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MEASURING PROGRESS TOWARDS MDGs IN CHILD HEALTH:
SHOULD BASE LEVEL SENSITIVITY AND INEQUITY MATTER ?

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ABSTRACT

Measurement of achievement or progress towards the Millennium Development Goals (MDGs) should be suggestive of the issues involved in intertemporal comparison. Commonly, we observe that the measurement techniques such as simple differentials, rates and ratios are employed for comparisons and interpretations. But such chosen measures are insensitive to two very important and fundamental concerns. Firstly, such measures are not differentially sensitive to the base level of the indicator against which comparisons are made to comment on the progress or achievement. Secondly, it is observed that in most of the progress assessments and comparisons, without exception, the focus is on population averages thus ignoring the inherent inequalities therein. To incorporate these two concerns, a method is proposed and an illustrative application is provided to review the MDG achievements in child health across 32 developing countries. The adopted technique is effective for comparison and interpretation of progress and achievement as it augments the principles of equity as well as base-level sensitivity. More importantly, such an improved measure could help the policymakers to identify achievements in a more realistic manner and thus develop a comprehensive vision regarding social and economic achievements.

Keywords*:* MDGs; Level sensitivity; Inequality; progress assessment, child health

JEL Classifications: I 1, I 14

1. Introduction

In the year 2000, the General Assembly of the United Nations reaffirmed its commitment to global developmental objectives referred to as the Millennium Development Goals - MDGs (United Nations, 2000). This millennium declaration adopted eight fundamental development goals (further subdivided into eighteen time bound targets) to serve as a blueprint and schema of efforts. In order to monitor the progress towards the millennium declaration the United Nations system, including the World Bank and the International Monetary Fund and other agencies came together and agreed on 48 quantitative indicators. Since then several assessments have been undertaken to monitor achievement or progress towards MDGs. Most of these assessments commonly engage with measures such as simple differentials, rates and ratios for making intertemporal, interregional or intergroup comparisons[1]. But recent literature has become highly critical as regards employability of these measures for comparing, valuing and interpreting progress especially in the case of health indicators. Specifically, the problem is that these measures are insensitive to two very important and fundamental concerns viz. *level sensitivity* and *inequality aversion* which cannot be

1 See, for instance, *MDGs: India Country Reports-2005 & 2007* for a status report on MDGs in India and the methods used to evaluate the progress so far made from the base year 1990. This report is prepared by the Government of India (Ministry of Statistics and Programme Implementation and Central Statistical Organisation).

overlooked while engaging with progress evaluation (see, among others, Mishra and Subramanian, 2006; Wagstaff, 2002; Murray et al, 1999; Paul, 1996). In order to provide a theoretical justification for such concerns a brief structured account of these two pertinent issues would be useful.

First, let us discuss the rationale for sensitising intertemporal progress evaluation towards level differentials. Scholars have argued that while measuring progress, allowance should be made for the notion that a variation in the value of a physical indicator at a higher level is different from a similar variation in the value at a lower level ((Paul, 1996 p.667).This is called level sensitivity. For example, it is rather difficult (hence rewarding) to increase life expectancy by one year if it is already at a higher level, say 78 years, compared to situation where the levels are much lower, say 55 years. Similarly, in case of health failures (e.g. IMR), improvements could be relatively faster if the base-levels are higher (IMR=140) whereas it becomes increasingly difficult if base-levels are lower (IMR=50). There are sufficient reasons to observe differential reductions in health failures because of differences in levels of the phenomenon. For example, a carpet intervention such as completeness of child immunisation can prove to be more effective in reducing the higher levels of IMR in less developed countries (such as the Sub-Sahara African countries of Chad or Nigeria) whereas in countries with lower IMR (such as Egypt or Philippines) several other strategies along with these basic interventions would be required to reduce the IMR levels in similar proportions. In fact, it is widely acknowledged by demographers and public health researchers that the intricacies involved in child health gets more specific with demographic transition hence specialised interventions (and resources) are required to address these complexities. Apart from the resource related problems, often biological/ genetic factors also pose their own disadvantages towards child health, which furthers impedes in the way of rapid improvements at lower levels of the phenomenon. Because of such inherent issues, any given gaps or distances between two groups [time points] should be given more importance the lower the level at which the gap arises (Mishra and Subramanian, 2006).Another justification for rewarding achievements at a lower level could be that such improvements help to set new and improved benchmarks for the rest of population. For example, the Indian state of Kerala sets a leading example in child survival to be imitated by other Indian states that are plagued with higher health failures. Given the dynamics of improvement at differential levels, it would be inappropriate to discount this concern while evaluating progress based on targets such as halving the average health failures (mortality rates) within a given time constraint. Although it could be argued that the MDGs are mostly relevant for developing countries but many of these countries are at different stages of demographic transition and are marked with differently performing health systems hence attempts should be made to advance measures for MDG progress assessment that are level sensitive.

A second reason why simple differential measures are inappropriate to comment on achievement is that they fail to offer any insights on health inequality. There is sufficient ethical justification to incorporate equity concern in health performance evaluations. Equity[2] in health is usually recognized by policymakers and public health researchers to be an important policy objective and neglect of the distributional performance could lead to non-trivial consequences. For instance, we cannot discount the possibility that the progress toward the MDGs might be satisfactory but, at the same time, it may be compromising on the widening gap between the poor and the non-poor. Given the temporal nature of MDGs, it is expected that progress would be accompanied by

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2 Equity, as defined by the International Society for Equity in Health (ISEqH), is: *"the absence of potentially remediable, systematic differences in one or more aspects of health across socially, economically, demographically, or geographically defined population groups or subgroups"* (Starfield, 2001).

either an increased, decreased or constancy in the level of health inequality. Owing to these possibilities, an egalitarian society would ideally seek to attain progress with reduced health inequality or at the most would prefer progress with non-increased health inequalities. Nevertheless, as evident from cross-country studies, it is quite likely that inequality levels would increase with the improved performance and in such cases the society needs to prioritise and target its health policies and programmes so as to promote equity. The concern for equity imbibes the positive spirit that all systematic deprivations resulting in health failures should be eliminated from the society. Large number of studies (see, for instance, Kakwani et al, 1997; van Doorslaer et al, 1997; Humphries and van Doorslaer, 2000) have concluded that income differentials emerge to be one of prominent causes of health inequality and therefore, inclusion of income-related equity concern into measurement exercise not only enlightens the policymaker regarding trade-offs between inequality and mean improvements but also facilitates the formulation of equity-enhancing policies. Apart from empirical evidences, the theoretical support for such an argument arises from the fact that health production is influenced by factors such as consumption behaviour, education, environmental conditions and medical care and individuals with better endowments of these inputs have better health (Grossman, 1972). This in turn implies that the societal distribution should also play a decisive role in determining the population health and as these inputs are primarily a function of income (especially when public provisioning is poor) hence income dimension emerges as one of the immediate alternatives to comprehend health inequality. However, it must be noted that the central concern of the paper remains unaffected and probably would get strengthened if certain other dimension of health inequality were selected for the analysis. This is because impediments in the distribution of health (in all of its alternative forms) inflate social ill-fare and therefore monitoring of pertinent distributional issues would be helpful to resolve prejudiced health progress.

In a nutshell, the inert concerns for equity and level sensitivity should form an integral part of any progress assessment or evaluation exercise. Assessments sensitised for these fundamental concerns would invariably provide better means for comparison, valuation and interpretation of aggregates. With this motivation, the present paper adopts and integrates two distinct approaches to sensitise the summary measures towards these identified concerns. An elementary illustrative application is also provided in this paper for reviewing the MDG achievements in child health across 32 developing countries. The MDG target under evaluation is listed as *MDG Goal 4 – Reduce Child Mortality*. This target requires by 2015 the under-five mortality rates, infant mortality rates and proportion of one year old that are not immunised against measles are reduced by two-thirds from their given levels in 1990. With this backdrop, the rest of the paper is organised as follows: section 2 presents the methods adopted to arrive at an index of relative progress. Section 3 elaborates on the data sources used for the analysis while section 4 presents the results. Section 5 concludes.

2. Measuring Relative Progress

Many measures from the income inequality literature has been utilized in the literature on health for measuring and comparing the progress of health outcomes (Wagstaffet et. al. 1991; Mackenbach and Kunst 1997) For instance, the concentration index, measures and comapres the degree of social and economic inequality in a health variable – Like, in child mortality (Wagstaff 2000), health subsidies (O'Donnell et al. 2008), child malnutrition (Wagstaff et al. 2003), adult health (van Doorslaer et al. 1997), child immunization (Gwatkin 2003), and health care utilization (van Doorslaeret al. 2006). There have been advancements over this measure like the second extension to the concentration index as given by Wagstaff (2002) which was a general measure of health achievement, capturing inequality in the distribution of health and its mean as well. This modified concentration index

(Wagstaff 2002) helps us to see how the value of measured inequality changes with the attributes of inequality. However, such measures remain just as measures of inequality. The importance for the 'levels' of health is often forgotten while measures are developed and used in evaluating health variables. The paper tries to incorporate level based sensitivity also into the picture

In order to construct an index for progress evaluation a two-step procedure is adopted. Firstly, the indicator of average health failure is adjusted to reflect the income-related inequality and in the second step a level-sensitive differential measure is employed on this inequality-adjusted figure. To begin, let I be the (unadjusted) real valued index of health failure for a society or the average health failure then the interpersonal-inequality adjusted[3] measure of average health failure is given by I(v), (Wagstaff, 2002; Lambert, 1993);

(1) $I(v) = I\,[1-C(v)]$

where

(2) $$C(v) = 1 - \frac{v}{n.I}\sum_{i=1}^{n} I_i (1 - R_i)^{(v-1)}$$

I(v) could be defined as a weighted average of the health failure levels in a society where the failures among the poorer individuals gets a higher weight compared to the richer ones(Arokiaswamy and Pradhan 2011). The weightage mechanism ensures that if ill-health were concentrated among poorer individuals than the I(v) value would increase to suggest the deterioration of mean achievement in a given population. Thus the distribution of I(v) captures both the average health failures (I) and income-related health inequality (C(v)). Here, C(v) is the extended concentration index proposed by Wagstaff (2002) and is analogue of

3 This is similar to Sen's (1976) technique of discounting the mean national incomes by (1-G), where G is the Gini coefficient of income inequality.

Yitzhaki's (1983) extended Gini Coefficient. C(v), given by (2) is widely employed in the health inequality literature to measure interpersonal-inequality in health on the dimension of income (also see Wagstaff et al. 1991, Kakwani et al. 1997). In (2), I_i is the indicator of ill-health failure for the i^{th}individual,R_i is the i^{th} individual's fractional rank in the socioeconomic distribution. Underlying C(v) is a simple but interesting principle of defining equity. The principle involved postulates that the cumulative proportions of ill-health must match with the cumulative population shares and any mismatch between the two sets is regarded as inequity. In the index C(v), varying attitudes to inequality aversion are accommodated by employing an inequality-aversion parameter v; v>1 (see Appendix 1). By contrast, when (v = 1), everyone's health is weighted equally to say that inequalities in health do not matter (C(1) = 0). If v is raised above 1, the health of the poor persons is given a larger weight and the weight assigned to the health of people above the 55th percentile decreases. When (v = 2), the poorest person has his or her health share weighed by a number close to two. The weights decline in a stepwise manner, reaching a number close to zero for the richest person. For (v = 6, 8) respectively, the weight assigned to the health of persons in the top two quintiles and those in the top half of the income distribution is virtually zero (Uthman 2009). The C(v) ranges between +1 and -1 and it takes negative values when ill-health outcomes (mortality) are disproportionately concentrated among the poor. If the indicator represents good health, for example in the case of full immunization, a positive concentration index shows that full immunization is concentrated among the rich and thus children from poor households face a constraint in obtaining full immunization, compared to their richer counterparts. The larger the value of the CI the greater is the degree of inequality (Arokiaswamy and Pradhan 2011).

Now the inequality-adjusted mean outcome is sensitised for level differentials. As discussed earlier, the prime concern revolves around the reasonable notion that a given hiatus between two groups should acquire a greater salience the lower the level at which the hiatus arises (Mishra and Subramanian, 2006). This proposition assumes a close resemblance with concepts such as the transfer-sensitivity property of the poverty index (Kakwani, 1993; Foster, 1984; Sen, 1976) or Paul's 'modified' human development index (Paul, 1996). Given that I(v) is the indicator of inequality-adjusted health failures, let us consider any two countries or regions (say, S=A, B) and allow $d^S(t_1, t_2)$ to be the differential measure of the inequality-adjusted indicator I(v) in regions (S=A, B) for any two time points ($t= t_1, t_2$). Now $d^S(t_1, t_2)$ is required to be a declining function of the level of indicator which can be formally stated in the form of a couple of level sensitivity axioms (Mishra and Subramanian, 2006);

Difference Based Level Sensitivity (*Axiom DBLS*): If $I^A_{t_1}(v) - I^A_{t_2}(v) = I^B_{t_1}(v) - I^B_{t_2}(v) > 0$ and $I^A_{t_1}(v) < I^B_{t_1}(v)$ & $I^A_{t_2}(v) < I^B_{t_2}(v)$ then Axiom DBLS requires that $d^A(t_1, t_2) > d^B(t_1, t_2)$. Further, to take account of worsening situations (regress) we add that if $I^A_{t_1}(v) - I^A_{t_2}(v) = I^B_{t_1}(v) - I^B_{t_2}(v) < 0$ and $I^A_{t_1}(v) < I^B_{t_1}(v)$ & $I^A_{t_2}(v) < I^B_{t_2}(v)$ then Axiom DBLS requires that $d^A(t_1, t_2) < d^B(t_1, t_2)$.

Ratio Based Level Sensitivity (*Axiom RBLS*): If $I^A_{t_1}(v)/I^A_{t_2}(v) = I^B_{t_1}(v)/I^B_{t_2}(v)$ and $I^A_{t_1}(v) < I^B_{t_1}(v)$ & $I^A_{t_2}(v) < I^B_{t_2}(v)$ then Axiom RBLS requires that $d^A(t_1, t_2) > d^B(t_1, t_2)$.

According to axiom DBLS, if across two regions and two time points if there has been a similar decline (increase) in health failures in absolute terms and across these time points one region consistently possesses lower health failures compared to the other region then the differential measure for the region with lower failures should be greater (lesser) than the region having higher failures. With similar conditions, axiom RBLS says that if the health failures in both the regions have declined in equal proportions then also the differential measure should be greater for the region with lower failures. To this effect, Mishra and Subramanian (2006) advance a measure, written as (3), that satisfies axioms DBLS and RBLS.

$$(3)\quad d^S(t_1, t_2) = \frac{[U^S_{t_1}(v)]^\alpha}{[U^S_{t_2}(v)]^{\alpha+1}}, \alpha > 0$$

But in more recent contributions, Mishra (2007) and Nathan and Mishra (2008) suggest certain improvements. Especially, the latter proposes a measure that satisfies two other important axiomatic properties of *Normalisation* (N) and *Monotonocity* (M). Axiom N says that the differential measure, $d^S(t_1, t_2)$, should lie between zero and one such that it attains a value of zero if there is no differential across time and is computed to be one when the temporal differential is the highest. Axiom M ensures that the measure of inter-temporal differential is higher (lower) if one of the regions remaining constant at a particular level of failure; the other changes so that the absolute gap increases (decreases).

Since we are dealing with situations which can show improvements as well as there are possibility of situation to worsen allowance has to be made in the measure for such possibilities as well. Therefore, for practical purposes, if then the differential measure, henceforth relative progress index (RPI), which satisfies all the mentioned condition is given by (4) Nathan and Mishra (2008);

$$(4)\quad RPI = d^S(t_1, t_2) = \left(1 - \frac{I^S_{t_2}(v)}{I^S_{t_1}(v)}\right)\left(1 - I^S_{t_2}(v)\right), I^S_{t_2}(v) > 0$$

Whereas, in cases where, $I^A_{t_1}(v) - I^A_{t_2}(v) = I^B_{t_1}(v) - I^B_{t_2}(v) < 0$ then we employ the RPI given by differential measure (5)

$$(5)\quad RPI = d^S(t_1, t_2) = \left(1 - \frac{I^S_{t_1}(v)}{I^S_{t_2}(v)}\right)\left(I^S_{t_1}(v) - 1\right)$$

It should be clear that the ranking of the regions in descending order of the differential measure $d^S(t_1, t_2)$ given by (4) and (5) or the RPI, will place the better performing region at the head of the list. This simple measure of relative progress is used in the subsequent analysis to monitor the progress made by selected developing countries towards MDGs in child health. Using a baseline of 1990, the MDG targets in child health states that by 2015; the infant and under-five mortality and proportion of one-year old children with non-receipt of measles vaccination to be reduced by two-thirds. Since the MDG in child health is composed of three quantitative indicators, it would be useful to arrive at a single composite index of relative progress in child health MDGs by taking a simple average of the RPI's (three differential measures, $d^S(t_1, t_2)$) for each of the quantitative indicator. Formally, RPI_I: $d_I^S(t_1, t_2)$, RPI_C: $d_C^S(t_1, t_2)$, RPI_M: $d_M^S(t_1, t_2)$ denote the differential measure assessing the relative performance for a region and across the indicators of infant mortality, under-five mortality and non-receipt of measles vaccination respectively. The overall inequality-adjusted and level-sensitive index of relative performance (RPI*) is now obtained as a simple of its component-wise adjusted differential measures:

(6) $RPI^* = (RPI_I + RPI_C + RPI_M)/3$

This RPI* is in no way exempted from the generic difficulties of aggregations that conceals the differences owing to the constituent elements. Nevertheless, aggregation makes it possible to present a consolidated picture of progress towards MDGs in a simple and convenient manner. In view of this, the subsequent empirical exercise would attempt to value, compare and interpret both the disaggregated and aggregated picture of progress and also contrast it with the results obtained through a simple but frequently used differential measures of percentage reduction which we call here as failure reduction rate. Specifically, this failure reduction rate is a simple percentage reduction and is defined in the paper as (7);

(7) Failure reduction rates: $$\left[1-\left(\frac{I^S_{t_2}(v)}{I^S_{t_1}(v)}\right)\right]*100$$

For the inequality adjustments performed here we have chosen v=2 and so (1) and (2) is actually computed for I(v=2) and C(v=2). In case of the indicator of measles, the information on its coverage and inequalities in coverage was provided. It creates a minor problem in the sense that measles information is provided in terms of a good health indicator, while the proposed RPI is specifically designed for health failure indicators. To overcome this problem, the inequality-adjusted measles coverage level were first obtained using (1), I(v=2) and thereafter the complement of (1), i.e [1-I (v=2)], was taken to represent failures in measles coverage. This information was then used to construct RPI_M. Further, the information based on survey year closest to 1990 is selected as the base level information and year and the most recent survey information is taken as midterm MDG monitoring point. However, the time points of information collection for the indicators may differ according the year of survey so we standardise the indices (4), (5) and (7) by dividing them with the number of years lapsed between the two information points.

3. Data

The World Bank, in collaboration with the Dutch and Swedish Governments, has sponsored this report for fifty-six developing countries in order to promote basic information about health inequalities within countries. These reports form one of the better sources to undertake a cross-country analysis and this paper makes use of these Health, Nutrition and Population (HNP) country reports[4] for developing countries to summarize the socio-economic inequalities in HNP (Gwatkin et al, 2007).

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4 These reports can be found at *www.worldbank.org/povertyandhealth/countrydata.*

Specifically, the information provided on the indicators of infant and under-five mortality and proportion of one-year old children with non-receipt of measles vaccination is used here. One of the interesting features of the report is that it provides figures dealing with health inequalities (measured using concentration index) across economically defined quintiles of the population for each indicator. The information provided in these reports are based on the analysis of data collected through Demographic and Health Survey (DHS) programme which has given a common format of information collection and enables comparability across the selected countries. The DHS programme is undertaken by Macro International with support from the U.S. Agency for International Development and other organizations. It has conducted surveys in almost seventy-five countries across Africa, Asia, Latin America, the Middle East, and the former Soviet Union. Economic status of a household is determined by using the information available on household assets and these served as the basis for constructing a single, consolidated index of living standards, using principal components analysis (PCA) to generate a weight for each item covered by the questions. The resulting household scores were standardized in relation to a standard normal distribution with a mean of zero and a standard deviation of one. All individuals usually present in each household were assigned the household's standardized wealth index score, and all individuals in the sample population were ranked according to that score. The sample population was then divided into quintiles of individuals, with all individuals in a single household being assigned to the same quintile (see Gwatkin et al, 2007). For our analysis we have considered only those countries that had information regarding the indicators for at least two time points and therefore the analysis is restricted for 32 developing countries only. The indicators considered here are in terms of IMR, U5MR and Measles vaccination. Infant mortality rate was computed as number of deaths to children under 12 months of age per 1000 live births based on experience during last ten years preceeding the survey. Similarly the U5MR represented number of deaths to children under five years of age per 1000 live births based on experience during the ten years preceeding the survey. Further, the measle vaccination coverage corresponded to percentage of children who had received a dose of measles vaccine by the time of the survey.

4. Results

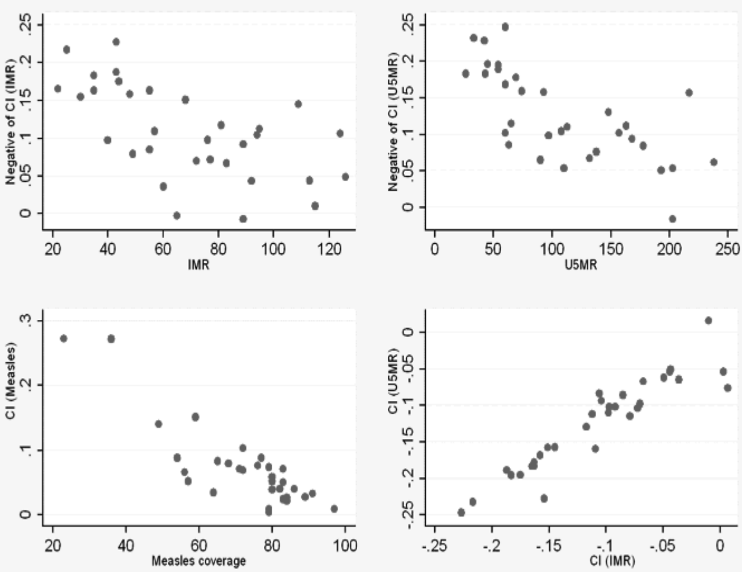
In this section, we shall attempt to interpret progress towards MDGs without undertaking anything in the nature of a discussion on the levels and causes of cross-country child health deprivations. Nevertheless, for details, the relevant cross-country indicators are provided in the appendix in the form of self-explanatory tables. Further, in this section, the results obtained through the proposed indicator and simple progress measure of percentage reduction in health failures is contrasted. As we know that the MDGs take into account the performance improvement since 1990 but due to information constraints, we would set the base differently depending upon data availability. Because of this limitation, we have standardised both the differential measures for survey period variations so as to make it comparable across countries. Now we proceed to highlight some of the results for the three selected indicators namely, IMR, U5MR and non-receipt of measles vaccination.

In general, it could be observed that there is a high degree of correlation between the three health indicators. The Pearson coefficient for correlation between IMR and U5MR is 0.970 (significant at one percent level). The correlations coefficient for Measles coverage with IMR is -0.621 and with U5MR is -0.666 and both are significant at one percent level. Perhaps, here the case of Zambia deserves a special mention because despite a good coverage for measles vaccination yet the levels of IMR and U5MR levels are very high. From a regional perspective, the base-level infant and under-five deaths are noted to be unacceptably higher (in excess of 100 and 200 in IMR and U5MR, respectively) in most of the countries of Sub-Saharan Africa. It is disconcerting to note that even after a decade (or so) the progress towards MDGs is disappointing as most of these countries have disquieting proportions of infant deaths. In some cases like(Nigeria, Cameroon and Chad), these rates have increased between the two survey periods. However, Namibia, with its better and improving IMR (62 in 1992 to 40 in 2000) and U5MR (92 in 1992 to 60 in 2000) profiles an exception for this region. In other regions of the globe, the prospects of infant and child survival have improved since the 1990s. For instance, the Middle-East countries of Egypt and Morocco have shown greater improvements in a shorter time frame of 5 and 8 years, respectively. The improved IMR and U5MR in countries belonging to the South Asian region, particularly India and Bangladesh and Latin American countries are also indicative of progress. Apart from the survival outcomes, there is considerable scope for widening the immunisation coverage against measles. Particularly, the coverage is found to be lower among many of the Sub-Saharan countries and even among Asian and Latin American countries, particularly India and Bolivia.

Figure 1 provides a snapshot of the degree of health inequality [C(v=2)] vis-à-vis its levels for the three selected indicators (see, for details, Table A1, A2 and A3 in appendix). The purpose here has been to view inequality response to the levels of the indicator. The two failure indicators IMR and U5MR show a consistent negative gradient of concentration with the levels i.e. concentrations are higher at lower levels and vice versa. Although the scatters are not quite similar, patterns do confirm and strength of this association is better in case of U5MR. It is immediately discernible from these scatter plot that almost all the C(v=2) values disfavour the poor. For instance, the negative C(v=2) values for IMR and U5MR indicate a greater concentration of child and infant deaths among the poorer sections of the society. In case of measles coverage, which is indicates good-health, the C(v=2) values are noted to be positive which again implies that the bulk of immunised children belong to the richer sections of the society. Nevertheless, the extent of pro-rich inequalities varies considerably across the selected countries and over time. The Latin American countries of Peru and Bolivia had higher levels of inequality in infant deaths during mid-1990s whereas most of Sub-Saharan countries possessed lower levels of inequalities. Also, the overall trend in health inequality is largely consistent with the cross-section evidence that increases in average incomes are associated with increases in the magnitude of health inequality (Wagstaff, 2002a). An example to this effect could be the case of Vietnam where inequality has increased from [-0.143] in 1997 to [-0.217] in 2002 or Nicaragua where the inequality level of [-0.094] in 1997-98 has almost got doubled [-0.183] in five years. In this regard, the performance of Egypt and Turkey deserves a special mention, as it has been able to reduce the overall inequality level in the past few years.

Another feature worth noting in Figure 1 is that the observed variations in health inequalities form a gradient against the overall levels of the phenomenon. For instance, the incidence of infant deaths is higher in Sub-Saharan region and therefore the inequality levels in

Figure 1: (Negative of) concentration index values and levels of IMR, U5MR and Measles



these countries also get conditioned accordingly. Similarly, several other countries with lower IMR and U5MR levels have a higher degree of inequality. It implies that there is a less likelihood of locating a country that fares well in terms of level as well inequality and greater possibility of finding countries doing well in one parameter and performing poorly on the other. Owing to such difficulties posed due to evaluation based on a single dimension (either level or inequality) it is desirable to capture these two dimensions in an overall summary index (Wagstaff, 2002). Although differing attitudes to inequality aversion could be incorporated as per the methodology discussed above, yet for simplicity, we adjust average health outcomes with the complement of standard concentration index which has an inequality aversion parameter of v=2. This achievement index, I(v), would suggest that if the progress towards MDGs have been pro-poor then it should register greater proportional improvements. The importance of such adjustment is evident from the comparison of the unadjusted and the adjusted health outcomes where the latter gets inflated in almost all the cases (see the I(v) values in the Tables provided in the appendix). If we attempt a comparison of [I(v)/I] figures, it is easily noticed that irrespective of the survey period, the child survival indicators for most of the countries gets inflated by a factor no less than 10 percent. This startling figure has a greater relevance because it brings forth the real facet of deprivation in the society, which otherwise remains hidden beneath the *average* of an indicator. It also indicates that the benefits of the progress are largely confined to the richer sections of the society. A comparison of health deprivation after incorporating the income dimension thus underlines the enormity of the problem and helps to refine policy. With this brief structured account of cross-country health inequalities, we now turn to the central task of the paper namely to monitor target achievements and thereby comment on relative progress of different countries.

As we know that the MDG targets are to reduce child health failures in the selected indicators by two-thirds or 66 percent which gives no consideration to the fact that stretching health improvements beyond a certain point requires larger efforts. In terms of unadjusted IMR and U5MR, the better performing countries are India, Namibia, Morocco, Egypt and Turkey and these countries have achieved one-third reduction or almost half of the required 66 percent reduction (see Tables A1 and A2 in appendix). But countries like Kazakhstan and some of the Sub-Saharan countries (Zimbabwe, Kenya and Nigeria) are showing regressive or negative achievements (or larger failures) both in terms of adjusted and unadjusted outcomes. The performance of Kazakhstan and Nigeria worsens a great deal especially in case of adjusted IMR. Moreover, once we exclude these poor performing countries, the MDG performance of other countries could be termed at the best as satisfactory. In case of measles coverage, it is encouraging to note that Egypt has already achieved the MDG target both in terms of adjusted and unadjusted outcomes whereas Morocco, Ghana and Mozambique have registered considerable progress (see Table A3 in appendix). Among other countries, Kazakhstan, India, Nepal and Dominican Republic are close to achieving one-halve of the prescribed target. However, in almost two-thirds of the selected countries the progress towards MDGs is noted to be relatively slower or negative.

But the above discussed target attainment in terms of percentage reduction is unable to distinguish between the progress towards MDGs in cases where the proportionate achievements are similar but the health deprivation levels are varying. For instance, an equal reduction in U5MR in Bangladesh and Indonesia by 24 percent is not appreciative of the fact that the latter country was able to reduce its U5MR from a much lower level than of the former country. Notwithstanding the income growth, inherently this implies that Indonesian health system has been able to sustain general interventions and now is increasingly able to address more specific causes. Hence missing out on such intricacies is rather unjustifiable while comparing the progress in isolation with the levels of the phenomenon.

Table 1: Measurement of relative progress using equity and level sensitive differential measure

Country	*Max.*	**IMR**			**U5MR**			**Measles**			**Overall**		
	RPI	*RPI*	*RPI/Yr*	*Rank*	*RPI*	*RPI/Yr*	*Rank*	*RPI*	*RPI/Yr*	*Rank*	*RPI**	*RPI*/Yr*	*Rank**
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)	(xii)	(xiii)	(xiv)
Bangladesh	1	0.182	0.026	13	0.210	0.030	11	0.140	0.020	13	0.177	0.025	14
Benin	1	0.060	0.012	23	0.070	0.014	20	0.110	0.022	11	0.080	0.016	17
Bolivia	1	0.110	0.022	16	0.100	0.020	16	0.260	0.052	3	0.157	0.031	9
Burkina Faso	1	0.140	0.014	21	0.030	0.003	25	-0.020	-0.002	22	0.050	0.005	25
Cameroon	1	0.013	0.001	26	0.000	0.000	27	0.221	0.017	17	0.078	0.006	24
Chad	1	-0.049	-0.007	27	0.007	0.001	26	0.007	0.001	20	-0.012	-0.001	27
Colombia	1	0.250	0.025	14	0.280	0.028	12	-0.330	-0.033	29	0.067	0.007	23
Dominican Rep.	1	0.288	0.048	3	0.288	0.048	5	0.258	0.043	6	0.278	0.047	3
Egypt	1	0.260	0.052	2	0.280	0.056	1	0.750	0.150	1	0.430	0.086	1
Ghana	1	0.190	0.019	18	0.200	0.020	17	0.490	0.049	4	0.293	0.029	12
Guatemala	1	0.140	0.035	7	0.180	0.045	6	0.140	0.035	10	0.153	0.038	5
Haiti	1	0.020	0.004	25	0.020	0.004	24	0.100	0.020	15	0.047	0.009	19
India	1	0.338	0.026	12	0.351	0.027	13	0.260	0.020	14	0.316	0.024	15
Indonesia	1	0.168	0.028	11	0.222	0.037	8	0.030	0.005	19	0.140	0.023	16
Kazakhstan	1	-0.300	-0.075	32	-0.112	-0.028	30	0.144	0.036	9	-0.089	-0.022	29
Kenya	1	-0.110	-0.011	29	-0.280	-0.028	29	-1.130	-0.113	32	-0.507	-0.050	32
Malawi	1	0.152	0.019	19	0.120	0.015	18	-0.104	-0.013	28	0.056	0.007	22
Mali	1	0.070	0.014	22	0.060	0.012	21	-0.020	-0.004	24	0.037	0.007	21
Morocco	1	0.240	0.020	17	0.324	0.027	14	0.528	0.044	5	0.364	0.030	10
Mozambique	1	0.138	0.023	15	0.204	0.034	9	0.516	0.086	2	0.286	0.048	2
Namibia	1	0.280	0.035	6	0.400	0.050	3	0.144	0.018	16	0.275	0.034	8
Nepal	1	0.150	0.030	9	0.120	0.024	15	0.190	0.038	8	0.153	0.030	11

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Nicaragua	1	0.141	0.047	5	0.090	0.030	10	0.030	0.010	18	0.087	0.029	13
Nigeria	1	-0.195	-0.015	30	-0.481	-0.037	32	-0.559	-0.043	30	-0.412	-0.032	30
Peru	1	0.120	0.030	10	0.032	0.008	22	-0.016	-0.004	25	0.045	0.012	18
Philippines	1	0.160	0.032	8	0.250	0.050	4	0.100	0.020	12	0.170	0.034	7
Tanzania	1	0.088	0.011	24	0.064	0.008	23	-0.040	-0.005	26	0.037	0.005	26
Turkey	1	0.290	0.058	1	0.260	0.052	2	-0.020	-0.004	23	0.177	0.035	6
Uganda	1	-0.048	-0.008	28	-0.018	-0.003	28	0.000	0.000	21	-0.022	-0.004	28
Vietnam	1	0.240	0.048	4	0.220	0.044	7	0.200	0.040	7	0.220	0.044	4
Zambia	1	0.108	0.018	20	0.090	0.015	19	-0.060	-0.010	27	0.046	0.008	20
Zimbabwe	1	-0.150	-0.030	31	-0.150	-0.030	31	-0.310	-0.062	31	-0.203	-0.041	31

Source: Computed by authors using the measure proposed as (4) and (5) in section 2 of the paper.

Note: The indicator of measles coverage was first adjusted for inequality in coverage and then the complement of the coverage was taken to indicate failures in coverage hence the estimates are to be interpreted similar to other health failure indicators.

In col. (ii) **Maximum RPI**: is the maximum progress per year that could be attained such that the health failures would become zero. **RPI** gives the values (standardised for number of years) based on equity and level sensitive differential measure proposed as (4) and (5) in section 2 of the paper. **% Progress** and **% Progress*** gives the relative progress attained as a percentage of maximum possible attainment per year (Max. RPI). If **% Progress** or **% Progress*** is greater than 66 percent then it implies that MDG target in that particular indicator is achieved. Ranks are obtained by arranging the countries in descending order of RPI with rank 1 given to the best performing country in each case. **RPI*** is the simple average of the three RPI's obtained for each of the three indicators.

Fig. 2: Attainment towards MDGs in child health

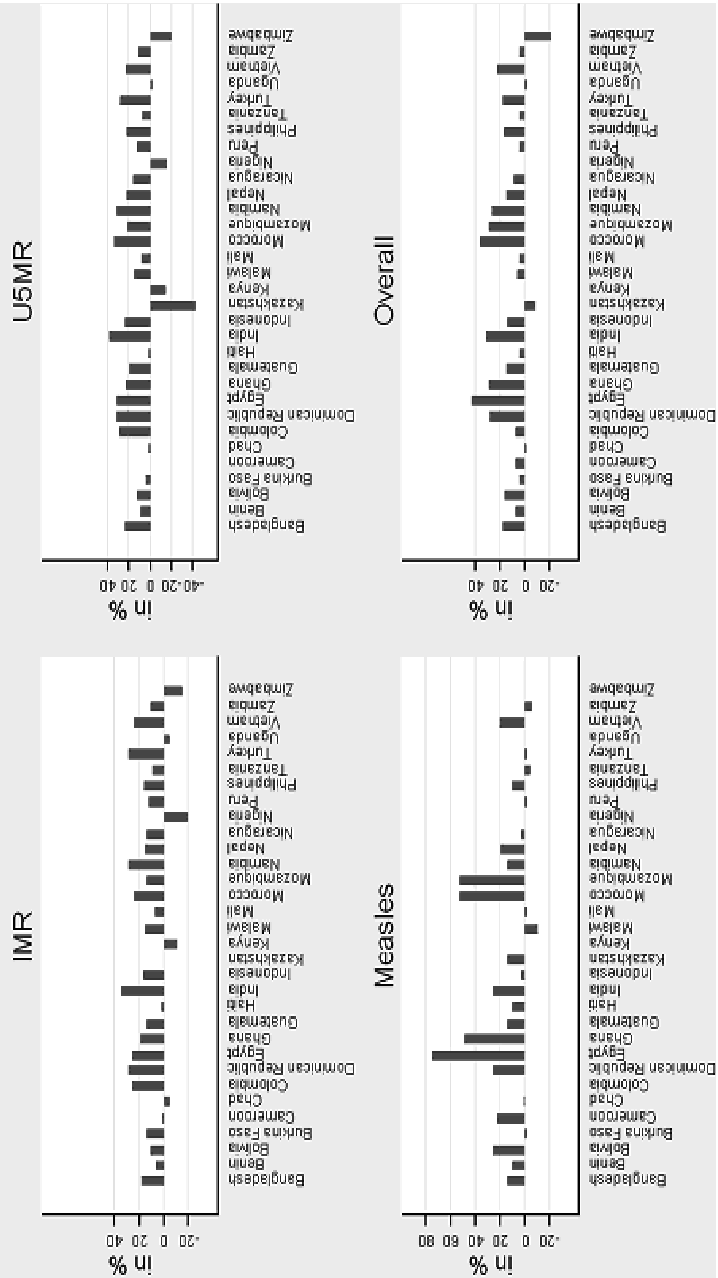


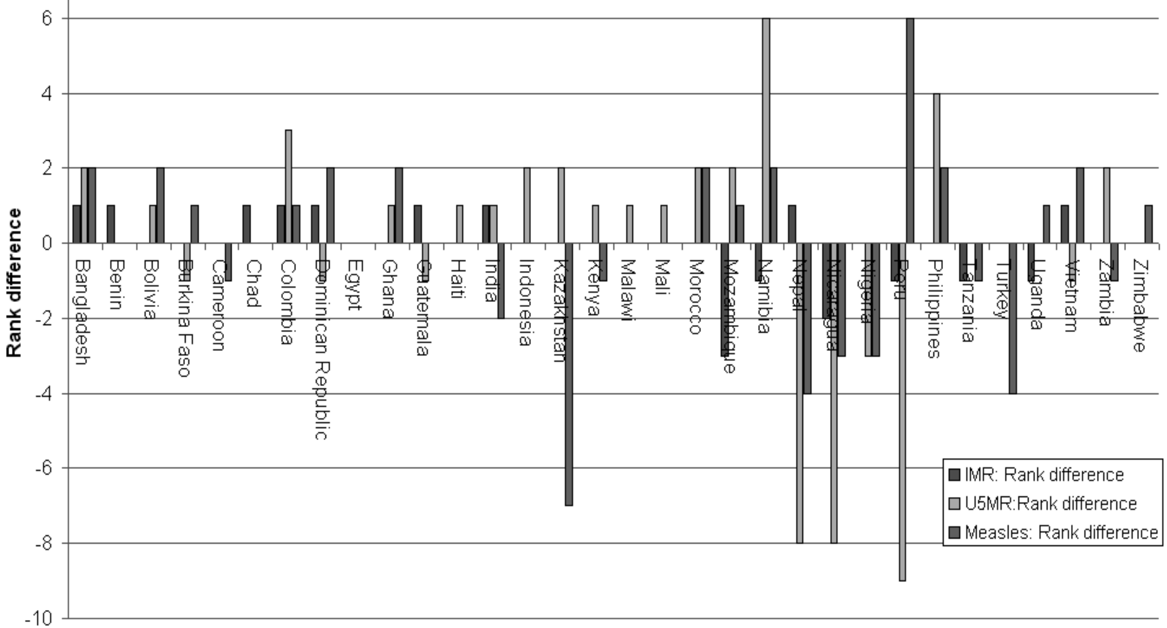
Table 1 provides the relative progress made by countries, which makes allowance for the concerns relating to equity and level differentials. In col. (ii) of the Table the values of maximum possible progress per year are provided. It must be noted that the maximum RPI values between any two available time points is equal to one. This maximum RPI values forms the ideal against which progress is valued. The ideal RPI value of one implies that a country has been successful in reducing the health failures to zero (for instance, IMR=0) from base level failures. As per the proposed method, the country specific RPI values are computed for each selected indicator and are reported in cols. (iii), (vi) and (ix) of the Table. Given an indicator, if a country attains a RPI figure of over [0.660] or 66 percent than that particular country is said to have attained the MDG target. However, in our case the results at best provide an approximate and not accurate picture of target attainment because of differences in the base year (is not 1990) and evaluation year (is different) for each country. Nevertheless, a quick glance at Figure 2 would, at least, give some indications regarding the performances of countries made during the available data points.

It should be clear from the bars representing IMR and U5MR reductions that no country so far has gone past beyond 40 percent reduction level. However, India, Egypt and Turkey have done relatively well especially the last two countries here have gained considerable ground in smaller time span. For measles coverage, four countries namely Egypt, Mozambique, Morocco and Ghana have been able to achieve 40 percent of their target. In fact Egypt has already attained its MDG target in case of measles and interestingly within a very short time frame. Because of a better performance in measles coverage, Egypt emerges as the only country, which actually exceeds the 40 percent attainment figure when all these three selected dimensions of child health are combined. A few other countries such as Morocco, Mozambique, Ghana, Namibia, India and Dominican Republic have attained over 20 percent in terms of overall aggregated attainment towards MDGs.

A reading of Col. (iii) and Col. (vi) suggests that among the selected countries India has performed the best in IMR and U5MR reductions between the two surveys. She has been able to achieve 34-35 percent reductions in IMR-U5MR values from early 1990s till 2005-06. Other countries such as Turkey, Egypt, Namibia and Dominican Republic have also registered considerable progress so far. But as mentioned above these RPI figures are neither comparable across countries nor indicative of relative progress due to differences in survey years. However, a direct comparison of RPI values is possible only for countries, which have similar time points of the two surveys. For instance, we can compare the performance of India, Cameroon and Nigeria in terms of RPI as these countries had their base survey year of early 1990 and midterm evaluation year after a gap of 13 years. These three countries had similar IMR levels in the early 1990s but after 13 years India was able to reduce IMR, Cameroon possessed similar rate and the condition in Nigeria deteriorated. Another direct comparison of RPI values could be made between Egypt and Turkey to find that latter has performed better in terms of IMR reduction whereas the former has shown better progress in U5MR reductions.

As pointed earlier, the RPI values are not directly comparable because the number of years lapsed between the two time points are varying across countries. In order to make it comparable we have to compute the progress attained per year (RPI/Year). Thus obtained progress in terms of RPI/Year is reported in the cols. (iv), (vii) and (x) of the Table. These figures are comparable across countries and could be used to monitor relative progress. Nevertheless, for comparison of relative progress, a ranking of the countries in descending order of the index RPI/Year will place the best progressing country at the head of the list, and the least progressing country at the bottom of the list. Based on these computations, now we can compare the performance of the countries in case of the three selected indicators. After adjusting the RPI figures (see col. (iv) and (vii)) it could be noted that the India no longer occupies

Fig. 3: Comparison of simple ratio and RPI rank difference for countries



the number one position in the rankings (see col. (v)) and in fact her performances in IMR and U5MR reductions has been ranked 12th and 13th, respectively. Instead, Turkey, Egypt and Dominican Republic emerge as the best three performers in case of IMR reductions. There, respective, year-adjusted relative progress values of [0.058], [0.052] and [0.048] are among the top three and their performance is rewarded by similar rankings because they were able to achieve these reductions in smaller time period. Similarly, in case of U5MR reductions, Egypt with an RPI/Year of [0.056] is the best performer while Turkey and Namibia are the next two better performers. Countries like Kazakhstan, Zimbabwe and Nigeria emerge as the worst three performers in terms MDGs with regressive IMR and U5MR increments. In the MDG for reducing measles non-receipt, again Egypt emerges to be the best performer and in fact has been successful in achieving the prescribed MDG target (see col. (ix), (x) and (xi)). It is interesting to note that Mozambique and Bolivia demonstrate better progress in measles coverage but still the latter has to go a long way before attaining the 66 percent benchmark. After combining all the three indicators of child health MDGs to obtain RPI* and RPI*/year it could be noticed that Egypt has best relative progress (RPI*/year of 0.086) among the selected countries. It is interesting to note that Mozambique, Dominican Republic and Vietnam are the next best performers in terms of relative progress per year. Kenya, Zimbabwe and Nigeria are not only the laggards in the race towards MDGs but emerge as major concerns with their negative progress.

Figure 3 reflects the changes in country rankings when comparisons are made on the basis of the proposed index and the simple ratio (see Table A4 in appendix). From this figure it could be made out that while shifting from simple ratio to RPI the range of rank differences occurring for countries in overall analysis has varied from [+6] to [-9]. Egypt is the only country that shows no rank reversals in all the three selected indicators whereas all other countries show some rank variations in at least one of the indicators. In case of IMR not much of alterations in the rankings are observed and the range of rank alterations is also lower [+1 to -3] with Mozambique being the only one that looses three places in country ranking. But in case of other two indicators greater rank changes are noticed. If we consider the indicator of U5MR then Peru [-9], Nicaragua [-8] and Nepal [-8] lose their rankings quite significantly when RPI is employed instead of simple ratio. These rank alterations are justified because these countries may have been unable to perform better given their levels or must have developed greater inequalities in the outcomes. A glance at Table A2 (appendix) would make it clear that in Nepal's case level sensitiveness is the toppling factor whereas for the other two countries higher inequalities are the major factor. Namibia performs well in terms of levels as well as on equity front, which is rewarded in the RPI index and hence it gains six ranks when compared to ranking on the basis of simple ratio. The country rank reversals in measles coverage suggest that Peru has been performing better in terms of levels and inequality reduction whereas Kazakhstan, Nepal and Turkey have shown poor progress.

5. Conclusion

The motivation behind this exercise was to highlight achievements in a more realistic manner and thus develop a comprehensive vision regarding social and economic progress. More importantly, this improvement in progress assessment is with appreciation of the fundamental concerns regarding equity and level-sensitivity. It is important to reiterate that while progressing towards MDGs, the policies should be constantly reinforcing maximum possible equality and monitoring should not sightlessly consider unadjusted level comparisons. However, the present empirical illustration is based on data pertaining to varied time points hence a straightforward comparability was restricted. The interpretations from the proposed index would be much simpler in cases where information is available uniformly across all the countries. However, while applying the RPI measure in case of other indicators special attention should be laid on the fact that the variable of interest demands level sensitivity. This exercise may be considered a beginning as regard progress monitoring but it lends itself to further ramification as regard target setting to be made more realistic. Appreciation of concerns made here as regard inequality and base-level sensitivity will perhaps help setting realistic targets and as a result comparisons in achievement will also be more robust.

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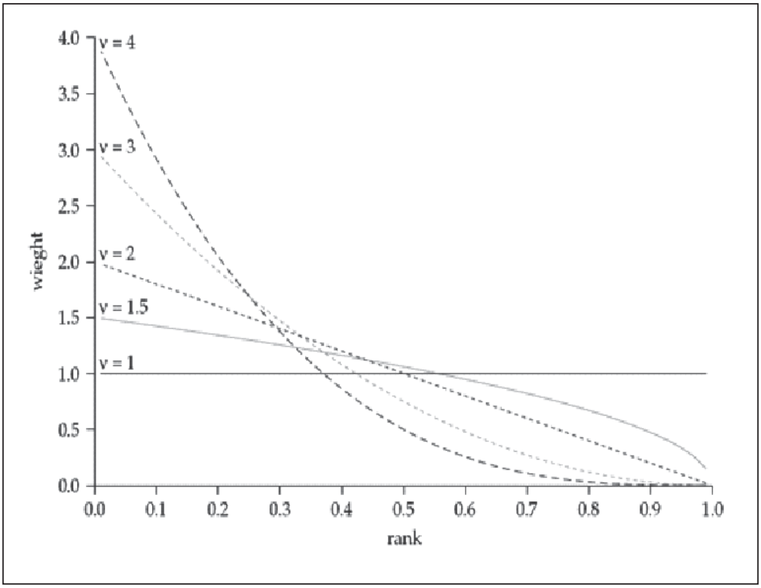
Appendix

Figure A1: Weighting scheme for extended concentration index



Source: Wagstaff (2002)

Table A1: Country-wise IMR, inequalities in IMR, and MDG target achievement as per baseline and midterm year

		C(v=2)				C(v=2)			Target achieved	
Country	Baseline	IMR	C(IMR)	IMR*	Midterm	IMR	C(IMR)	IMR*	IMR	IMR*
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)
Bangladesh	1996-97	90	-0.067	96	2004	72	-0.07	77	20	20
Benin	1996	104	-0.08	112	2001	95	-0.112	105	9	6
Bolivia	1998	74	-0.211	89	2003	68	-0.151	78	8	12
Burkina Faso	1992-93	108	-0.058	114	2003	92	-0.043	96	15	16
Cameroon	1991	80	-0.141	92	2004	81	-0.117	91	-1	1
Chad	1996-97	110	-0.001	110	2004	115	-0.01	116	-5	-5
Colombia	1995	31	-0.121	35	2005	22	-0.165	26	29	26
Dominican Republic	1996	49	-0.169	57	2002	35	-0.163	40	29	30
Egypt	1995	73	-0.216	89	2000	55	-0.163	64	25	28
Ghana	1993	75	-0.093	82	2003	65	0.003	65	13	21
Guatemala	1995	57	-0.082	62	1998-99	49	-0.079	53	14	15
Haiti	1994-95	87	-0.043	91	2000	89	0.007	89	-2	2
India	1992-93	86	-0.149	99	2005-06	57	-0.109	63	34	36
Indonesia	1997	52	-0.195	62	2002-03	43	-0.187	51	17	18
Kazakhstan	1995	41	0.004	41	1999	55	-0.085	60	-34	-46
Kenya	1993	63	-0.176	73	2003	76	-0.098	83	-21	-14
Malawi	1992	136	-0.034	141	2000	113	-0.044	117	17	17
Mali	1995-96	134	-0.075	144	2001	126	-0.049	132	6	8
Morocco	1992	63	-0.117	70	2003-04	44	-0.175	52	30	26
Mozambique	1997	147	-0.116	164	2003	124	-0.106	137	16	16

Cont'd....

	C(v=2)				C(v=2)				Target achieved	
Country	Baseline	IMR	C(IMR)	IMR*	Midterm	IMR	C(IMR)	IMR*	IMR	IMR*
(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)	(ix)	(x)	(xi)
Namibia	1992	62	-0.003	62	2000	40	-0.097	44	35	29
Nepal	1996	93	-0.06	99	2001	77	-0.072	83	17	16
Nicaragua	1997-98	45	-0.094	49	2001	35	-0.183	42	22	14
Nigeria	1990	92	-0.07	98	2003	109	-0.145	125	-18	-28
Peru	1996	50	-0.222	61	2000	43	-0.227	53	14	13
Philippines	1998	36	-0.157	42	2003	30	-0.154	35	17	17
Tanzania	1996	94	-0.04	98	2004	83	-0.067	88	12	10
Turkey	1993	68	-0.189	81	1998	48	-0.158	56	29	31
Uganda	1995	86	-0.081	93	2000-01	89	-0.092	98	-3	-5
Vietnam	1997	35	-0.143	40	2002	25	-0.217	30	29	25
Zambia	1996	108	-0.095	118	2001-02	94	-0.104	104	13	12
Zimbabwe	1994	51	-0.007	52	1999	60	-0.036	62	-18	-19

Source: Computed by authors using the World Bank, HNP Country-reports (Gwatkin et al, 2007)

Note: Baseline year and midpoint year selected for the analysis were subject to availability of the latest information provided in the World Bank, HNP Country-reports (Gwatkin et al, 2007). IMR and IMR* gives the unadjusted and inequality-adjusted IMR, respectively. C(IMR) is the concentration index of IMR provided in the country reports which has been used for adjusting the IMR based on the method discussed in (1) in section 2 of the paper, namely IMR*= IMR[1-C(IMR)]. Here C(v=2) implies that we are using an inequality aversion parameter of v=2, which is the standard concentration index. Target achieved in terms of IMR and IMR* is computed using measure (7) discussed in section 2 of the paper. Ranks are obtained by arranging the countries in descending order with rank 1 given to the best performing country in each case

Table A2: Country-wise U5MR, inequalities in U5MR, and MDG target achievement as per baseline and midterm year

			C(v=2)				C(v=2)		Target achieved	
Country	Baseline	U5MR	C(U5MR)	U5MR*	Midterm	U5MR	C(U5MR)	U5MR*	U5MR	U5MR*
Bangladesh	1996-97	128	-0.084	139	2004	97	-0.098	106	24	24
Benin	1996	184	-0.081	199	2001	163	-0.112	181	11	9
Bolivia	1998	99	-0.222	121	2003	93	-0.158	107	6	12
Burkina Faso	1992-93	205	-0.039	212	2003	193	-0.051	203	6	4
Cameroon	1991	144	-0.159	167	2004	148	-0.13	167	-3	0
Chad	1996-97	201	-0.007	202	2004	203	0.016	199	-1	1
Colombia	1995	37	-0.131	42	2005	26	-0.183	30	30	29
Dominican Republic	1996	61	-0.208	74	2002	43	-0.183	51	30	31
Egypt	1995	96	-0.231	118	2000	69	-0.178	82	28	31
Ghana	1993	133	-0.133	150	2003	110	-0.054	116	17	23
Guatemala	1995	79	-0.119	89	1998-99	65	-0.115	72	18	19
Haiti	1994-95	141	-0.071	151	2000	138	-0.076	148	2	2
India	1992-93	119	-0.169	139	2005-06	74	-0.159	86	38	38
Indonesia	1997	71	-0.21	85	2002-03	54	-0.189	65	24	24
Kazakhstan	1995	48	-0.005	48	1999	63	-0.086	68	-31	-42
Kenya	1993	93	-0.168	109	2003	113	-0.11	125	-22	-15
Malawi	1992	240	-0.046	251	2000	203	-0.054	214	15	15
Mali	1995-96	252	-0.09	275	2001	238	-0.062	253	6	8
Morocco	1992	84	-0.154	97	2003-04	54	-0.195	64	36	34
Mozambique	1997	219	-0.118	245	2003	178	-0.084	193	19	21
Namibia	1992	92	-0.053	97	2000	60	-0.102	66	35	32
Nepal	1996	139	-0.096	153	2001	108	-0.104	120	22	22
Nicaragua	1997-98	56	-0.124	63	2001	45	-0.196	53	20	16

Cont'd....

	C(v=2)				C(v=2)				Target achieved	
Country	Baseline	U5MR	C(U5MR)	U5MR*	Midterm	U5MR	C(U5MR)	U5MR*	U5MR	U5MR*
Nigeria	1990	191	-0.128	216	2003	217	-0.157	251	-14	-16
Peru	1996	68	-0.245	85	2000	60	-0.247	75	12	12
Philippines	1998	55	-0.191	65	2003	42	-0.228	51	24	22
Tanzania	1996	145	-0.051	152	2004	132	-0.067	141	9	7
Turkey	1993	81	-021	97	1998	60	-0.168	70	26	28
Uganda	1995	156	-0.079	168	2000-01	157	-0.102	172	-1	-2
Vietnam	1997	46	-0.159	53	2002	33	-0.232	41	28	23
Zambia	1996	192	-0.073	206	2001-02	168	-0.094	184	13	11
Zimbabwe	1994	76	-0.054	80	1999	90	-0.065	96	-18	-20

Source: Computed by authors using the World Bank, HNP Country-reports (Gwatkin et al, 2007)

Note: Baseline year and midpoint year selected for the analysis were subject to availability of the latest information provided in the World Bank, HNP Country-reports (Gwatkin et al, 2007). U5MR and U5MR* gives the unadjusted and inequality-adjusted U5MR, respectively. C(U5MR) is the concentration index of U5MR provided in the country reports which has been used for adjusting the U5MR based on the method discussed in (1) in section 2 of the paper, namely U5MR*= U5MR[1-C(U5MR)]. Here C(v=2) implies that we are using an inequality aversion parameter of v=2, which is the standard concentration index. Target achieved in terms of U5MR and U5MR* is computed using measure (7) discussed in section 2 of the paper. Ranks are obtained by arranging the countries in descending order with rank 1 given to the best performing country in each case

Table A3: Country-wise Measles coverage, inequalities in coverage, and MDG target achievement as per baseline and midterm year

			C(v=2)				C(v=2)		Target achieved	
Country	Baseline	M	C(M)	M*	Midterm	M	C(M)	M*	M	M*
Bangladesh	1996-97	70	0.068	65	2004	76	0.076	70	19	14
Benin	1996	64	0.092	58	2001	68	0.08	63	10	10
Bolivia	1998	51	0.055	48	2003	64	0.034	62	27	27
Burkina Faso	1992-93	60	0.104	53	2003	56	0.066	52	-9	-3
Cameroon	1991	56	0.144	48	2004	65	0.083	60	21	23
Chad	1996-97	23	0.284	16	2004	23	0.272	17	0	0
Colombia	1995	89	0.034	86	2005	83	0.05	79	-52	-49
Dominican Republic	1996	84	0.035	81	2002	89	0.028	86	31	29
Egypt	1995	89	0.058	84	2000	97	0.009	96	71	75
Ghana	1993	64	0.103	58	2003	82	0.04	79	51	51
Guatemala	1995	80	0.022	79	1998-99	84	0.027	82	21	17
Haiti	1994-95	48	0.11	43	2000	54	0.088	49	12	11
India	1992-93	42	0.26	31	2005-06	59	0.151	50	29	27
Indonesia	1997	71	0.064	66	2002-03	72	0.069	67	2	1
Kazakhstan	1995	67	0.027	65	1999	79	0.004	78	35	38
Kenya	1993	84	0.039	81	2003	72	0.103	65	-71	-80
Malawi	1992	86	0.034	83	2000	83	0.024	81	-19	-10
Mali	1995-96	51	0.156	43	2001	49	0.14	42	-4	-2
Morocco	1992	80	0.093	72	2003-04	91	0.033	87	53	55
Mozambique	1997	58	0.198	46	2003	77	0.088	70	45	44
Namibia	1992	76	0.021	74	2000	80	0.039	77	20	12

Cont'd....

	C(v=2)				C(v=2)				Target achieved	
Country	Baseline	M	C(M)	M*	Midterm	M	C(M)	M*	M	M*
Nepal	1996	57	0.101	51	2001	71	0.071	66	32	30
Nicaragua	1997-98	86	0.044	82	2001	86	0.04	83	5	6
Nigeria	1990	46	0.2	36	2003	36	0.271	26	-18	-16
Peru	1996	86	0.037	83	2000	84	0.027	82	-10	-3
Philippines	1998	79	0.06	74	2003	80	0.052	76	4	5
Tanzania	1996	81	0.059	76	2004	80	0.059	75	-6	-5
Turkey	1993	78	0.059	73	1998	79	0.074	73	3	-2
Uganda	1995	60	0.101	54	2000-01	57	0.052	54	-7	1
Vietnam	1997	77	0.073	71	2002	83	0.071	77	27	20
Zambia	1996	87	0.026	84	2001-02	84	0.022	83	-16	-11
Zimbabwe	1994	86	0.01	85	1999	79	0.009	78	-53	-49

Source: Computed by authors using the World Bank, HNP Country-reports (Gwatkin et al, 2007)

Note: Baseline year and midpoint year selected for the analysis were subject to availability of the latest information provided in the World Bank, HNP Country-reports (Gwatkin et al, 2007). M and M* gives the unadjusted and inequality-adjusted Measles coverage, respectively. C(M) is the concentration index of Measles provided in the country reports which has been used for adjusting the Measles coverage based on the method (1) in section 2 of the paper, namely M*= M[1-C(M)]. Here C(v=2) implies that we are using an inequality aversion parameter of v=2, which is the standard concentration index. Target achieved in terms of M and M* is computed using measure (7) discussed in section 2 of the paper. Ranks are obtained by arranging the countries in descending order with rank 1 given to the best performing country in each case.

Table A4: Percentage reduction in health failures per year (based on number of years between baseline and midterm dates of the analysis)

	IMR		U5MR		Measles Coverage	
Country	*% reduction/year*	*Rank*	*% reduction/year*	*Rank*	*% reduction/year*	*Rank*
Bangladesh	2.83	14	3.39	12	2.04	14
Benin	1.25	24	1.81	20	2.38	11
Bolivia	2.47	16	2.31	17	5.38	5
Burkina Faso	1.58	21	0.42	24	-0.21	23
Cameroon	0.08	26	0	27	1.78	16
Chad	-0.78	28	0.21	26	0.17	20
Colombia	2.57	15	2.86	15	-5	30
Dominican Republic	4.97	4	5.18	4	4.39	8
Egypt	5.62	2	6.1	1	15	1
Ghana	2.07	18	2.27	18	5	6
Guatemala	3.63	7	4.78	5	3.57	10
Haiti	0.44	25	0.4	25	2.11	13
India	2.8	13	2.93	14	2.12	12
Indonesia	2.96	11	3.92	10	0.49	19
Kazakhstan	-11.59	32	-10.42	32	9.29	2
Kenya	-1.37	29	-1.47	30	-8.42	31
Malawi	2.13	19	1.84	19	-1.47	28
Mali	1.67	22	1.6	22	-0.35	24
Morocco	2.14	17	2.84	16	4.46	7
Mozambique	2.74	12	3.54	11	7.41	3
Namibia	3.63	6	3.99	9	1.44	18

Cont'd....

	IMR		**U5MR**		**Measles Coverage**	
Country	*% reduction/year*	*Rank*	*% reduction/year*	*Rank*	*% reduction/year*	*Rank*
Nepal	3.23	10	4.31	7	6.12	4
Nicaragua	4.76	3	5.29	3	1.85	15
Nigeria	-2.12	30	-1.25	29	-1.2	27
Peru	3.28	9	2.94	13	-1.47	29
Philippines	3.33	8	4.31	8	1.54	17
Tanzania	1.28	23	0.9	23	-0.52	25
Turkey	6.17	1	5.57	2	0	21
Uganda	-0.9	27	-0.4	28	0	22
Vietnam	5	5	4.53	6	4.14	9
Zambia	1.98	20	1.78	21	-1.04	26
Zimbabwe	-3.85	31	-4	31	-9.33	32

Source: Computed by authors using the World Bank, HNP Country-reports (Gwatkin et al, 2007)

Note: Percentage reduction per year is computed by using measure (7) discussed in section 2 of the paper. Ranks are obtained by arranging the countries in descending order with rank 1 given to the best performing country in each case. The indicator of measles coverage was first adjusted for inequality in coverage and then the complement of the coverage was taken to indicate failures in coverage hence the estimates are to be interpreted similar to other health failure indicators.

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