (34=34) (35=35) (96=80) (99=sysmis) (else=copy).

variable labels floormat 'Type of floor material'.

value labels floormat 10'Natural' 11'Mud or dung' 12'Sand' 20'Rudimentary' 21'Wood planks' 22'Bamboo' 23'Adobe' 30'Finished' 31'Polished wood' 32'Vinyl' 33'Tile' 34'Cement, concrete, brick' 35'Carpet' 36'Ceramic, marble' 37'Asphalt' 80'Other'.

cro floormat by hv213.

*Roof material.

compute roofmat=hv215.

recode roofmat (10=10) (11=5) (12=11) (13=11) (20=20) (21=20) (22=12) (23=22) (24=20) (30=30) (31=21) (32=22) (33=26) (34=31) (35=32) (36=30) (96=80) (sysmis=999).

Variable Labels roofmat 'Type of roof material'.

value labels roofmat 5'No roof' 10'Natural' 11'Grass/ thatch' 12'Reed or bamboo' 13'Tin cans'

20'Rudimentary' 21'Corrugated iron' 22'Wood' 23'Plastic sheet' 24'Mobile roofs of nomads' 25'Asbestos'

26'Calamine' 30'Finished' 31'Tiles' 32'Cement' 33'Bricks' 80'Other' -98'DK' 999'No data'.

cro roofmat by hv215.

**Wall material.*

compute wallmat=hv214.

recode wallmat (10=10) (11=5) (12=10) (13=11) (20=20) (21=22) (22=27) (23=28) (24=21) (25=24) (26=21) (30=30) (31=32) (32=32) (33=31) (34=32) (35=28) (36=21) (96=80)(sysmis=999).

Variable Labels wallmat 'Type of wall material'.

value labels wallmat 5'No wall' 10'Natural' 11'Mud' 12'Straw' 20'Rudimentary' 21'Wood' 22'Bamboo' 23'Mud and cement' 24'Plastic/ cardboard' 25'Corrugated iron/ zinc' 26'Prefab' 27'Stone' 28'Adobe' 30'Finished' 31'Brick' 32'Cement' 33'Mixed brick' 34'Single panel Gert (mongolia)' 35'Double panel Gert (mongolia)' 80'Other' 999'No data'.

cro wallmat by hv214.

**Rooms for sleeping.*

```
compute sleeproom=hv216.

recode sleeproom (99=sysmis).

variable labels sleeproom'number of rooms for sleeping'.

cro sleeproom by hv216.


*******************************.

*Education Harmonisation*.

*******************************.

*Highest education level attended.

*Data from the individual mens/womens files are assumed to be more accurate; if missing, then take the data from the household member file.

*This syntax assumes data from the Men's and Women's files have been meerged to the household-level file.

compute edulev=999.

if (edulev=999) edulev=v106.

if (edulev=999) edulev=HA66.

if sysmiss (edulev) edulev=HB66.

if sysmiss (edulev) edulev=HV106.

if (b16 ge 1) edulev=HV106.

recode edulev (8=-98) (9=sysmis).

value labels edulev 0'No education' 1'Primary' 2'Secondary' 3'Higher' 4'Non-standard' -98'DK' 999'No data'.

variable labels edulev 'Highest education level'.

EXECUTE.

fre edulev.


*Education attainment.

*This syntax assumes data from the Men's and Women's files have been meerged to the household-level file.

compute eduat=999.

if (eduat=999) eduat=v149.
```

if sysmis (eduat) eduat=HV109.

if (b16 ge 1) eduat=HV109.

recode eduat (98,99=sysmis).

variable labels eduat 'Education attainment'.

Value labels eduat 0'No education' 1'Incomplete primary' 2'Complete primary' 3'Incomplete secondary' 4'Complete Secondary' 5'Higher' 8'DK'.

EXECUTE.

fre eduat.

*Highest year/grade of education.

**Data from the individual mens/womens files are assumed to be more accurate; if missing, then take the data from the household member file.

*This syntax assumes data from the Men's and Women's files have been meerged to the household-level file.

compute edugrade=999.

if (edugrade=999) edugrade=v107.

if sysmis (edugrade) edugrade=HA67.

if sysmis (edugrade) edugrade=HB67.

if sysmis (edugrade) edugrade=HV107.

if (b16 ge 1) edugrade=HV107.

if (hv106=0) edugrade=0.

recode edugrade (98,99=sysmis).

variable labels edugrade 'Highest year/grade of education'.

EXECUTE.

fre edugrade.

*Still attending school . If no data for HV110, use HV121 attended school in current school year.

compute school=hv110.

if sysmiss (hv110) school= HV121.

recode school (0=0) (1,2=1) (9=sysmis) (8=-98).

variable labels school 'Still at school'.

value labels school 0'No' 1'Yes' -98'DK' 999'No data'.

EXECUTE.

fre school.

*Total number of years of education.

*This syntax assumes data from the Men's and Women's files have been meerged to the household-level file.

compute eduyr=-9.

If (eduyr=-9) eduyr=v133.

If sysmis (eduyr) eduyr=hv108.

if (b16 ge 1) eduyr=hv108.

recode eduyr (98,99=sysmis).

variable labels eduyr 'Number of years of education'.

EXECUTE.

fre eduyr.

SPSS Syntax for Generating Post-Stratification Population Weights

```
*1. Get the Population data file.
GET FILE='\\Aggregated population by age and sex data.sav'.

*2. Select the relevant country data (by changing LOCID for each country) and year for
        each year (e.g. 2010). In this example, we use data for Zimbabwe, whose LocID
        value on the population data file is 716. We also select data for the year 2010).

SELECT IF (LocID = 716 & year = 2010).
Exe.

****NEED TO MAKE A CHANGE HERE - re Name of country and year.
SAVE OUTFILE='\\Zimbabwe 2010 age and sex data.sav'
  /COMPRESSED.

dataset close all.

*3. Get the DHS data file for chosen country.
GET FILE='\\Zimbabwe2006DHS_allnewvars.SAV'.

weight off.
*Need to create variable "agegroup" on DHS file to match those on the population data.
*Need to change var HV105 to AGE when running on harmonised files.
recode AGE (0 thru 4=1) (5 thru 9=2) (10 thru 14=3) (15 thru 19=4) (20 thru 24=5) (25
        thru 29=6) (30 thru 34=7) (35 thru 39=8) (40 thru 44=9) (45 thru 49=10)
 (50 thru 54=11) (55 thru 59=12) (60 thru 64=13) (65 thru 69=14) (70 thru 74=15) (75
        thru 79=16) (80 thru 97=17) (98=sysmis) into agegroup.
variable labels agegroup 'Age in five year groups'.
value labels agegroup 1'0-4' 2'5-9' 3'10-14' 4'15-19' 5'20-24' 6'25-29' 7'30-34' 8'35-39'
        9'40-44' 10'45-49' 11'50-54' 12'55-59' 13'60-64' 14'65-69' 15'70-74' 16'75-79'
        17'80+'.
exe.
cro age by agegroup.

*Open file and run merge syntax below, noting name of file which you are merging into
        the DHS.
*Merge the Aggregated population data to the DHS file, using AGEGROUP as the break
        variable.

SORT CASES BY agegroup(A).
MATCH FILES /FILE=*
  /TABLE='\\Zimbabwe 2010 age and sex data.sav'
  /BY agegroup.
exe.

*Now we need to aggregate the total WEIGHTED N of people in the DHS by sex and
        agegroup.
```

```
*Sample weight variable in DHS is HV005; variable for sex is HV104 – needs to be
        renamed 'sex'.
compute wt1=hv005/1000000.
weight by wt1.
crosstab agegroup by sex.
crosstab agegroup by sex/cells=total.

*To sum up the N of people by age and sex.
Compute Unity=1.
EXECUTE.
SORT CASES BY agegroup sex.
AGGREGATE
  /OUTFILE=* MODE=ADDVARIABLES
  /PRESORTED
  /BREAK=agegroup sex
  /Unity_sum=SUM(Unity).
weight off.

*Now to compute PSPW for each age group and sex which inflates the sample to the
        population size (in 1000s).
do if (sex=1).
compute gywt =(PopMale_sum/Unity_sum)*wt1.
else if (sex=2).
compute gywt =(PopFemale_sum/Unity_sum)*wt1.
end if.
variable label gywt "Sample weight adjusted for age and sex, weighted to population (in
        000s)".
exe..

***Finally to scale weights back down.
*nywt=gywt*(unweighted sample/total sample pop weighted by gywt).
compute countryXX=1.
exe.

*Sample total weighted by GYWT.
weight off.
weight by gywt.
compute weightedsamptot=1.
SORT CASES BY countryXX.
AGGREGATE
  /OUTFILE=* MODE=ADDVARIABLES
  /PRESORTED
  /BREAK=countryXX
  /weightedsamptot_sum=SUM(weightedsamptot).
weight off.

*To get unweighted population totals.
weight off.
compute unweightedunity=1.
```

```
SORT CASES BY countryXX.
AGGREGATE
  /OUTFILE=* MODE=ADDVARIABLES
  /PRESORTED
  /BREAK=countryXX
  /unweightedunity_sum=SUM(unweightedunity).

*Final calculation for NYWT.
*nywt=gywt*(unweighted sample/total sample pop weighted by gywt).
compute nywt=gywt*(unweightedunity_sum/weightedsamptot_sum).
variable label nywt 'Sample adjusted for age and sex, weighted down to original sample
        size'.
exe.



*Final checks.
weight off.
fre agegroup sex.
cro agegroup by sex.
cro agegroup by sex/cells=row.

weight by wt1.
fre agegroup sex.
cro agegroup by sex.
cro agegroup by sex/cells=row.

weight off.
weight by gywt.
fre agegroup sex.
cro agegroup by sex.
cro agegroup by sex/cells=row.

weight off.
weight by nywt.
fre agegroup sex.
cro agegroup by sex.
cro agegroup by sex/cells=row.

weight off.

*Note that cases which lack data for the variable AGE or SEX will not be given a final
PSPW weight.

*Tidy up data.
delete variables LocID Location_first PopMale_sum PopFemale_sum
PopTotal_sum_mean wt1 Unity Unity_sum weightedsamptot weightedsamptot_sum
unweightedunity unweightedunity_sum weightedsamptot weightedsamptot_sum
unweightedunity
```

```
unweightedunity_sum countryXX.

*Sort datafile back into original order and save.
SORT CASES BY region cluster hhnum line.
SAVE OUTFILE='\\ Zimbabwe2006DHS_allnewvars2.SAV'.

*End.
```