



UNIVERSITÀ DEGLI STUDI ROMA TRE  
**DIPARTIMENTO DI ECONOMIA**

**HOW ARE WE DOING ON POVERTY  
AND HUNGER REDUCTION?  
A NEW MEASURE OF COUNTRY-LEVEL PROGRESS**

Ugo Gentilini and Patrick Webb

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Working Paper n° 68, 2006



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**Abstract.** *Progress toward eradicating poverty and hunger is patchy and generally too slow. New impetus is needed to meet internationally accepted goals, better informed by recent progress and challenges. The United Nations Millennium Development Goal No. 1 (MDG-1) aims to halve the proportion of people affected by poverty and hunger by 2015. The five indicators officially employed to assess progress toward MDG-1 reflect different deprivations of basic human capabilities, and progress in one domain does not guarantee progress in each of the others. Building on the statistical methodology of the widely-adopted Human Development Index, a new composite indicator – Poverty and Hunger Index (PHI) – that combines on all 5 measures together provides original insights on poverty and hunger trajectories. A number of findings emerge from the analysis, suggesting that the new index can play an important role in informing the policy debate on the prominence of all MDG-1 dimensions.*

**J.E.L.: O15; O19; O57; Q18**

**Keywords:** poverty, hunger, malnutrition, food insecurity, inequality, MDGs.

## 1. Introduction

In the year 2000, world leaders committed their nations to a new global partnership to eradicate human poverty based on “certain fundamental values (...) essential to international relations in the twenty-first century. These include freedom, equality, solidarity, tolerance, respect of nature and shared responsibility” (UN, 2000, p.2). Underpinning this Millennium Declaration are the Millennium Development Goals (MDGs) – a set of tailored benchmarks covering human deprivation in its various dimensions, including income, nutrition, health, education, gender, and environmental sustainability. These were derived as a synthesis of multiple unimodal summits and targets developed during the 1990s, including the World Summit on Children (1990), the World Summit for Social Development (1995) and the World Food Summit (1996). But MDGs were the first collective initiative that on the one hand, made explicit the cross-sectoral and synergistic nature of defined problems, but quantified time-bound targets to addressing them as a set, rather than individually<sup>1</sup>. As argued by *The Economist* (2005, p.67), “governments are having to frame their policies around specific intended outcomes rather than policy inputs. It is a bigger change than you might suppose”.

While governments begin to assess whether, and how, the Goals can be achieved, they assess policy priorities. Such priorities are (in theory at least) also driven by communities and civil society, for whom the Goals provided a tool for holding

authorities accountable. As a result, international development agencies have increasingly aligned their own policies and investments in terms of the MDG global framework (World Bank, 2005a; WHO, 2005; UNDP, 2003). Conceptually, the MDGs represent an overarching framework for promoting human development and expanding people's capabilities (UNDP, 2003).

Eight MDGs were defined, articulated around 18 specific targets, each of which should be achieved at global, regional and country levels. This paper focuses on the first MDG (hereafter referred to as MDG-1), the intent of which is "*to halve, by the year 2015, the proportion of the world's people whose income is less than one dollar a day and the proportion of people who suffer from hunger*" (UN, 2001, p.19). How to measure poverty and hunger becomes key to assessing accomplishments of such commitment. Although the 2000 UN resolution itself identified five official indicators to monitor progress towards MDG-1, trends have often been assessed with respect to separate individual indices (FAO, 2005; Chabra and Rokx, 2004; Deaton, 2003). Typically, trends in one MDG-1 indicator have been even confused with ones in another MDG-1 indicator (Pogge, 2004)<sup>2</sup>. And more generally, there seems to be a tendency of confining MDG-1 to just income poverty. With the words of the World Bank (2005c, p.2) "... prospects are promising for halving income poverty between 1990 and 2015—the *first* MDG". Hunger is often all but ignored in discussion of MDG-1, just as it has, for far too long, been all but invisible on the development agenda.

The intent here is to demonstrate that all five measures of MDG-1 matter – progress to meeting the Goal cannot and should not be measured using one or another indicator alone. Building on the statistical structure of the widely-used Human Development Index (HDI), a composite Poverty and Hunger Index (PHI) captures in a single measure all five MDG-1 official indicators and uses net gains or losses across these elements to assess progress since 1990 towards reaching the defined goal for 2015.

The paper is structured as follows. The next section lays out the basic differences among official MDG-1 indicators and briefly reviews their trends over the 1990s. Section three sets out the statistical methodology underpinning the proposed new indicator on poverty and hunger. A fourth section presents analytical results on countries performance in achieving the MDG-1. The final section presents conclusions on the value of this new methodological approach to the MDG agenda.

## **2. Conceptual Framework**

MDG-1 refers to poverty *and* hunger, not just one or the other, meaning that success in one without success in the other is not acceptable (UN, 2001). As a result, MDG-1 is built around 2 equally-important targets, both of which are tracked using multiple indicators. To underline this understanding, the United Nations Secretary-General argued that hunger and poverty are complex concerns

which must be overcome by addressing “the interconnected challenges of agriculture; healthcare; nutrition; adverse and unfair market conditions; weak infrastructure; and environmental degradation<sup>3</sup>”.

As mentioned earlier, in 2001 the UN General Assembly chose five official indicators to measure progress towards MDG-1, including the following (UN, 2001):

1. The proportion of people living in poverty (on less than US\$1/day);
2. The poverty gap;
3. The share of the lowest quintile in national income or consumption;
4. The proportion of people undernourished;
5. The prevalence of underweight among preschool children.

The first three indicators are derived from the UN Millennium Indicators Database and the World Bank<sup>4</sup>. The first MDG-1 index, also known as ‘poverty headcount index’, describes by the percentage of population living in households with consumption or income per person below an international poverty line (World Bank, 2005). In particular, such poverty line corresponds to US\$1.08 per day in 1993 PPP prices, which is easy to interpret but has the well-known deficiency that it tells us nothing about differences in the depth of poverty below the line (Chen and Ravallion, 2004). Hence the choice of the UN to also adopt the second MDG-1 indicator – the poverty gap – seems well taken as it gives the mean distance below the poverty line as a proportion of the poverty line itself

(where the mean is taken over the whole population, counting the non-poor as having zero poverty gaps). Past research has also scrutinized ways for weighting the poverty gap in such a way to make the marginal effects of downwards changes higher the lower the income levels (Sen, 1976).

The third MDG-1 indicator, the share of the lowest quintile in national income or consumption, is an indicator of inequality that measures the share that accrues to the poorest subgroup of a population when divided into quintiles. Therefore, and differently from the Gini index, this MDG-1 indicator does not capture general national inequality but rather focuses on inequality at the bottom end of the poverty distribution.

The above MDG-1 official indicators number four and five, undernourishment and underweight, are based on methodologies developed by the FAO and WHO/UNICEF respectively and – as for the other food and nutrition security indicators – their advantages and possible ways for strengthening them have been long debated in the literature (Coates *et al.* 2003; FIVIMS, 2002; Diaz Bonilla *et al.* 2000). The fourth MDG-1 indicator, the prevalence of undernourishment, builds on three main parameters (FAO, 1996): the national per-capita calories availability; a log-normal distribution of available calories across households; and a minimum threshold for the lowest acceptable per-capita availability of calories. Households with a per-capita availability of calories that fails to meet the minimum norm are classified as undernourished. Therefore, according to this

index the physical availability of calories (food) plays a crucial role in determining the extent of the population undernourished (Svedberg, 1999). Finally, the fifth official indicator – children under-5 underweight – signals a low weight relative to their age as compared to the mean value of the NCHS/WHO international reference. This ‘weight-for-age’ index, which is calculated at  $< -2SD$  from the reference, is a composite measure of stunting (low height-for-age) and wasting (low weight-for-height), reflecting respectively long and short-term malnutrition (UNSCN, 2004, 2000).

Based on these indicators, important gains were achieved during the 1990s in reducing poverty and hunger. According to Chen and Ravallion (2004), the number of people living in poverty (earning less than US\$1/day) declined by 129.5 million, thus affecting 1089 million people in 2001 (or 21.1% of the world’s population). Between 300 and 420 million of those are considered to be chronically poor, defined as living below the poverty line for more than 5 consecutive years (CPRC, 2004). The number of undernourished people also fell from 823 million to 814 million in developing countries during the 1990s (FAO, 2005)<sup>5</sup>. The number of preschool children underweight for their age similarly declined from 162 to 126 million (UNSCN, 2004). Such gains are important. They demonstrate that progress can be made despite population growth, devastating conflicts and natural disasters, and the number of challenges that the

agri-food sectors in most developing countries are facing (Webb and Rogers, 2003; Maxwell and Slater, 2003).

That said, global trends mask substantial spatial and temporal differences, and many countries – especially in Sub-Saharan Africa – are showing worsening trends in all those dimensions<sup>6</sup>. While these statistics make grim reading they also demonstrate that, on the one hand, the set of inter-locking targets for hunger and poverty are theoretically achievable, at least if appropriate policies are in place, funded on a sufficiently large scale, and aimed at achieving synergies (UN, 2005a,b); on the other hand, they also suggest that gains in one of these measures *may not* underpin progress in others.

For example, while empirical studies suggest that economic growth is a crucial element for poverty reduction (World Bank, 2005a,d; Dollar and Kraay, 2000), this is not automatic and does not translate in linear fashion into improvements for the poorest households (Ravallion, 2001). That is, inequality influences many dimensions of human development (Milanovic, 2003; Thorbecke and Charumilind, 2002). While the relationship between poverty and inequality is still largely debated, a growing body of evidence tends to suggest that better wealth distribution not only offers immediate benefits to the poor during the process of growth, but it also *accelerates* the poverty reduction rate in the longer run (Ravallion, 2005b; Bourguignon 2003). Recent econometric simulations conducted on several Latin American countries show that Brazil, for example, could reduce income poverty by 50% in 10 years if it achieved and maintained 3% annual

macroeconomic growth *as well as* an improvement of 5% in the Gini coefficient - but it would take the country 30 years to achieve the same objective if growth was not accompanied by inequality reduction (De Ferranti *et al.* 2003). Trade-offs for simultaneously achieving both poverty and inequality reduction seem less pronounced than often perceived – one won't be necessarily achieved at the expenses of the other<sup>7</sup> (Ravallion, 2005a).

Similarly, a considerable body of evidence documents that nutrition capital does not trickle down even where food availability and economic growth are high (Smith *et al.* 2005; Allen and Gillespie, 2001; Haddad *et al.*, 1997). For example, data show that at any given level of food availability, underweight rates can range from 2 to 70 percent (World Bank, 2006; Smith and Haddad, 2000). Though the relationship between poverty and malnutrition is potentially strong, if direct investments at all levels are not made on factors that determine the nutrition equation – for instance better food, care and health – then malnutrition is unlikely to decrease (Haddad *et al.*, 2003; Black *et al.*, 2003). In fact, significant malnutrition rates have not only been found to be present among non-poor households, but even among the richest quintiles in many countries, like India for example (World Bank, 2006; Gillespie, 2002; Appleton and Song, 1999). In other words, malnutrition is not a just a physical state, a snap-shot of current well-being; it is a process that includes but goes well beyond wealth creation and food production.

In other words, the causal factors of poverty and hunger are *multifaceted* and *inter-linked*. So while the multifaceted aspects suggest that sound policies should be tailored to address the specific problems underpinning each MDG-1 dimension, evidence also suggests that such specific policies act on an interlocked web of interactions between those dimensions. This indicates the overall benefits from the promotion of specific policies seem to be higher than the individual sum of the parts. Hence the scope to approach these problems also with a multidimensional lens (Alderman *et al.* 2005).

In fact, taken separately the indicators used to define the MDG-1 indicators provide a rich but sometimes fragmented picture; that is, they tell little about a country's net progress towards reaching all aspects of the overall *goal*. Measuring progress towards MDG-1 becomes particularly tricky when countries show different degrees and directions in their performance depending on the indicators chosen. For example, Figure 1 shows that Nepal ranks very differently against other countries depending on the indicators used: it is 69<sup>th</sup> (out of 83 countries considered in this analysis) according to the indicator on poverty level, 82<sup>nd</sup> based on the share of children who are underweight, 22<sup>nd</sup> when ranked by the share of population in the poorest quintile, but 41<sup>st</sup> in terms of national food availability. Given these disparate rankings, how well is Nepal doing in terms of achieving MDG-1 becomes hard to tell.

Figure 1.

Hence the need for a composite index to calibrate and complement the specific information provided by individual indicators, and to offer a more cohesive picture of countries' performance towards achieving MDG-1. As noted by DFID (2002), "action is required at international level to refine the methods used for measuring progress towards the Millennium Development Goal." The new method proposed here responds to that call.

### **3. Methodology**

Since their first appearance in 1990, the UNDP Human Development Reports (HDRs) have contributed greatly to expanding the concept of development--promoting it not simply in terms of economic parameters but as a process that enhances "people's choices, the most critical ones to lead a long and healthy life, to be educated and to enjoy a decent standard of living" (UNDP, 1990, p.10). A Human Development Index (HDI) was launched in the first HDR which now – after some modifications over the past decade – measures a country's achievements in three essential dimensions of human development: a) a long and healthy life (measured by life expectancy at birth); b) human capital (measured by achievements in education)<sup>10</sup>; and c) poverty (measured by GDP per capita converted to purchasing power parity in US\$). While the UNDP has also introduced gender and poverty-oriented composite indices, empirical

contributions have also expanded the HDI beyond the UNDP dimensions (Chakravarty, 2003; Anand and Sen, 2000, 1993; Desai, 1991). For example, integration of distribution-sensitive and inequality aspects can be found in Foster *et al.* (2005) and Hicks (1997), while considerable efforts have also been spent for ‘greening’ the HDI with environmental and sustainability considerations (Costantini and Monni, 2005; Neumayer, 2001).

There are a number of shortcomings with composite indices, including the selection of the single components, their weighting and possible compensations, and the loss of information when aggregating the single components (Noorbakhsh, 1998; Ravallion, 1996; McGillivray, 1991). These arguments are important, and should always be kept in mind when constructing an index. Notwithstanding these considerations, when transparent and conceptually coherent composite indicators can be an important tool for policy making, can stimulate a sense of competition (thereby enhancing national efforts to combat poverty and hunger), and – by being more “eye-catching” than a group of single indicators – they often are a powerful instrument for policy advocacy (OECD, 2003; Wiesmann *et al.* 2000). The next two sub-paragraphs lay out the statistical methodology employed for building the proposed new index.

### 3.1. Building the Poverty and Hunger Index

The statistical methodology of the new Poverty and Hunger Index builds on the HDI statistical structure. To generate the composite HDI an index is first created for each dimension. Minimum and maximum values are chosen for each dimension: for example, the life expectancy index is given a range from 25 to 85, while adult literacy rates range of 0 to 100. The HDI is then calculated as a simple average of the combined indices. Resultant results range from zero (the lowest level of human development) to 1 (the highest level), allowing for a ranking of countries on this scale (UNDP, 2004). The HDI basic equation is thus:

$$HDI = \sum_{i=1}^3 [(x_i - \min_i) / (\max_i - \min_i)] \cdot 1/3$$

where  $i$  is the HDI dimension (life expectancy, education, GDP per capita),  $x$  the actual value of the dimension and  $max$  and  $min$ , its parameters.

Building on the HDI statistical structure, the PHI uses the 5 official indicators established by the UN General Assembly (UN, 2001). Equal weights were given to the components because the UN resolution did not envisage a particular hierarchy among the indicators. Since they reflect different dimensions, and each is of equal importance, then equal weighting may be an appropriate and transparent approach.

The PHI is constructed as follows:

$$PHI = \sum_{i=1}^5 [(x_i - \min_i) / (\max_i - \min_i)] \cdot 1/5$$

To calculate these five ‘dimensions indicators’, minimum and maximum values (goalposts) are chosen for each underlying indicator (table 1).

Table 1.

This produces an index that takes all 5 separate measures into account simultaneously. Figure 2 below illustrates the calculation in relation to data for Armenia:

Figure 2.

As the HDI, the PHI represents a static value in a given point in time. In order to calculate progress towards achieving MDG-1, the PHI needs to be put in dynamic terms. The next sub-paragraph lays out the methodology for constructing the PHI’s measure of progress.

### **3.2. Building a Measure of Progress toward MDG-1**

A measure of progress (MoP) in poverty and hunger reduction involves scaling the 5 PHI dimensions above in terms of progress towards 2015 based on single components status in 1990 (the MDG baseline year). Therefore, the PHI and MoP can also be dealt with separately, thus providing interesting insights on the

difference emerging when analyzing countries' actual levels of poverty and hunger from their trends over time. These aspects will be further analyzed in paragraph 5.

Back to the methodology, the scaling of dimension  $i$  ( $S_i$ ) is derived by applying the usual formula involving an observation rate ( $2000i$ ), and maximum and minimum rates ( $2015i$  and  $1990i$  respectively):

$$S_i = (2000i - 1990i) / (2015i - 1990i)$$

While '1990' refers to data closest to year 1990 for all the five dimensions, '2000' stands for 'latest available data' in those dimensions (i.e. the data used to construct the PHI). Values range from 1 to  $-\infty$ , where reaching 1 means reaching the dimensional goal (e.g. halving poverty according to 1990 levels by 2015); 0.5 indicates being on track with the dimensional goal, as the '2000' check point approximately corresponds to half way to the goal; 0 is equal having made no progress, while negative numbers indicate a reversing trend. Note that value 1 represents an artificial limit: in the few cases where the dimensional value exceed 1 (i.e. when a country halved the rate already in 2000), corrections were made to equalize it to 1. In other words, value 1 represents *reaching* the dimensional goal, no matter if just reached or exceeded. For any given country, the corresponding MoP is calculated as the average of the scaled dimensions:

$$MoP = \sum_{i=1}^5 (S_i) \cdot 1/5$$

Thus, reaching MDG-1 is *quantified* in the form of a single number, value ‘1’ of the MoP. A value in the MoP of 0.5 indicates being on track to meet MDG-1 (or that 50% of the path towards MDG-1 has been completed); a 0 represents no progress at all; finally, negative numbers indicate a reversing trend. Note that MDG-1 is attained when – and only when – *all five* dimensional indexes are met (i.e. are equal to 1), hence at that point excluding possible compensations across the board between different components. As for other composite indicators, when MDG-1 is not achieved yet (values lower than 1) compensations are possible. The next section considers analytical results emerging from applying the PHI using country poverty and hunger data, while section four uses the MoP for assessing countries’ net position towards achieving MDG-1.

#### **4. Results**

Data for the 5 MDG-1 indicators were compiled for 83 countries which together account for around 90% of world poverty and 85% of global undernourishment. Applying the statistical methodology described above, the 83 countries for which data are available were ranked (see table 2).

Table 2.

Despite the data significantly cover most developing countries, the unavailability of figures for one or more of the five dimensions limits possible analysis,

especially when constructing trends. That's why one of the key recommendations of this paper, and that the use of the indicator itself may encourage, is to building and strengthening countries statistical capacity to regularly collect and publish reliable data on MDG-1 indicators, especially in countries such as Afghanistan, Angola, Eritrea, Haiti, North Korea, Somalia and Sudan (UN, 2005c; Prabhu, 2005; UNDP, 2003).

Based on available data, our nonparametric correlation analysis supports most of the research findings outlined in paragraph two (table 3). Correlation between underweight and undernourishment are among the lowest, mirroring the related but different aspects of deprivations (longer-term malnutrition and food kcal inadequacy respectively) they are supposed to capture. Poverty and poverty gap, highly correlated by construction, are only weakly correlated to inequality, the latter showing non-significant correlation with undernourishment and underweight.

### Table 3.

A possible explanation is that malnutrition also affects people in higher income quintiles. Compared with its components, the PHI performed well in terms of correlations with all the five dimensions, which can be considered a noteworthy comparative advantage of the newly created index. Interestingly, the PHI is more

sensitive to inequality than income poverty, and has even higher correlations than poverty itself in the domains of undernourishment and underweight.

We also compared ranking by PHI with the HDI for the same countries. While the two composites show a similar pattern, some important differences emerge (figure 4).

### Figure 3.

For example, according to the PHI Egypt ranks 4<sup>th</sup>, but is only 47<sup>th</sup> using the HDI – a difference of 43 positions. Similarly, the Kyrgyz Republic was ranked 5<sup>th</sup> in terms of PHI but 40<sup>th</sup> on the HDI (a difference of 35 positions), while Cote d’Ivoire records a difference of 31 places in the two rankings. Overall, more than 60% of these countries showed a difference of more than 10 ranking positions (30% had a difference of 20 positions or more). Interestingly, while there is considerable consistency in terms of the countries among the bottom ten of both rankings (6 countries are the same), there is more variation among the top ten (only 2 countries are the same). This is arguably because the PHI is correlated to the ‘worst’ manifestations of human deprivation (hunger and poverty), while two of the three HDI dimensions focuses more on human life and quality of living (Anand and Sen, 1996). This means that there is scope to fruitfully combine one index with the perspective of the other. For example, the third HDI dimension (low levels of income measured by GDP per capita) is an important common

factor among countries where poverty and hunger are widespread (figure 5). This also is in line with literature findings mentioned in paragraph two. But while the analysis indicates a quite clear trend, a net direction of causality is difficult to establish.

#### Figure 4.

The figure however, seems to support that part of the literature indicating that countries facing endemic poverty and hunger patterns are also more likely to find themselves trapped into an exponential vicious cycle of self-reinforcing deprivations, including lower GDP per-capita (Barrett and Swallow, 2006; UN, 2005a). The next paragraph tests countries' performance over the 1990s in achieving MDG-1.

### **5. Progress Towards MDG-1: Trends and Policy Underpinnings**

Monitoring countries' performances in reducing poverty and hunger over time requires data on at least two points in time. Following the UN Millennium Project, 1990 was taken as a base year against which to measure achievements to 2015, thus a baseline was established using data for the 5 official MDG-1 indicators collected as near as possible to 1990. Following Chhabra and Rokx (2004), at least four years were necessary between the underweight 1990 data and those constituting the PHI (the latest available data) to make them comparable. As a

result, it was possible to calculate the MoP for only 58 (for which all necessary data are currently available) of the original set of 83 countries; nevertheless those 58 countries account for almost 85% of the population of all developing countries (table 4).

#### Table 4.

Also here, table 5 and our nonparametric correlation analysis (table 5) suggests that progress in one domain does not equate to progress in another. Progress in underweight and undernourishment is not significantly correlated to the other dimensions.

#### Table 5.

In order to identify countries performance, we divided progress in three simple categories: ‘on track’ is defined as progress equal to, or greater than, the rate needed to meet targets by 2015; ‘progress, but not on track’ means progress towards the goal at less than the rate needed to meet the goal; ‘reversing’ signals countries are falling backwards. Of the 58 countries considered in this analysis, 31% performed at a rate sufficient to meet the MDG-1 goal on time, 24% recorded moderate progress, but 45% showed a “reversing” trend between 1990 and 2000. Among those with the best progress (net improvement across multiple indicators) were Mauritania, Tunisia and Chile (see table 6). By contrast, those with serious reversing trends include Venezuela, Uzbekistan and Laos. Nonparametric correlations are offered in table 7.

Table 6.

Some of these results are consistent with well-known development ‘success stories’, such as Chile, Vietnam, Indonesia, China, Malaysia, Brazil and Thailand. These are Asia Tiger economies (which continue to grow rapidly), plus countries that successfully embraced macroeconomic and institutional reforms during the late 1980s and 1990s, or that are members of the Cairns Group (i.e. strong agricultural exporting developing countries).

Other results are more surprising, even counter-intuitive. A few such examples are worth considering in more detail. Mauritania, for instance, emerges as the star performer in terms of net progress to MDG-1 (relative to where it stood in 1990). Little noticed perhaps, but Mauritania managed to reduce its poverty, undernourishment *and* poverty gap by 6 percentage points between 1990 and 2000. Moreover, its incidence of child underweight was reduced by more than 15 percentage points. For instance, it appears that appropriate choices and investments were made at the right time. In 1991/92 Mauritania established a pluralist democracy after years of military rule and instituted a series of economic reforms that managed to stabilize the economy and improve the judicial and legal environment for business activity. As a result, average annual economic growth exceeded 4 percent during most of the 1990s, inflation was defeated (brought down to around 6% for most of the decade), and the balance of payments swung

from a deficit of almost 30% in 1993 to a double-digit surplus by the end of the decade. However, importantly, there was conscious attention to ensuring pro-poor growth. Private sector activity was fostered and basic social services became a priority: enrolment in education rose from 46% in 1990 to around 90% today, and access to health facilities within 5km of home rose from 30% of the population to 70% by the end of the decade. The result was a shift in the Gini coefficient (a common measure of income inequality across a nation) fell from 0.50 in 1990 to around 0.38 by the end of the decade. While poverty and malnutrition remain concerns, Mauritania's performance on the 5 MDG-1 measures shows that progress is possible <sup>11</sup>.

Then there is Jamaica. Not often held up as a development model, Jamaica achieved major successes during the 1990s, particularly in reducing poverty (its incidence of poverty was halved from 28% in 1995 to 17% in 2000), largely by explicitly promoting pro-poor policies that succeed in controlling inflation, reducing food prices, enhancing real wages, building jobs in the private sector and enhancing social conditions. Dollar and Kraay (2000) have called Jamaica's policy framework "super-pro-poor", and the results place the country among the world's top performers in terms of progress made.

A third case worth considering is Azerbaijan, which cut its poverty by 7 percent since 1990, undernourishment by 15 percent, and levels of underweight by 3 percent. As in most other former Soviet states, the start of the 1990s saw a

massive fall in GDP, hyperinflation, currency depreciation. By 1995, Azerbaijan's gross national product was only 44% of its 1990 level, and household consumption is estimated to have declined by around 50% in the same period. However, 1995 saw a political and economic turn-around. Macroeconomic reforms were implemented on a large scale, land reform allowed for considerable redistribution of assets to the poor, GDP increased 250% between 1995 and 2001, maternal mortality fell from 37 deaths per 100,000 live births in 1995 to only 25 in 2001; infant mortality also fell from 23 (per 1,000 live births) in 1995 to 12 in 2001 (World Bank 2003).

It could be argued that Azerbaijan has done well because it enjoys oil revenues, but that simple argument does not hold. Azerbaijan's agricultural sector also made gains, and industrial output more than tripled in the latter half of the 1990s. What is more, there are many other oil-exporters who did not fare so well, including Nigeria (not on track to reach MDG-1), and Venezuela, which lies in last place overall--actually reversing away from the MDG-1 targets relative to where it stood in 1990.

Indeed, there are too many countries in which poverty and hunger are worsening; that is, for whom the trend towards MDG-1 targets is negative. These include Niger, Uzbekistan, Ghana and Armenia (Azerbaijan's neighbour). Certainly among countries making insufficient progress or no progress at all there is a large number who have suffered the effects of armed conflict during the period in

question (including Ethiopia, Uganda, Colombia, and Sri Lanka). And there are those countries that have suffered serious natural disasters or economic instability (Ethiopia again, Niger, Bangladesh and Philippines).

But that alone does not explain the trend. For example, Bolivia has a rich endowment of natural resources, and it embraced many of the same macroeconomic reforms as its neighbours in the 1980s and 1990s. Nevertheless, there has been little economic growth to show for it, 90% of the population continue to live below the poverty line, and more than 50% of the country's wealth is concentrated in the hands of the richest 20% of the income distribution. Agricultural output has (at least) improved since 1990, and access to health services was made free, resulting in health gains. But political and economic uncertainty appear to have constrained the pro-poor growth that was required.

One should also consider the case of countries like Ghana and Uganda—once darlings of the donor community. Ghana, for example, saw considerable gains during the 1980s, but a slow down following in the 1990s (World Bank 2001). Price volatility eroded purchasing power, GDP growth “barely exceeded the rate of population growth” (Coulombe and McKay 2003), and until the late 1990s there was limited attention to poverty reduction as opposed to wealth creation. Export-led agriculture did improve, but the wages of agricultural workers did not keep pace with decontrolled prices. What is more, spending on the social sectors (health, education, nutrition) remained low even by African standards. As a

result, the country's Gini coefficient deteriorated from 0.34 in 1992 to 0.4 in 2003. The most recent Poverty Reduction Strategy Process document (PRSP) highlights that "measures of social deprivation point to a grim state of vulnerability and exclusion in Ghana." (GoG, 2003), while Townsend and Gordon (2002) note that since "40% of the population [are] below the poverty line, a conclusion of mass poverty becomes indisputable." These analyses appear to bear out Ghana's MoP position among countries "reversing" away from MDG-1.

By contrast, Uganda's status is more nuanced. Uganda sits among the countries that are making progress towards MDG-1 but at a rate that will *not* allow them to meet the targets on time. Its economic performance has been impressive. During the 1990s, the economy more than doubled in size, with an annual growth rate exceeding 5%, inflation (over 100% per annum in the 1980s) came down to single digits since 1994, and agriculture has prospered. Nevertheless, according to a World Bank study (2001) it was not until the late 1990s that poverty reduction became an explicit concern of the government (a first Poverty eradication Action Plan was adopted in 1997), and a greater focus on improved health and education service delivery appears after 2000. As a result, Uganda has made progress, but "the number of poor people has not declined" (OECD/DAC, 2002), and "the benefits of Uganda's high growth have not been evenly distributed across the country" (UNECA, 2003).

In other words, without explicit attention to the needs and concerns of the poorest and hungriest sectors of the population, macroeconomic gains will not be sufficient to reach MDG-1. Which highlights the important fact that net progress in MoP terms does not mean that the government, or the international community, can sit on their laurels. On the one hand, a high MoP ranking (which measures good progress) does not mean that countries like Uganda no longer have serious poverty and malnutrition—they do, and that still demands urgent attention.

On the other hand, although some countries are close to reaching the MoP value of ‘1.0’ that does not mean that they have done equally well on all 5 counts of MDG-1. For example, only 13 of the countries analysed showed improvements in all five dimensions <sup>11</sup>. Interestingly, in most of the cases where a country is on track with the goal (an MoP higher than 0.5), it is the measure of inequality that lags furthest behind. For example, during the 1990s Chile made an outstanding performance in 4 out of five indicators, but its income inequality worsened (see figure 6). In other words, although Chile is closing in on the overall MDG-1 goal public action in the next decade (up to 2015) needs to be focused on tackling inequality, thereby improving its net position.

Figure 5.

By contrast, there are 13 countries (including Mauritania (Figure 7), Uganda, India and Pakistan) that have made substantial progress in *all five* components, including reducing inequality.

Figure 6.

This suggests that while a clear focus on reducing *both* hunger and poverty will be needed to achieve MDG-1, distributional concerns must have a higher priority in the policy-making agenda, as must net rates of progress. Overall progress will be hindered by inaction on anyone of the 5 components. Since all components are equally important a country that concentrates only on some of them cannot achieve MDG-1.

Figure 8 defines sets of countries in terms of both current level of poverty and hunger (PHI) *and* progress in their reduction (MoP). PHI levels are defined as low (less than 0.7), medium (0.7-0.8) and high (more than 0.8). Cut-off points were identified by looking at the way countries values were distributed. By plotting the two indexes high, medium and low priority countries can be identified (posted in the black, gray, and white cells respectively).

Figure 7.

A set of 27 countries in this list fall into the ‘high priority’ category—those with too slow (or reversing) trends *and* with low or medium current standing on the 5 indicators. This implies that appropriate policies, considerable financial resources, and appropriate human capital need to be invested in these priority countries for there to be even remote hope of them meeting MDG-1.

## **6. Conclusions**

The paper has presented a new composite index that uses the HDI statistical structure for capturing all the 5 MDG-1 indicators officially selected by the UN. Our correlation analysis between the index’s components supports the literature showing that poverty and hunger are related but different problems. Even the indicators usually employed for measuring hunger – undernourishment and underweight – reflect linked but different dimensions of human deprivation.

A measure of progress of the new index has illustrated countries’ performance over the 1990s. Several findings emerged, including the fact that the majority (55%) of the countries surveyed made some progress towards the Goal; however, too many countries are falling behind, many of them from Southern Africa. However, it is also worth recalling that the way MDGs were framed (% reductions) posed bigger challenges to poorest countries as opposed to the better-off countries.

That said, a stark contrast in performance between and within regions was also evident (for example between East Asia and Sub-Saharan Africa, and within Latin

America and the CIS). For instance, some of the poorest developing countries performed quite well, while some better-off developing countries are struggling or stagnant in achieving the Goal, including some high-economic growth countries. Only a limited number of countries made equitable progress on all five dimensions, and much more attention will be needed to the distributional character of poverty and hunger (inequality in access to food and actual consumption relative to need), if this aspect of MDG-1 is not to drag back progress on the other 4 dimensions. Further research may undertake a more nuanced lessons learned exercise for scrutinizing factors underscoring countries actual successes and failures.

By providing a powerful ‘eye catching’ idea of countries poverty and hunger situation and trends, the new Poverty and Hunger Index (PHI) and its Measure of Progress (MoP) can be particularly relevant for policy advocacy purposes, particularly within the MDG agenda at the international and national levels. Based on the national HDI model, further research may adapt the PHI and MoP to sub-national areas.

However, achieving MDG-1 does not mean *ending* poverty and hunger. For those countries who may reach the Goal by 2015, a MDG-phase II may be launched for eradicating the second half of poverty and hunger remaining.

Finally, many countries that signed the UN resolution on the MDG are still unable to publish recent figures in multiple time periods, or sometimes any data at all. In the wake of the principles of accountability and transparency this paper echoes to

the calls for strengthening or even building national statistical capacities to regularly provide reliable data for documenting progress on the MDGs.

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## Figures and Tables

Figure 1. *Nepal Ranking According to Separate MDG-1 Indicators (against 82 other countries for which full data are available)*

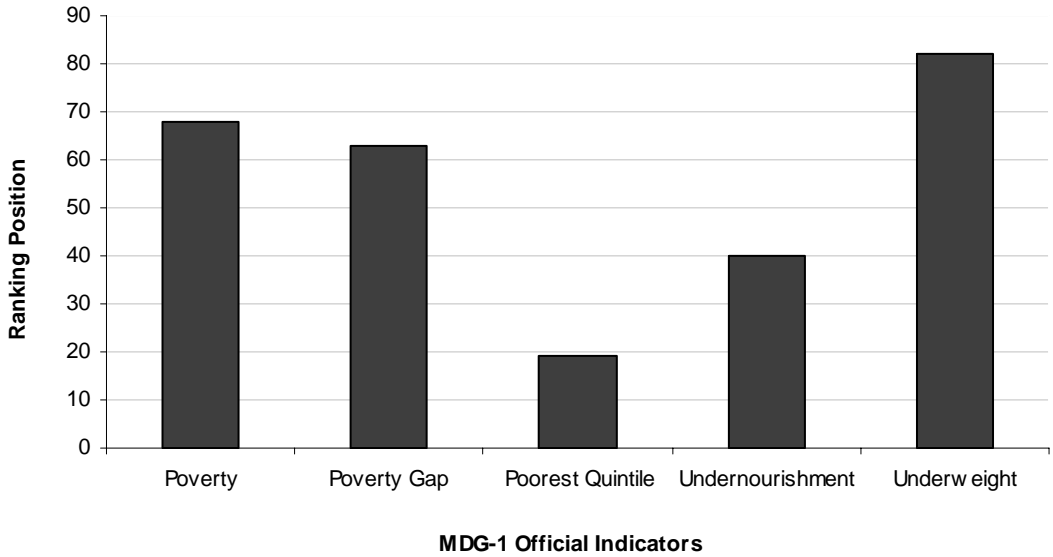


Figure 2. *Calculating the PHI for Armenia*

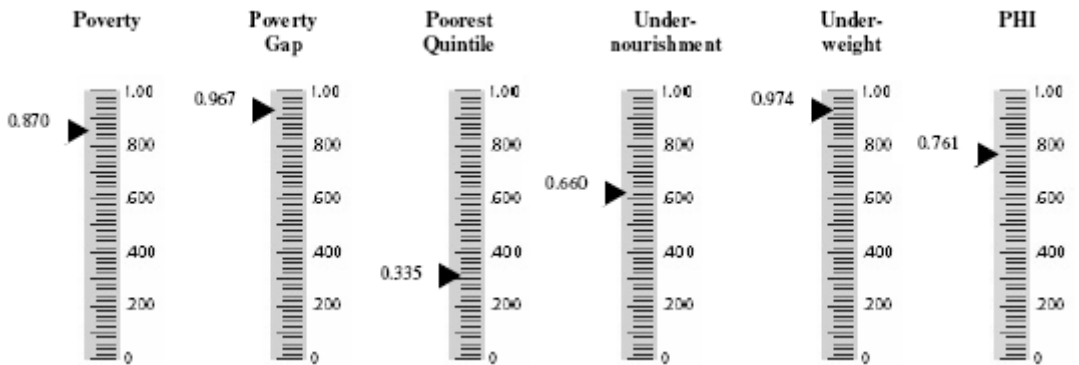


Figure 3. *PHI and HDI*

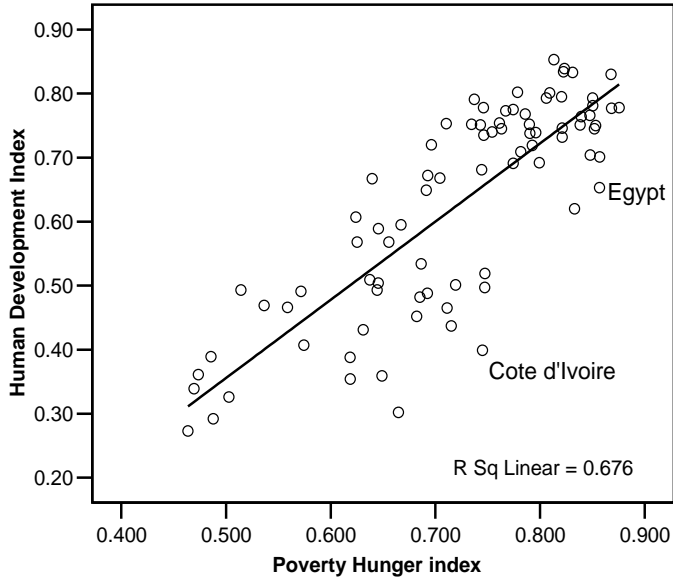


Figure 4. *PHI and GDP per capita*

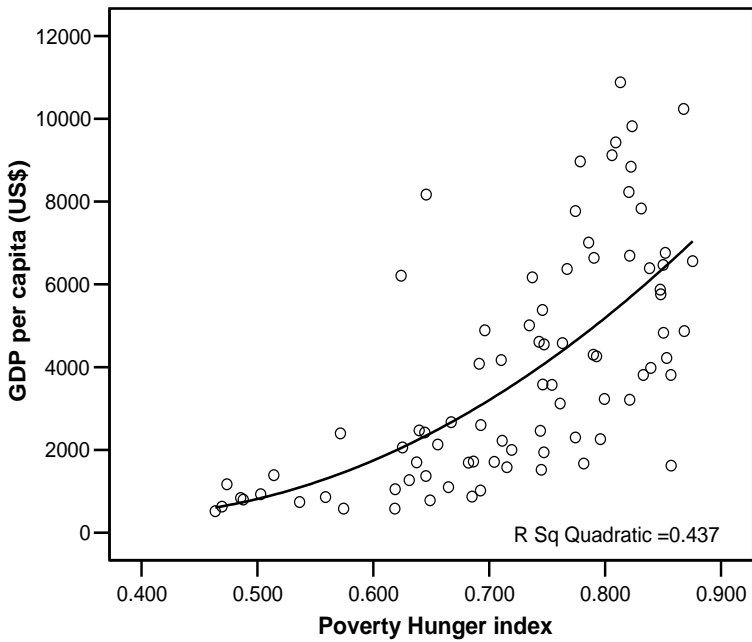


Figure 5. *Progress to MDG-1 Targets by Chile*

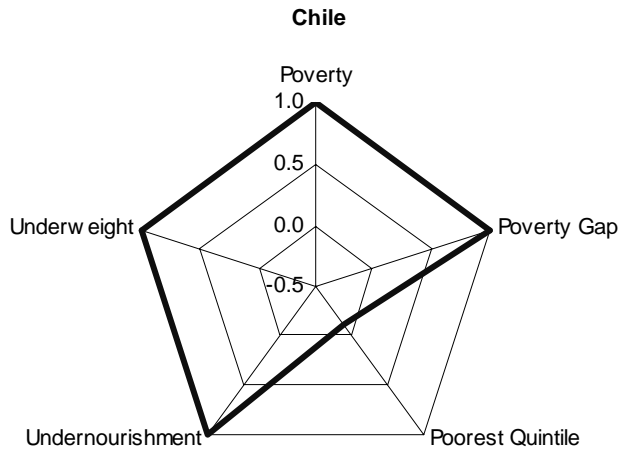


Figure 6. *Progress to MDG-1 Targets by Mauritania*

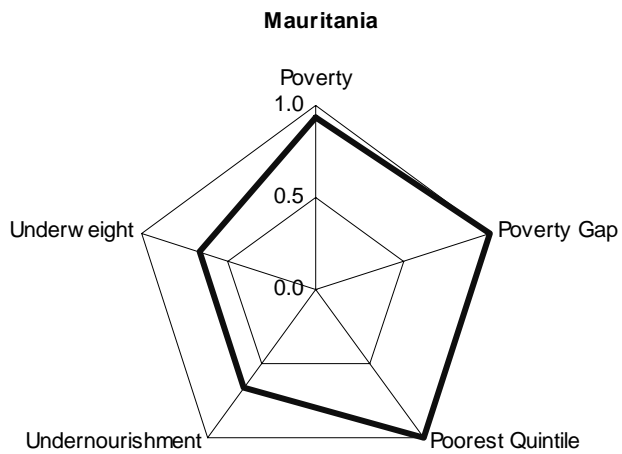


Figure 7. *Country Matrix by PHI and MoP*

	<i>High</i>		Costa Rica Egypt Jordan Morocco Romania Russia Turkey	Azerbaijan Chile Indonesia Jamaica Kazakhstan Malaysia Tunisia
<i>PHI</i>	<i>Medium</i>	Armenia Bolivia Colombia Cote d'Ivoire Mongolia Peru Sri Lanka Uzbekistan Venezuela	Cameroon Ecuador India Mexico Panama Philippines	Brazil China Dominican Rep. Mauritania Pakistan Senegal Thailand Vietnam
	<i>Low</i>	Burundi El Salvador Ghana Laos Lesotho Madagascar Niger Yemen Zambia Zimbabwe	Bangladesh Burkina Faso Etiopía Gambia Guatemala Honduras Nicaragua Nigeria Uganda	Kenya
		<i>Reversing</i>	<i>Slow</i>	<i>Fast</i>
		<i>MoP</i>		

Table 1. *Goalposts for calculating the PHI*

<i>Official MDG-I Indicators</i>	Maximum value	Minimum value
Proportion of population living on less than 1\$ a day	100	0
Poverty Gap	100	0
Share of the lowest quintile in national income or consumption	20	0
Proportion of population undernourished	100	0
Prevalence of underweight children	100	0

Table 2. *Country Rankings by PHI*

<b>Rank</b>	<b>Country</b>	<b>PHI</b>	<b>Rank</b>	<b>Country</b>	<b>PHI</b>
1	Romania	0.876	43	Bolivia	0.744
2	Ukraine	0.868	44	Paraguay	0.743
3	Croatia	0.868	45	Panama	0.737
4	Kyrgyz Republic	0.857	46	Peru	0.735
5	Egypt	0.857	47	Cameroon	0.719
6	Jordan	0.853	48	Senegal	0.715
7	Tunisia	0.852	49	Mauritania	0.711
8	Albania	0.850	50	Philippines	0.710
9	Macedonia FYR	0.850	51	Mongolia	0.704
10	Algeria	0.848	52	El Salvador	0.696
11	Kazakhstan	0.848	53	Honduras	0.693
12	Jamaica	0.839	54	Kenya	0.692
13	Turkey	0.838	55	Guatemala	0.691
14	Morocco	0.833	56	Lao PDR	0.686
15	Uruguay	0.831	57	Yemen	0.685
16	Chile	0.823	58	Gambia	0.682
17	Costa Rica	0.822	59	India	0.667
18	Azerbaijan	0.821	60	Burkina Faso	0.665
19	Iran	0.821	61	Ghana	0.656
20	Russia	0.821	62	Ethiopia	0.649
21	Argentina	0.813	63	Botswana	0.646
22	Trinidad and Tobago	0.809	64	Nepal	0.645
23	Malaysia	0.806	65	Lesotho	0.644
24	Indonesia	0.799	66	Nicaragua	0.640
25	Georgia	0.796	67	Bangladesh	0.637
26	Guyana	0.793	68	Rwanda	0.631
27	Dominican Republic	0.790	69	Cambodia	0.625
28	Turkmenistan	0.790	70	Namibia	0.624
29	Thailand	0.786	71	Mozambique	0.619
30	Uzbekistan	0.782	72	Malawi	0.619
31	Mexico	0.779	73	Tanzania	0.574
32	Brazil	0.774	74	Zimbabwe	0.572
33	Vietnam	0.774	75	Nigeria	0.559
34	Colombia	0.767	76	Madagascar	0.536
35	China	0.763	77	Uganda	0.514
36	Armenia	0.761	78	Mali	0.503
37	Sri Lanka	0.754	79	Niger	0.488
38	Swaziland	0.747	80	Zambia	0.486
39	Pakistan	0.747	81	Cen. African Rep.	0.474
40	Ecuador	0.746	82	Burundi	0.469
41	Venezuela	0.746	83	Sierra Leone	0.464
42	Côte d'Ivoire	0.745			

Table 3. *PHI and PHI Components: Nonparametric Correlations*

	People living on less 1\$/day	Poverty gap	Share of the lowest quintile	Undernourishment	Underweight
<b>Spearman</b>					
Poverty gap	.985(**)				
Share of the lowest quintile	.281(*)	.374(**)			
Undernourishment	.688(**)	.670(**)	.075		
Underweight	.651(**)	.580(**)	-.112	.550(**)	
PHI	.947(**)	.941(**)	.355(**)	.790(**)	.728(**)

\*\* Correlation is significant at the 0.01 level (2-tailed).  
\* Correlation is significant at the 0.05 level (2-tailed).

Table 4. *MoP and MoP Dimensions*

Country	MoP	Poverty	Poverty Gap	Poorest Quintile	Under- nourishment	Underweight
Armenia	-0.512	-1.714	-2.400	0.436	0.692	0.424
Azerbaijan	0.760	1.000	1.000	0.145	1.000	0.653
Bangladesh	0.197	0.000	0.159	0.069	0.286	0.471
Bolivia	-2.669	-2.667	-11.250	-0.571	0.500	0.642
Brazil	0.603	0.857	1.000	0.286	0.500	0.371
Burkina Faso	0.346	1.000	1.000	-0.364	0.190	-0.098
Burundi	-0.734	-0.444	-1.290	-0.709	-0.833	-0.393
Cameroon	0.383	0.938	1.000	0.435	0.485	-0.940
Chile	0.777	1.000	1.000	-0.114	1.000	1.000
China	0.631	0.970	1.000	-0.291	0.625	0.851
Colombia	-1.238	-3.333	-3.500	-0.500	0.471	0.673
Costa Rica	0.209	1.000	0.923	0.100	0.667	-1.643
Côte d'Ivoire	-0.584	-1.200	-2.000	-0.382	0.444	0.218
Dominican Rep.	0.710	1.000	1.000	0.429	0.148	0.971
Ecuador	0.048	0.200	-0.448	-0.778	1.000	0.267
Egypt	0.465	0.500	1.000	-0.023	0.500	0.346
El Salvador	-0.151	-0.480	-0.792	-0.294	0.167	0.645
Ethiopia	0.462	0.516	0.800	0.563	0.476	-0.043
Gambia	0.412	1.000	1.000	-0.182	-0.455	0.695
Ghana	-1.902	-3.000	-7.105	-0.582	1.000	0.176
Guatemala	0.354	1.000	1.000	0.476	-1.000	0.293
Honduras	0.258	0.895	1.000	-0.846	0.087	0.156
India	0.303	0.333	0.523	0.094	0.320	0.244
Indonesia	0.612	1.000	1.000	-0.069	0.667	0.462
Jamaica	0.646	1.000	1.000	0.310	0.571	0.348
Jordan	0.340	1.000	1.000	0.576	-1.500	0.625

Country	MoP	Poverty	Poverty Gap	Poorest Quintile	Under-nourishment	Underweight
Kazakhstan	0.626	1.000	1.000	0.275	-0.130	0.988
Kenya	0.677	0.647	1.000	1.000	0.500	0.239
Lao	-2.975	-4.500	-10.600	-0.438	0.483	0.182
Lesotho	-0.034	0.307	0.128	-0.929	0.588	-0.266
Madagascar	-0.222	-0.652	-0.080	-0.310	-0.114	0.044
Malaysia	0.679	1.000	1.000	-0.087	1.000	0.480
Mauritania	0.854	0.939	1.000	1.000	0.667	0.664
Mexico	0.280	0.750	0.195	-0.488	0.000	0.944
Mongolia	-1.052	-1.857	-3.226	-0.466	0.353	-0.065
Morocco	0.348	1.000	1.000	-0.030	-0.333	0.105
Nicaragua	0.127	0.125	0.340	-0.286	0.200	0.255
Niger	-1.039	-0.905	-3.440	-1.307	0.341	0.117
Nigeria	0.082	-0.373	-0.407	0.200	0.615	0.374
Pakistan	0.537	1.000	1.000	0.095	0.333	0.259
Panama	0.289	0.833	1.000	0.400	-0.476	-0.314
Peru	-1.649	-2.000	-7.100	-0.816	1.000	0.673
Philippines	0.262	0.500	0.571	-0.169	0.308	0.101
Romania	0.732	1.000	1.000	-0.217	1.000	0.877
Russia	0.244	0.000	0.000	0.649	0.000	0.571
Senegal	0.562	1.000	1.000	1.000	-0.087	-0.102
Sri Lanka	-0.379	-1.500	-0.857	-0.202	0.429	0.236
Thailand	0.572	1.000	1.000	0.179	0.571	0.108
Tunisia	0.807	1.000	1.000	0.034	1.000	1.000
Turkey	0.495	1.000	1.000	0.103	-0.030	0.404
Uganda	0.057	0.023	0.092	-0.265	0.417	0.017
Uzbekistan	-5.509	-9.333	-15.200	0.486	-4.500	1.000
Venezuela	-5.580	-7.333	-20.000	-0.333	-1.091	0.857
Vietnam	0.634	1.000	1.000	0.051	0.774	0.343
Yemen	-1.189	-3.000	-2.182	0.426	-0.118	-1.073
Zambia	-0.147	0.031	0.324	-0.308	-0.042	-0.741
Zimbabwe	-0.821	-1.394	-3.378	0.300	0.044	0.323

Table 5. *MoP and MoP Components: Nonparametric Correlations*

	People living on less 1\$/day	Poverty gap	Share of the lowest quintile	Undernourishment	Underweight
<b>Spearman</b>					
Poverty gap	.932(**)				
Share of the lowest quintile	.346(**)	.423(**)			
Undernourishment	.119	.092	-.150		
Underweight	.110	.071	.069	.159	
MoP	.881(**)	.920(**)	.458(**)	.305(*)	.269(*)

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).

Table 6. *Measure of Progress (MoP) Toward MDG-1*

On Track		Progress, but not on Track		Reversing	
Mauritania	0.854	Turkey	0.495	Lesotho	-0.034
Tunisia	0.807	Egypt	0.465	Zambia	-0.147
Chile	0.777	Ethiopia	0.462	El Salvador	-0.151
Azerbaijan	0.760	Gambia	0.412	Madagascar	-0.222
Romania	0.732	Cameroon	0.383	Sri Lanka	-0.379
Dominican Rep.	0.710	Guatemala	0.354	Armenia	-0.512
Malaysia	0.679	Morocco	0.348	Côte d'Ivoire	-0.584
Kenya	0.677	Burkina Faso	0.346	Burundi	-0.734
Jamaica	0.646	Jordan	0.340	Zimbabwe	-0.821
Vietnam	0.634	India	0.303	Niger	-1.039
China	0.631	Panama	0.289	Mongolia	-1.052
Kazakhstan	0.626	Mexico	0.280	Yemen	-1.189
Indonesia	0.612	Philippines	0.262	Colombia	-1.238
Brazil	0.603	Honduras	0.258	Peru	-1.649
Thailand	0.572	Russia	0.244	Ghana	-1.902
Senegal	0.562	Costa Rica	0.209	Bolivia	-2.667
Pakistan	0.537	Bangladesh	0.197	Lao	-2.975
		Nicaragua	0.127	Uzbekistan	-5.509
		Nigeria	0.082	Venezuela	-5.580
		Uganda	0.057		
		Ecuador	0.048		

## Endnotes

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<sup>1</sup> Also the International Development Goals devised in 1996 by the OECD set quantifiable targets (on which the MDGs themselves built upon), but they were widely criticized for being a brainchild solely of rich countries. On the contrary, the MDGs are a truly global commitment that recognizing the responsibility of developing countries – while placing more concrete demands on rich countries. Here the call of the UN Millennium Project recommendations for both bold reforms in developing countries and donors to match and gearing up their support to such efforts (UN, 2005a).

<sup>2</sup> In fact, the author compared the WFS target and the MDG-1 on the basis on income poverty rather than undernourishment data. Such an approach not only artificially confines the array of MDG-1 indicators to the mere income poverty (people living on less than 1\$/day), but also looks at the WFS target with the wrong lens (income poverty itself). So, while we tend to agree with one of the author's general conclusion that the WFS target may be more ambitious (because expressed in absolute terms) than the MDG-1 (expressed in relative terms), the article signals the confusion often surrounding the MDG-1 indicators.

<sup>3</sup> Kofi Annan., speech to heads of states and senior members of the international community at a presidential-level seminar on hunger, Addis Ababa, Ethiopia, July 5, 2004.

<sup>4</sup> Data on poverty and poverty gap derive from the United Nations Millennium Indicators Database ([http://millenniumindicators.un.org/unsd/mi/mi\\_goals.asp](http://millenniumindicators.un.org/unsd/mi/mi_goals.asp), accessed on April 13<sup>th</sup>, 2005), while the share of the poorest quintile figures are taken from World Bank's *World Development Indicators* and cross-checked with the *World Development Reports* (World Bank, 2005a-1997a, 2005b-1990b). Data for undernourishment derive from the FAO's *State of Food Insecurity in the World* reports (FAO, 2005-1999). Child malnutrition data derive from national government surveys and available in WHO's Global Database on Child Growth and Malnutrition (<http://www.who.int/nutgrowthdb/>). Data were cross-checked, and in some cases complemented by the UNSCN reports on the World Nutrition Situation (UNSCN, 2004, 2000), and by latest UNICEF *State of Children in the World* report (UNICEF, 2004) and WHO *World Health Report* (WHO, 2004).

<sup>5</sup> These numbers do not include Commonwealth of Independent States, in which 28 million people are estimated to be undernourished.

<sup>6</sup> In fact, much recent progress has been driven by East Asia where, for example, China alone reduced poverty by 160 million people and undernourishment by 50 million. By contrast, poverty increased by 85 million in Sub-Saharan Africa, as did undernourishment (by 35 million) and the prevalence of underweight children (by 20 million). In Eastern Europe & Central Asia undernourishment grew by 5 million in the same period, alongside a quite worrisome increase in poverty of about 15 million. Sometimes gains are not constant over time and that setbacks have been reported. For example, while during the 90s the number of undernourished people fall by 9 million, in the first half of the decade the numbers fell by 27 million. However, during the second half the numbers increased by 4 million a year, wiping out two thirds of the gains achieved in the first half of the decade.

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<sup>7</sup> It is important to highlight that in this regard we refer to relative inequality. Absolute inequality (e.g. in standard of living) may well increase during the process of growth (Ravallion, 2001).

<sup>8</sup> The education component of the HDI is itself a composite index that combines a country's adult literacy rate (with a two-thirds weight in the calculation), with the combined primary-secondary-tertiary gross enrollment ratio (one-third weight).

<sup>9</sup> Note that in order to accomplish the monotonicity property outlined by Chakravarty, (2003) (i.e. 'the higher value the better'), an additional operation [ $1 - (\text{dimensional value})$ ] was necessary for all but one index (share of the poorest quintile).

<sup>10</sup> Of course since 2000 Mauritania has suffered several significant natural disasters in the form of protracted drought and the major locust invasions of 2003/04. The extent to which such shocks impact on recent progress should be closely monitored.

<sup>11</sup> Only one country – Burundi – regressed on all five measures.

Finito di stampare nel mese di ottobre 2006, presso *Tipolitografia artigiana Colitti Armando* snc  
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