Pro-Poor Growth: The Evidence Beyond Income

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Draft Version 29 August 2008

Abstract

It is widely agreed that economic growth is necessary for reducing poverty. It is also well-established that poverty is multi-dimensional and not fully explained by income levels alone. Therefore, this paper attempts to fill a relative gap in the pro-poor growth literature by examining the impact of income growth on non-income poverty, particularly child mortality.

The results confirm that although changes in per capita income matter for non-income poverty outcomes, they may not matter as much as for income poverty or as much as other factors, particularly in low-income countries. For developing countries, we find that a 1 per cent increase in income per capita is associated with a 0.3 per cent decline in the child mortality rate, declining to just a 0.1 per cent reduction for Sub-Saharan Africa. In contrast, a country's level of literacy appears to have a larger impact on non-income poverty with a 1 per cent decline in illiteracy associated with as much as a 0.5 per cent decline in child mortality in low-income countries. Our results suggest that pro-poor growth policies must be more sensitive to the constraints that exist in poorer countries that reduce the impact of economic growth on poverty.

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Introduction

Economic growth is crucial for reducing poverty; it is stated as a key priority for achieving the MDGs[2], and has been identified as important for improving social indicators[3]. Several studies examine the impacts of economic growth on income poverty concluding that there is a strong correlation between income growth and income poverty reduction[4]. This much is obvious – countries that have reduced absolute income poverty have had economic growth – but it doesn't tell us much about the details of the relationship between economic development and poverty reduction. Clearly the level of income distribution and its trend is important. But we also need to understand how economic growth impacts on human development; i.e. on poverty in its true multidimensional definition.

However, the relationship between economic growth and non-income poverty is unclear and neglected in the literature and pro-poor growth policy-making discussions. Grosse et al (2005) states that "one existing shortcoming of current pro-poor growth concepts and measurements is that they are completely focused on income… The shortcoming of [which] is that a reduction in income poverty does not guarantee a reduction in the non-income dimensions of poverty, such as education or health."[5] One of the most comprehensive research projects on the relationship between growth and poverty, the joint donor project on Operationalizing Pro-Poor Growth, focused exclusively on income and saw non-income dimensions as important only to the 'discussion of how initial conditions…affected the impact of policies'[6]. The recognition that poverty is multidimensional and not perfectly reflected in measurement of household income is well established. Well-being should be defined by the fulfilment of multiple capabilities; to enjoy an education, access to healthcare, be well-fed and to participate freely in society[7]. In addition, studies have highlighted the limited overlap in variation between income and non-income indicators, such as income and health, as the former measures poverty at the household level and the latter at the individual level[8]. This is not to say that per capita income is not a useful proxy of a person's well-being, but that it is a narrow measurement and that we have a responsibility to widen our analysis where possible.

Over the last few years the issue of economic growth and how to achieve it in developing countries has re-emerged at the forefront of international development debate[9]. A sub-set of these discussions mention or directly focus on the achievement of

[2] See the 2003 Human Development Report - *Millennium Development Goals: A Compact Among Nations to End Human Poverty*
[3] *Saving Children's Lives: Why Equity Matters*. 2008. Save the Children UK
[4] *World Development Report: Attacking Poverty* 2000/01; *Growth is Good for the Poor*. 2002. Dollar and Kraay; *What Can New Survey Data Tell Us About Recent Changes in Distribution and Poverty?* 1997. Ravallion and Chen;
[5] Grosse et al. 2005. Measuring Pro-Poor Growth with Non-Income Indicators. University of Göttingen. Pp 3.
[6] *Operationalizing Pro-Poor Growth*. 2005. World Bank Concept Paper
[7] *Development as Freedom*. 1999. Sen A.
[8] *Measuring Chronic Non-Income Poverty*. 2007.Günther I. and Klasen, S. University of Göttingen.
[9] This refreshed agenda is being led by both northern and southern organisations at the national and cross-country level. Organisations such as the World Bank, the International Poverty Centre and the UK's Department for International Development are leading the debate internationally. Similarly, organisations such as the Human Sciences Research Council in South Africa and

pro-poor growth, i.e. economic growth that benefits the poorest. The twin questions of how economic growth is created, and how it can be made to be pro-poor are at the heart of the current debate, each to varying degrees. In achieving economic growth, the efficiency and effectiveness of a country's institutions and policies are vital. How *pro-poor* growth is achieved is less understood, as poverty analysis and economic growth analysis are often treated as separate, rather than mutually reinforcing, objectives. The joint-donor research project on Operationalising Pro-Poor Growth provides the most comprehensive diagnosis, emphasising the need to focus on job creation, girls' education, rural-to-urban infrastructure, strengthening property rights, access to financial markets, and tackling ethnic and gender discrimination.[10]

The lack of analysis of the impact of growth on non-income poverty means that the knowledge of how to promote pro-poor growth is partial and weakened. Despite general acceptance of the multidimensionality of poverty, income is still the dominant measure throughout the development literature[11]. Without an assessment of the impact of economic growth on education and health, amongst other areas, it will be impossible to design accurately pro-poor growth policies.

The aim of this paper is to contribute to this area by re-examining econometrically the relationship between national income per capita and non-income poverty indicators, particularly child mortality and illiteracy rates. It builds on Prichett and Summers (1996) who focus on the total effects of changes in national incomes on health outcomes, but it takes a further step by focusing on the partial effects of incomes and on the contribution of a number of factors that mediate the relationship between income and non-income outcomes, such as educational levels, provision of health inputs and basic infrastructure, and income inequality. The paper adds to the literature by providing an updated panel data analysis of the different determinants of (non-income) poverty outcomes, particularly health and education variables. The panel analysis initially involves a cross-section of 127 developed and developing countries over 1965-2005. It then also adds to the literature by exploring possible differentiated impacts of social determinants across different country groupings: developing countries, low-income countries and the Sub-Saharan African region.

The paper provides robust evidence that growth in national income per capita matters for non-income poverty, though perhaps not as much as for income poverty, and that other factors, especially those that mediate the income-poverty relationship such as educational levels, may play a larger role. The analysis, involving different country groupings, also indicates that these other factors are all the more important among poorer countries and in Sub-Saharan Africa in particular. The evidence also suggests that the secular trend that can be observed in various social indicators, and which in previous studies is assumed as invariant across regions and countries, seems in fact to have a stronger effect in richer than in poorer countries. If this is true, it may be explained by the greater capacity of richer countries to absorb technological change more effectively. Finally, income inequality explains differences in poverty reduction

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Research on Poverty Alleviation (REPOA) in Tanzania have been generating evidence and debate at the national level.

[10] *Operationalising Pro-Poor Growth*. 2005. World Bank Concept Paper

[11] *Identifying and Measuring Chronic Poverty: Beyond Monetary Measures*. 2005. Hulme, D; McKay, A.

across developed and developing countries, but it does not stand out within regions where levels of distribution may simply be too similar.

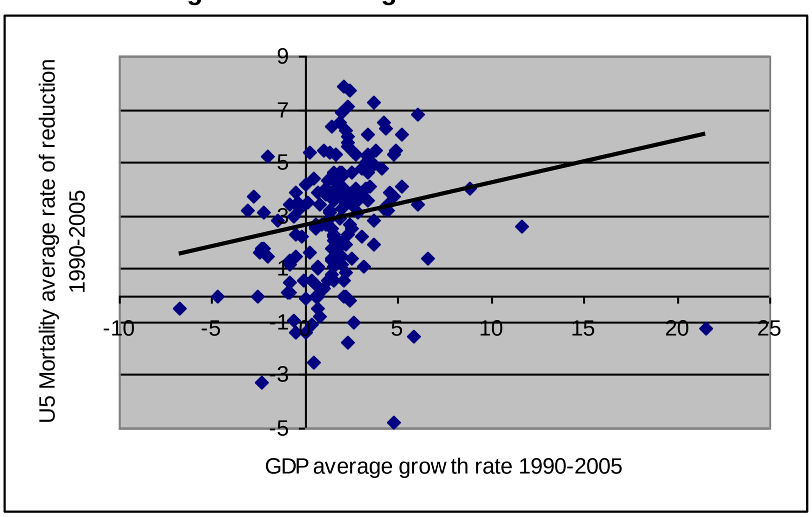
This research might be expanded by examining the impact of income on a wider set of indicators, including health outputs and malnutrition. We could also examine the distributional impacts of income per capita on non-income variables.

Following this introduction, section 2 describes the relationship between economic growth and non-income poverty, reviews results from previous studies on this subject and highlights the main methodological issues these studies have encountered. Section 3 provides a brief descriptive analysis of the data set used in this study. Section 4 discusses the methodological steps undertaken to examine the income-poverty nexus, and section 5 presents and discusses the results. Section 6 concludes and considers the implications of our results for policy-making.

II. The Growth-Outcome Relationship: Earlier Results and Methodological Issues

There is a close relationship between economic and human development; higher GDP per capita tends to track closely improved health and education indicators, for example.[12] However, a cross-plot of average GDP per capita growth rates and under-five mortality average rates of reduction over 1990-2005 reveals a disparate relationship at the margin. Of the nine countries that had average GDP per capita growth of 5 per cent or more, only two experienced an average reduction in the under-five mortality rate of the same proportion. And almost a third of the 29 countries that experienced negative growth over the period still saw average reductions in the under-five mortality rate of 3 per cent or more. Clearly, the relationship between economic growth and non-income indicators can vary substantially.

Figure 1: Cross plot of Under-5 Mortality Rate Reduction and Economic Growth Per Capita Average annual change 1990-2005



Source: authors' elaboration. Data: UNICEF State of the World's Children 2007

[12] *From Commitment to Action: Human Development and Growth*. 2005. DFID/HMT

Economic growth can affect non-income poverty through two main channels. Firstly, growth increases a government's resource base and therefore should allow greater spending on goods and services that the poor benefit from. Secondly, income growth provides people with more resources to spend themselves on meeting their needs[13]. Clearly, this is a two-way causal relationship; as increased expenditure creates improved human development, so improved human development leads to a more productive economy[14].

There are a number of caveats to this relationship. Firstly, the efficiency and effectiveness of resource raising and use, both at the national and household level, will mitigate the impact of income on non-income poverty. If a government squanders its resources or is restricted by inefficient institutions, or if households face a lack of functioning markets or services, income will not translate effectively into non-income benefits. Secondly, the distribution of economic growth determines its impact on human development. To reduce non-income poverty, the poor have to be able to participate in the creation of economic growth, which means ensuring the availability of social protection, decent employment and infrastructure. Lastly, we recognise that a large number of variables aside from economic growth affect non-income outcomes; each individual country's social, cultural, political, and institutional conditions are crucial and control variables are used in our analysis.

The literature on the determinants of poverty outcomes is extensive.[15] Early studies examined the contribution of income per capita on poverty outcomes while controlling for the contribution of other determinants. Subbarao and Raney (1995), Hill and King (1992) and Flegg (1982), all testing for the determinants of infant mortality, have found an income elasticity varying between of -0.16 and -0.21, when controlling for the effects of a number of variables, including physicians per capita, access to safe water, secondary enrolment rates and urbanisation. Pritchett and Summers (1996) and Kakwani (1993), also using infant mortality as the dependent variable, have found a total income elasticity of between -0.2 and -0.4 and between -0.5 and -0.6 respectively. Anand and Ravallion (1993) also testing for the income-health outcomes relationship, introduce poverty (measured by percent of population living with less than one dollar a day) and public health expenditure per capita in their equation. The coefficient on income per capita collapses when the poverty variable is used. For the latter, they find a negative effect on life expectancy and a positive effect on infant mortality; for public health expenditure, they find opposite effects on these two health indicators.

As in Pritchett and Summers (1996), more recent work has also focused on total effects of income per capita, but this time using child mortality rate as the dependent variable. Tandon (2005) has found a coefficient estimate on income per capita of -0.7 based on national data involving 35 Asian developing countries. Bhalotra (2008) drawing on state data from India, finds a total income effect of -0.7 as well. The poverty variable does not show a significant coefficient when it is included in the equation (thus contradicting Anand and Ravallion's results), while the inclusion of government health expenditure

[13] *Rights and Economic Growth: Inevitable Conflict or 'Common Ground'?.* 2005. McKay A. and Vizard P.
[14] *Growth Versus Basic Needs – is There a Trade Off?.* 1979. Hicks. World Development, vol. 7, no. 11/12 (November/December 1979), pp. 985-94
[15] For a detailed and updated review of the literature, on which we draw heavily, see Elmhirst (2008), available upon request.

lowers the income elasticity to -0.51, thus not as much as in Pritchett and Summers when the education variable or alternative estimation methods are used.

Another strand of the literature has focused on child malnutrition as the main variable to be tested against a number of possible determinants. Smith and Haddad (1999) use country and household data to examine the determinants of child malnutrition. The authors draw on a framework that categorises possible micro and macro variables as immediate, underlying, and basic determinants. Using different econometric techniques including non-linear functions to explore possible existence of non-linearity in the relationships under examination, the authors estimate the contribution of the underlying determinants of reducing child malnutrition. Their results indicate that improvements in women's education contribute the most (43 per cent), followed by national food availability, health environment, and women's relative status. They also find that the basic determinants – national income and democracy – also have significant effects via investments in the underlying determinants. Haddad et al. (2002), in turn, explores the direct contribution of income growth on reductions in child malnutrition. They find a positive relationship between income per capita and the nutritional status of children, and that mother's height and years of parental education are also important in explaining child's nutritional levels. However, they point out that even if the countries in their sample grew at 2.5 per cent on average (which only 3 of the 12 had) until 2015, this would result in only 3 of the 12 countries reaching the MDG target of cutting undernutrition in half.

More recent work such as Gabriele and Schettino (2007) and Svedberg (2004) using similar nutrition-related variables have also found some support for a positive role of income per capita in explaining nutritional status of children. Svedberg finds that income distribution is also a significant determinant in child stunting and underweight. These studies point to the need for specific public interventions to accelerate child malnutrition, although Svedberg (2006) claims that income per capita is still the critical factor, as it alone explains between 50 and 60 per cent of variation in stunting and underweight across countries.

The focus on the MDGs since the early 2000s has spurred a number of studies on a wider range of non-income poverty outcomes. In addition to the most commonly researched social indicators such as child and infant mortality, child malnutrition, life expectancy or educational attainment, authors such as Panda and Ganesh-Kumar (2007) and Grosse, Harttgen and Klasen (2005) have also considered different poverty indices, the poverty gap ratio, percentage of population undernourished, a gender parity index at different enrolment levels, maternity mortality, vaccination per child, stunting and a composite welfare index formed of several social indicators. Earlier, Easterly (1999) tested the effects of income levels and growth on 81 indicators that are associated with quality of life, drawn from areas such as individual rights, democracy, political instability, war, health, education, multidimensional inequalities, pollution, crime and suicides. Results from these latter studies are somewhat less robust, partly due to the use of different methodological approaches and partly due to the use of a wider range of variables. For example, in Easterly (1999) results vary according to whether fixed effects or first differences are used. Panda and Ganesh-Kumar (2007), using a number of MDG-related indicators, show that while the income elasticity is high for health indicators, it is low for educational and gender indicators. Results vary also because while some of these studies are cross-country, others draw on household data from a few or even a single country.

All the studies cited here and various others have faced a number of methodological issues when testing the income-poverty outcomes relationship. A critical factor, mentioned above, is the reverse causation between income per capita and non-income poverty outcomes, especially in the areas of health and education. Other issues include measurement error problems, which arise due to data scarcity on most social indicators, and how these are constructed and data gaps filled; the appropriate functional form to be used, especially since various poverty variables are either bounded from above (e.g., life expectancy) or below (child mortality), thus pointing to possible existence of a non-linear relationship between the variables of interest; and the existence of persistence in the dependent variable, pointing to the possible need for a dynamic specification. Further important issues relate to the need to address possible country (or individual)-specific effects associated with factors that are unobservable and invariant over time (and also time-specific effects that do not vary across countries or individuals); and the potential tension between pooling different regions, countries or individuals and the homogeneity assumption that pooling implies. A further problem relates to panel studies, which have been increasingly used in studies on the topic. As more cross-time data becomes available and the time-span of these studies therefore increases, the existence of unit-roots in series in levels becomes an issue that needs addressing. We discuss further below how to address these issues when we present the methodological options for our own analysis on the income-poverty relationship.

III. Descriptive Data Analysis

The data used in this study was collected from the World Development Indicators (WDI) database, accessed via the WDI CD-ROMs for 2002 and 2008. Moreover, the United Nations Common Database (UNCD) was used to complement the dataset. Table A1, in the annex, presents basic statistical information on all the variables used in the panel analysis. It is based on all countries included in the econometric analysis – 127 in total – covering the period 1965 to 2005. It shows that there are large differences between minimum and maximum values in virtually all variables, which include:

- GDP: GDP per capita, PPP (constant 2005 international $)
- CMR: Mortality rate, under-5 (per 1,000)
- IMR: Mortality rate, infant (per 1,000 live births)
- LE: Life expectancy at birth, total (years)
- ILR: Illiteracy rate, adult total (% of people ages 15 and above)
- HEX: Health expenditure, public (% of GDP)
- HOS: Hospital beds (per 1,000 people)
- PHY: Physicians (per 1,000 people)
- GINI: Gini index
- WAT: Improved water source (% of population with access)
- EEX: Public spending on education, total (% of GDP)

Table 1 below presents the statistics for the main social indicators and income per capita for the initial and final years – 1965 and 2005. It shows large variations within each variable, due to both cross country variation in the same year and within countries over time. For instance, between 1965 and 2005, mean income per capita increased 155 per cent (from US$ 4,654 to US$ 11,861) while child mortality declined 61 per cent.

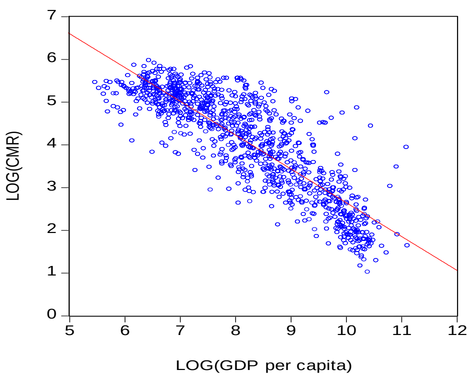
Table 1: Basic statistics for social indicators and income per capita[1]

Variables	Mean value			Maximum		Minimum		Number of observations	
	1965[1]	2005	Var. %	1965[1]	2005	1965[1]	2005	1965[1]	2005
Income p.c. (GDP, US$ PPP 2005)	4,654	11,861	154.9	21,135	66,577	234	253	97	97
Child mortality rate (CMR) %	169.92	66.9	-60.6	394	271	17.4	3.7	99	99
Life expectancy (LE) in years	53.32	66.15	24.1	74	82	33	40	125	125
Illiteracy rate (ILR) %	49	24	-50.6	94	83	1.8	0.3	101	101

Source: authors' elaboration. [1] For each variable, the number of countries is held constant between 1965 and 2005. [2] 1970 for illiteracy rate (ILR).

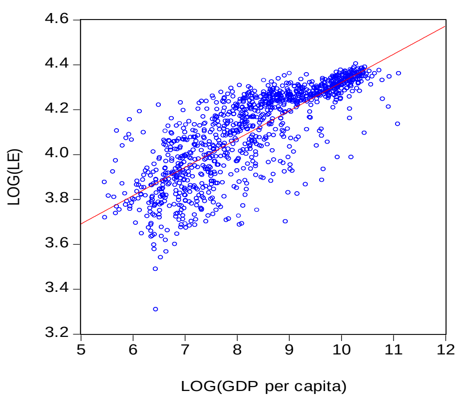
Most variables are trended, and plots between pair of variables show non-linear relations between them, see figures A1-A3 in the annex. Nonetheless, they can be easily linearised with the use of variables in logs – see figures 2-4 below.

Figure 2: Log of Child Mortality Rate (CMR) and Log of GDP per Capita



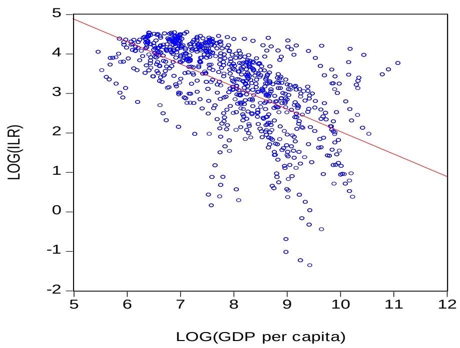
Source: authors' elaboration.

Figure 3: Log of Life Expectancy (LE) and Log GDP per Capita



Source: authors' elaboration.

Figure 4: Log of Illiteracy Rate (ILR) and Log of GDP per Capita



Source: authors' elaboration.

The non-linearity observed is due to the fact that social indicators vary little among countries with high income per capita. However Table 2, which summarises basic statistics for different country groupings, shows that the largest variations in social indicators over time take place among richer rather than poorer countries. That is, countries that were already considered developed at the beginning of the sample period saw massive improvements in their social indicators over the following 40 years. Specifically, the table shows that OECD countries experienced faster improvement in child mortality and illiteracy rate – two key social indicators – compared to developing countries, low-income countries and Sub-Saharan Africa. Although this may be partly explained by relatively faster growth of income per capita among OECD countries, our econometric results suggest that this is also explained by a stronger secular trend in social indicators among richer compared to poorer countries.

Table 2: Social Indicators and Income Per Capita for Selected Country Groupings

Mean values and percentage changes %

	OECD Countries			**Developing Countries**			**Low-income Countries**			**Sub-Saharan Africa**		
	1965[1]	**2005**	**Var. %**	**1965[1]**	**2005**	**Var. %**	**1965[1]**	**2005**	**Var. %**	**1965[1]**	**2005**	**Var. %**
Income per capita	10,773	31,152	189.2	2,294	4,421	92.7	1,047	1,013	-3.2	1,642	2,646	61.2
Child mortality rate (CMR) %	60	7	-88.0	198	82	-58.5	254	134	-47.2	240	141	-41.2
Life expectancy (LE)	68	78	15.9	49	62	27.8	41	53	29.6	43	52	20.6
Illiteracy rate (ILR) %	30	9	-69.7	51.5	26.35	-48.8	74	45	-39.7	70	39	-44.5

Source: authors' elaboration. [1] For each variable, the number of countries is held constant between 1965 and 2005. Note that we use country categories from the most recent period rather than the categorisations present in 1965. [2] 1970 for illiteracy rate (ILR).

IV. Methodology

We focus on child mortality rate (CMR) as our dependent variable – when we replace it with infant mortality rate (IMR), life expectancy at birth (LE) or illiteracy rate (ILR), similar results are obtained. Income per capita is our main variable on the right hand side of the equation, which is proxied by GDP per capita in purchasing power parity (PPP) terms (GDP). Together with GDP, we try a number of variables in our specifications, which we believe may be also important in explaining poverty outcomes. These variables, which have been used in one way or another by different authors testing similar hypotheses, are: illiteracy rate (ILR), public health expenditure (HEX), public expenditure on education (EEX), hospital beds (HOS), physicians (PHY), the GINI index (GINI) and improved water source (WAT).

Our panel data analysis is conducted for five different groups of countries. The largest group involves 127 developed and developing countries – what we call here the ALL grouping. The four other groups are: the developing country (DEV), low-income country (LIC), Sub-Saharan African country (SSA) and Latin America and the Caribbean country (LAC) groupings.[16]

Each observation is based on five-year averages between 1965 and 2005, which implies that time *t* in our regressions has a maximum value of 9. The averaging procedure is adopted to address the lack of annual data information for the various social indicators used, which in some cases are drawn from surveys conducted every five years only. Notwithstanding this, data gaps remain where information is missing for fairly long periods of time in some countries.

A couple of methodological points are important. First, we are examining a large number of countries that are quite different in various aspects. Some of these differences are country-specific characteristics that are difficult to observe and which do not vary much – if at all – over time. If these country-specific characteristics are not accounted for, then coefficient estimates will be biased and even inconsistent. To address this problem we use the cross fixed effects estimation method in some of our specifications.[17]

Second, although time *t* in the regressions is relatively small, the time span of 40 years is quite long. Data plots of most variables indicate the existence of a fairly strong secular trend. If this time-specific factor exists and is not accounted for, parameter estimates will be biased and inconsistent, analogous to the case of the country specific effects. We address this by using a time-specific effects estimation method in all specifications. Of course, in some cases both country and time specific effects will be addressed simultaneously.[18]

Third, the issue of reverse causality is addressed using instrumental variables estimation. Since this study has a larger *t* compared to previous ones, we take advantage of this fact and use lagged variables as instruments.

Previous studies also called attention to the possible existence of non-linearity in the relationship between income per capita and non-income outcomes – seen earlier when plotting the data, especially when both developed and developing countries are pooled together. This happens because various social indicators tend to be bounded – that is, they vary very little once they reach a certain level, which happens to be the case among

[16] We use the latest available World Bank developing country classification to form these groupings. Our grouping differs from the World Bank in that whilst Korea is categorised by the Bank as a developed country, it is included here in the developing country grouping. The maximum number of countries for the DEV, LIC, SSA and LAC groupings respectively are: 92, 34, 39 and 21.

[17] The appropriate specification is the one-way error component model (Baltagi, 1995).

[18] In this case, the appropriate specification is the two-way error component model (Baltagi, 1995).

developed countries, as discussed. To mitigate this problem, we linearise all the series by using natural logarithms. We also experiment with quadratic functions, but these do not work well. A further possible problem relates to data persistence, which some authors raise – such as Smith and Haddad (1999) in the case of child malnutrition. Whilst we do not see persistence as a major issue among our dependent variables, we try a dynamic specification to test for the robustness of our initial results. Finally, because the time span of the study is large, we apply a battery of unit-root tests to detect non-stationarity when data series are in levels. However, the null of unit-roots is consistently rejected, possibly because our *t* is small.

V. Model Specification and Results

The general equation that guides our choices of specification in this paper is:

$$Y_{it} = \alpha + X_{it}\beta + \mu_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

Where Y is the dependent variable, α is a scalar, β is K x 1 vector of parameters, i denotes countries, t denotes time, X is the *it*th observation on K explanatory variables, μ_i is the unobservable country-specific effect, λ_t is the unobservable time-specific effect, and ε_{it} the usual stochastic error term.

The Impact on Child Mortality: the ALL Grouping

We start by running regressions for the ALL grouping. Using CMR as the dependent variable and all variables in logs, we initially assume that μ_i is equal to 0 and thus use OLS estimation method with the time fixed effects. We next run regressions using GLS with time effects and time weights, then with both time and cross fixed effects (FE) and instrumental variables with both cross and time fixed effects (IV/FE). The coefficient estimates from these various regressions are displayed in Table 3 below.

Column 1 presents a regression using just the GDP variable. However, from column 2 to 8 we display different specifications with inclusion of a number of variables that in previous studies have been hypothesised and tested as additional possible determinants of poverty outcomes. The first variable included in the regressions together with income per capita was illiteracy rate (see column 2). The variable worked well and was maintained in subsequent specifications. The size of the estimated coefficient for this variable varied between 0.26 and 0.36, showing to be fairly robust across different specifications. Clearly, the level of a population's education is an important contributory factor to improved health for a given level of income. In the subsequent specifications (from column 3 to 6), other variables were added to income per capita and illiteracy rates, one at a time. These were number of physicians per thousand of inhabitants, number of hospital beds, access to water, and the GINI index. All of them were highly significant and showed sizeable coefficients, especially water at -0.39 and the GINI coefficient at 0.28. In column 7 the regression contains both physicians and hospital beds variables together. Their respective coefficients decline slightly and, in the case of hospital beds, it loses significance, possibly because both these variables are health inputs and therefore closely correlated. Finally, column 8 displays a regression using both number of physicians and water access together, both showing to be important and significant and thus indicating the importance of both health inputs and basic infrastructure in determining health outcomes.

Table 3: Regression Results for the ALL Grouping. Dependent Variable: Log (CMR).

ALL (127)	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	GLS	FE[1]	IV/FE
	1	2	3	4	5	6	7	8	9	10	11	12	13
Const	**10.301**	**6.816**	**6.196**	**6.859**	**9.069**	**6.988**	**6.155**	**8.273**	**4.859**	**6.060**	**6.040**	**4.631**	**4.580**
	89.96	*35.84*	*25.42*	*30.05*	*22.55*	*14.14*	*22.46*	*15.71*	*16.79*	*26.50*	*25.30*	*9.92*	*9.56*
Log(GDP)	**-0.760**	**-0.469**	**-0.385**	**-0.455**	**-0.533**	**-0.595**	**-0.373**	**-0.484**	**-0.276**	**-0.386**	**-0.367**	**-0.262**	**-0.260**
	-55.36	*-25.80*	*-14.59*	*-18.72*	*-16.90*	*-15.55*	*-12.33*	*-12.42*	*-9.57*	*-15.65*	*-14.20*	*-6.56*	*-6.39*
Log(ILR)		**0.364**	**0.293**	**0.306**	**0.281**	**0.250**	**0.284**	**0.261**	**0.298**	**0.296**	**0.300**	**0.480**	**0.486**
		18.36	*12.60*	*11.50*	*10.06*	*8.15*	*10.16*	*8.09*	*13.44*	*13.62*	*12.99*	*6.34*	*6.20*
Log(PHY)			**-0.126**				**-0.103**	**-0.066**	**-0.142**	**-0.083**	**-0.120**	**-0.122**	**-0.128**
			-5.69				*-4.08*	*-2.04*	*-6.68*	*-3.50*	*-5.74*	*-4.32*	*-4.07*
Log(HOS)				**-0.083**			**0.064**[3]						
				-2.44			*-1.86*						
Log(WAT)					**-0.387**			**0.294**[2]					
					-3.80			*-2.57*					
Log(GINI)						**0.279**[2]							
						2.21							
_DEV									**0.492**				
									7.78				
_SSA										**0.312**			
										6.21			
_LAC										**0.349**			
										8.32			
Cross	127	101	101	99	96	82	99	96	101	101	101	101	101
Time	9	8	8	8	4	6	8	4	8	8	8	8	8
Adj R2	0.79	0.81	0.82	0.83	0.82	0.81	0.84	0.81	0.83	0.84	0.81	0.95	0.95
F-Stat	411.6	341.2	278.2	250.8	270.6	128.2	225.7	199.4	282.9	272.7	270.2	110.5	107.8
Fixed-F	38.65	24.49	18.44	22.04	2.80	5.56	17.21	2.73	-	-		21.11	
Hausman	19.96	167.48	92.15	55.24	8.39	7.14	66.89	-	-	-		-	
Normality	73.41	3.97	2.38	8.82	11.26	1.44	3.16	6.66	-	-		158.69	164.84

Source: authors' elaboration. All coefficient estimates are in bold, and t-ratios in italic. All coefficient estimates are valid at 1 per cent significance level, unless otherwise indicated. [1] Includes both cross and time fixed effects. [2] Valid at 5 per cent significance level. [3] Valid at 10 per cent significance level.

Using our preferred specification, which includes GDP, ILR and PHY, we then account for differences that are likely to exist across countries, using a dummy for developing countries, presented in column 9, which turns out to be highly significant. To test whether the difference between developed and developing countries is really in the intercept or in the slope parameters, we add to the regression an interaction term based on income per capita and a dummy. The results, which are not displayed here, indicate that the slope of the parameter for the income per capita among developing countries is considerably lower compared to that for the ALL grouping.

We next test the hypothesis that there may be regional differences by introducing dummies for each of the following developing regions: East Asia and the Pacific (EAP), Latin America and the Caribbean (LAC), South Asia (SA) and Sub-Saharan Africa (SSA).[19] Column 10 displays the regression that includes the dummies for LAC and SSA, which are highly significant; however the dummies for EAP and SA are not significant. As for developing countries, we test whether the difference is in the intercept or in the slope by introducing an interaction term for each region. The results show that the coefficient estimates on GDP for both LAC and SSA are considerably smaller, converging to -0.26.

[19] World Bank categories for developing regions are used. North Africa and Middle East, and Europe and Central Asia are left out as the ALL grouping includes only very few countries that belong to these two categories.

Next, the regional dummies are dropped and the hypothesis of the existence of country-specific effects is tested through running a regression using the cross (and time) fixed estimation method. The results, displayed in Column 11, show a smaller GDP coefficient estimate, which converges to -0.26 once fixed effects are included, as shown in column 12. At the same time, the coefficient estimate on illiteracy rates moves up from around 0.30 to 0.48, while that on number of physicians remain stable at -0.12. Results displayed in column 13, which include the use of instruments to address the problem of reverse causation, do not change significantly.[20]

The Impact on Health and Illiteracy: the ALL Grouping

Table 4 below summarises the results for examining the impact of income on a wider range of health and education variables (illiteracy). It displays results using OLS with time fixed effects, and instrumental variables with cross and time fixed effects, and in the cases of LE and ILR, only cross fixed effects. It shows that increases in income per capita are important to explain poverty outcomes along with other explanatory variables. In regard to the equation that uses illiteracy rate as the dependent variable, public expenditure on education under the IV-FE estimation method shows as having a significant coefficient estimate (though only at 10 per cent significance level). It should be noted that the ILR equation is the only one among those estimated under the IV-FE method that passes the normality test.[21]

[20] The testing results displayed at the lower part of Table 4 show existence of fixed effects at least at 5 per cent significance level among the various specifications; where available, the Hausman test rejects the random effects model in favour of fixed effects at 10 per cent significance level at least; finally, not all regression specifications pass the normality test, especially when both cross and time fixed effects are used. When just cross fixed effects are used to improve the distribution of the residuals, coefficient estimates remain stable, except for illiteracy rate, which moves up strongly from around 0.48 to over 0.90. This is because the latter coefficient captures the secular trend phenomenon, as a result of the removal of the time dummies. Notwithstanding the removal of the time dummies, the regression residuals still fail the normality test and therefore the regression results are not reported in the Table for economy of space.

[21] Also, the Hausman test does not reject the random effects model. For the OLS with time fixed effects which has ILR as the dependent variable, the statistical F-test for fixed effects does not reject the null of no effects. This result is consistent with the Hausman chi-square test for random versus fixed effects, which does not reject the null that both fixed and random effects models have similar coefficients.

Table 4: Regression Results for the ALL Grouping, with Different Dependent Variables

ALL	OLS	OLS	OLS	OLS	IV-FE[1]	IV-FE[1]	IV-FE[2]	IV-FE[2]
Dependent Var	CMR	IMR	LE	ILR	CMR	IMR	LE	ILR
	1	2	3	4	5	6	7	8
Const	**6.196**	**5.932**	**3.912**	**4.227**	**4.580**	**4.128**	**4.387**	**9.290**
	25.42	*25.83*	*78.04*	*4.13*	*9.56*	*9.28*	*106.41*	*28.01*
Log(GDP)	**-0.385**	**-0.373**	**0.041**	**-0.871**	**-0.260**	**-0.250**	**0.003**[3]	**-0.759**
	-14.59	*-15.02*	*7.49*	*-14.76*	*-6.39*	*-6.65*	*0.65*	*-18.08*
Log(ILR)	**0.293**	**0.263**	**-0.023**		**0.486**	**0.513**	**-0.077**	
	12.60	*11.94*	*-4.74*		*6.20*	*7.06*	*-17.92*	
Log(PHY)	**-0.126**	**-0.075**	**0.061**		**-0.128**	**-0.100**	**0.063**	
	-5.69	*-3.57*	*13.46*		*-4.07*	*-3.42*	*14.92*	
Log(GINI)				**1.482**				
				5.84				
Log(EEX)								**-0.070**[4]
								-1.72
Cross	101	101	101	82	101	101	101	100
Time	8	8	8	6	8	8	8	8
Adj R2	0.82	0.79	0.76	0.51	0.95	0.95	0.98	0.93
F-Stat	278.2	239.6	200.7	35.7	107.8	99.2	273.2	85.7
Fixed-F	18.44	18.00	11.35	1.51	-	-	-	-
Hausman	92.15	100.94	19.96	1.45	-	-	21.48	-
Normality	2.38	1.41	675.74		164.84	189.65	33.96	5.85

Source: authors' elaboration. All coefficient estimates are in bold, and t-ratios in italic. All coefficient estimates are valid at 1 per cent significance level, unless otherwise indicated. [1] Includes both cross and time fixed effects. [2] Includes only cross-fixed effects. [3] Non-significant. [4] Valid only at 10 per cent significance level.

The Impact on Child Mortality: The Developing Country (DEV) Grouping

Estimation results for the DEV grouping are similar to those for the ALL grouping under OLS, except that income per capita coefficient estimates are generally smaller while illiteracy rate coefficient estimates are higher than our previous results, except when fixed effects are introduced (see Table 5). However, in both estimations, the illiteracy coefficient is still larger than the GDP coefficient, suggesting that increases in a country's educational capital feeds through into reductions in child mortality rates more effectively than income growth. Another difference is that when the water and physicians variables are used together, water emerges with a slightly larger coefficient than in the ALL grouping and the coefficient for number of physicians becomes slightly smaller, a result that is repeated further below for the LIC and SSA groupings. These results are obtained once we exclude from the developing country grouping China, Guyana and Mongolia, which in the scatter plots of CMR against GDP and then ILR show to stand as outliers – see Figures A4 and A5 in the annex. If these had been included, some of the OLS results would have failed the normality test for the regression residuals.

Table 5: Regression Results for the *DEV* Grouping. Dependent Variable: Log (CMR)

DEV	OLS	OLS	OLS	OLS	OLS	OLS	OLS	GLS	FE[1]	IV/FE
	1	2	3	4	5	6	7	8	9	10
Const	**9.180**	**5.556**	**4.866**	**7.594**	**6.005**	**6.491**	**7.131**	**4.610**	**5.506**	**5.403**
	58.82	*25.42*	*16.48*	*18.24*	*11.86*	*11.79*	*10.60*	*16.38*	*11.03*	*10.50*
Log(GDP)	**-0.603**	**-0.345**	**-0.254**	**-0.377**	**-0.488**	**-0.293**	**-0.340**	**-0.229**	**-0.304**	**-0.297**
	-30.05	*-16.36*	*-7.95*	*-10.39*	*-11.93*	*-6.47*	*-6.63*	*-7.52*	*-6.87*	*-6.57*
Log(ILR)		**0.464**	**0.409**	**0.421**	**0.345**	**0.395**	**0.406**	**0.436**	**0.345**	**0.356**
		21.14	*16.73*	*12.52*	*10.44*	*10.78*	*10.83*	*18.15*	*4.26*	*4.21*
Log(PHY)			**-0.102**			**-0.087**		**-0.086**	**-0.076**	**-0.086**
			-4.59			*-2.74*		*-4.07*	*-2.58*	*-2.60*
Log(HOS)										
Log(WAT)				**-0.426**		**-0.326**	**-0.620**			
				-4.53		*-3.09*	*-4.68*			
Log(GINI)					**0.238[3]**		**0.284[2]**			
					1.87		*2.18*			
_DEV										
_SSA										
_LAC										
Cross	92	85	85	84	72	84	71	85	85	85
Time	9	8	8	4	6	4	4	8	8	8
Adj R2	0.64	0.80	0.81	0.80	0.80	0.80	0.82	0.81	0.94	0.94
F-Stat	147.7	288.9	226.1	220.7	114.8	161.9	130.1	230.6	83.2	79.5
Fixed-F	34.19	20.46	15.29	1.50	4.20	1.25	4.20	17.18	15.71	-
Hausman	18.17	94.86	98.97	4.49	14.73	-	-	98.97[4]	-	-
Normality	2.22	2.14	2.45	3.35	0.89	0.79	2.31	2.45	177.99	142.37

Source: authors' elaboration. All coefficient estimates are in bold, and t-ratios in italic. All coefficient estimates are valid at 1 per cent significance level, unless otherwise indicated.
[1] Includes both cross and time fixed effects. [2] Valid at 5 per cent significance level. [3] Valid at 10 per cent significance level. [4] Fixed Chi-square test.

Given that there is evidence of regional differences and country-specific effects, and the fact that coefficient estimates on income per capita converge when these differences are addressed with the use of dummy variables, we proceed to analysing groupings which we believe hold a higher degree of homogeneity within them: low-income countries, and the SSA and LAC regions.

The Impact on Child Mortality: The Low-Income Country (LIC) Grouping

The scatter plots displayed in Figure A6 in the Annex show Nepal and especially Vietnam as clear outliers in the low-income group. Therefore, these two countries were dropped from the LIC sample. By doing so, the regressions pass the normality tests, and coefficient estimates change only very slightly, thus showing robustness to different country samples.

Similarly to the ALL and DEV groupings, the coefficient estimate on GDP becomes smaller when other variables are added to the regression and when we move from OLS to other estimation methods (see Table 6). But its magnitude is again considerably lower (in absolute terms) compared to those from the previous groupings. This suggests that in low-income countries the direct effects of income per capita on child mortality are smaller compared to other countries. The coefficient estimate on ILR under OLS is on average larger than the GDP coefficient at around 0.30, increasing to approximately 0.5 when other estimations methods are used, suggesting that other factors aside from income can be more important for affecting health outcomes. Also, when WAT is placed together with PHY the former retains significance while the latter loses it, suggesting that the provision of health inputs does not necessarily translate into poverty reduction as well as putting in place basic infrastructure.

A couple of other differences stand out. First, the time fixed effects loses significance under some specifications. Thus, if a secular trend exists at all for indicators among low-income countries, it is much weaker compared to the other countries. Given this result, we tried next cross-fixed effects methods alone. This yielded good results, including the non-rejection of a null hypothesis of normal distribution of regression residuals. Second, the Hausman test does not reject the random effects model in favour of the fixed effects model. Therefore, both models are valid. We report in Table 6 the results for the random effects model.

Table 6: Regression Results for the *LIC* Grouping. Dependent Variable: Log (CMR)

LIC	OLS	OLS	OLS	OLS	OLS	IV	IV-RE[1]
Const	**6.649**	**5.271**	**5.052**	**6.596**	**6.321**	**4.298**	**4.082**
	29.99	*20.75*	*16.78*	*15.53*	*12.71*	*12.42*	*10.16*
Log(GDP)	**-0.213**	**-0.240**	**-0.192**	**-0.299**	**-0.249**	**-0.150**	**-0.170**
	-6.57	*-8.24*	*-5.27*	*-6.92*	*-4.79*	*-2.48*	*-3.79*
Log(ILR)		**0.376**	**0.299**	**0.258**	**0.242**	**0.399**	**0.499**
		8.39	*5.67*	*4.47*	*3.71*	*4.81*	*5.61*
Log(PHY)			**-0.070**		**-0.035**[3]	**-0.096**	**-0.073**
			-3.17		*-1.12*	*-2.32*	*-2.11*
Log(HOS)							
Log(WAT)				**-0.137**[2]	**-0.160**[4]		
				-1.93	*-2.06*		
Log(GINI)							
Cross	34	32	32	32	32	32	32
Time	9	8	8	4	4	8	8
Adj R2	0.37	0.51	0.53	0.41	0.40	0.45	0.71
F-Stat	18.8	27.6	21.6	15.6	11.2	48.8	150.3
Fixed-F	17.50	6.34	5.56	1.14	0.95		
Hausman	5.97	34.24	16.24	3.42	-	-	0.58
Normality	2.23	1.23	3.62	0.18	0.62	1.38	1.43

Source: authors' elaboration. All coefficient estimates are in bold, and t-ratios in italic. All coefficient estimates are valid at 1 per cent significance level, unless otherwise indicated. [1] Includes cross random effects, using the Swamy and Arora estimator of component variances weighing method.
[2] Valid at 10 per cent significance level. [3] Non-significant. [4] Valid at 5 per cent significance level.

Secondly, whilst the GINI variable seems important to explain differences especially across countries, it loses significance among low-income countries.[22] It may be possible that income distribution is important to explain poverty outcome differences among regions (and between developed and developing countries), but does not vary much within low-income countries.

The next step is to report the results for the regional groupings. As with the developing and low-income groupings, country outliers were detected from a simple visual analysis of the country plots. Removing these outliers for the *SSA* grouping worked well in that the regression results passed the normality tests and the coefficient estimates showed just very little variation. However, for the LAC grouping the removal of two countries – Bolivia and Guyana – although contributing to improved normality tests, yielded very different coefficient estimates compared to those from the original sample, thereby

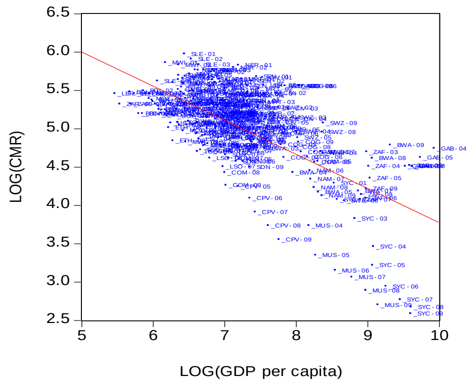
[22] The results are not reported here, but are available on request.

making it difficult to interpret and indeed trust in the results. We therefore report and discuss next the results for SSA only.

The Impact on Child Mortality: The Sub-Saharan Africa (SSA) grouping

Table 7 below displays the results for the SSA grouping. These are achieved following exclusion of Cape Verde and Mauritius from the sample, which appear as outliers in Figure 5 below.

Figure 5: Scattered Plots Between Log CMR and Log GDP – SSA



Source: Authors' elaboration.

The table confirms many results from the LIC grouping: first, coefficient estimates on GDP are small compared to the ALL and DEV groupings, but they are even smaller than the LIC grouping at -0.10 under the IV-RE estimation method and much smaller than the coefficient for the illiteracy rate. Also, when WAT is placed together with PHY, the former has a sizeable and highly significant coefficient, while the latter again loses significance. Overall, this suggests that although levels of income (and wealth) matter, other factors that mediate the income-health outcomes relationship such as educational levels, health inputs and basic social infrastructure can be more important. As with the LIC grouping, under some OLS specifications the F-test fails to reject the null of no time fixed effects. As again, this result takes us to try cross-fixed effects with no time fixed effects. Under this latter method, the Hausman test does not reject the random effects model in favour of the fixed effects model. Thus, both fixed and random effects models seem valid, and we displayed the latter's results in the Table.

Table 7: Regression Results for the *SSA* Grouping - Dependent Variable: Log (CMR)

SSA	OLS	OLS	OLS	OLS	OLS	IV	IV-RE[1]
Const	**7.788**	**5.166**	**4.809**	**6.602**	**6.508**	**4.802**	**4.160**
	45.68	*17.11*	*12.05*	*13.97*	*10.85*	*11.79*	*11.32*
Log(GDP)	**-0.378**	**-0.205**	**-0.163**	**-0.205**	**-0.190**	**-0.163**	**-0.102**
	-15.96	*-8.54*	*-4.58*	*-5.84*	*-3.98*	*-4.47*	*-2.57*
Log(ILR)		**0.349**	**0.325**	**0.209**	**0.210**	**0.322**	**0.376**
		7.93	*6.02*	*3.58*	*2.95*	*5.86*	*7.33*
Log(PHY)			**-0.054**[2]		**-0.010**[3]	**-0.057**	**-0.057**[2]
			-1.76		*-0.25*	*-1.81*	*-1.67*
Log(HOS)							
Log(WAT)				**-0.239**	**-0.249**		
				-3.15	*-2.95*		
Log(GINI)							
Cross	39	34	34	34	34	34	34
Time	9	8	8	4	4	8	8
Adj R2	0.51	0.62	0.60	0.56	0.55	0.60	0.70
F-Stat	36.6	45.2	31.2	29.0	19.9	29.4	150.1
Fixed-F	7.79	3.75	2.78	0.05	0.08	-	-
Hausman	1.40	6.88	9.58	-	-	10.00	4.38
Normality	95.24	0.30	0.02	0.18	0.42	0.03	1.23

Source: authors' elaboration. All coefficient estimates are in bold, and t-ratios in italic. All coefficient estimates are valid at 1 per cent significance level, unless otherwise indicated. [1] Includes cross random effects, using the Swamy and Arora estimator of component variances weighing method. [2] Valid at 10 per cent significance level. [3] Non-significant.

Lastly, we can compare our results to estimations of the impact of economic growth on *income* poverty reduction, which appear to be larger. The World Bank summarises this relationship, as presented by Ravallion (2004), as being between 0.6 and 4.3, depending on initial levels of inequality. This means that a 1 per cent increase in income levels could result in a 0.6 per cent decrease in income poverty in high inequality countries and up to as much as a 4.3 per cent decrease in low inequality countries.

VI. Conclusions

The results confirm that per capita income matters for reducing non-income poverty, though perhaps less than for income poverty. When fixed effects are controlled for, a 1 per cent increase in income per capita is associated with a between 0.26 to 0.30 per cent decline in the child mortality rate for the ALL and DEV groupings, in line with results from previous studies. However, for low-income countries and the Sub-Saharan grouping, these coefficients are considerably lower, indicating that a 1 per cent increase in income per capita is associated with between 0.10 and 0.17 per cent decline in the child mortality rate. This indicates that among poorer countries other factors matter more than income's direct contribution to poverty reduction.

The illiteracy rate variable has larger coefficient estimates than income per capita across all groupings, showing that education matters a great deal for poverty outcomes. For the low-income grouping, a 1 per cent decline in the illiteracy rate is associated with an approximately 0.3 to 0.5 per cent decrease in the child mortality rate. Health inputs, represented by number of physicians and hospital beds, seem to have less of an impact on outcomes that the provision of basic infrastructure, such as access to safe water.

In addition, whilst significant time-fixed effects indicate a strong secular trend underlying social indicators, it appears to be rather weak among low-income countries. A possible explanation for this may be that technical changes are better absorbed and translated into improved outcomes in richer countries, where the changes often originate, due to more developed institutional and economic conditions. The results also suggest that income distribution matters in explaining poverty outcomes across developed and developing countries and across regions.

In sum, if we agree that poverty is multi-dimensional, our results suggest that economic growth might not be the 'single most powerful way' of reducing poverty that current development debate suggests[23], especially in poorer countries, which should be of most concern. Other factors, such as a country's level of education, might have a larger impact on reducing non-income poverty than economic growth. As a result, donors and developing country governments must integrate poverty analysis and growth analysis to understand how poor people can be best equipped to engage in the economic growth process so that it has the greatest possible effect on their overall well-being.

[23] *Making Governance Work for the Poor*. 2006. DFID White Paper

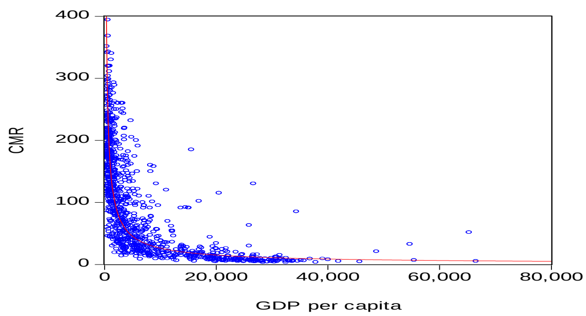
Annex:

Table A1: Basic statistical indicators for all variables used in the panel analysis

Variables[1]	Mean value	Maximum	Minimum	Number of observations
Income per capita (GDP, US$ PPP 2005)	8,013	66,577	234	1057
Child mortality rate (CMR) %	101	394	2.8	1072
Infant mortality rate (IMR) %	66	223	2.4	1093
Life expectancy (LE) in years	61	81	27	1137
Illiteracy rate (ILR) %	36	94	0.26	808
Public Health expenditure (HEX) % GDP	3.2	8.6	0.3	473
No. of Hospital beds (HOS) per 1000 people	3.7	19.9	0.1	681
No. of Physicians (PHY) per 1000 people	0.9	4.7	0.007	944
GINI index (GINI)	43.0	74.3	23.0	261
Water access (WAT) % total population	78.9	100.0	19.0	459
Public education expenditure (EEX) %GDP	4.4	41.8	0.6	912

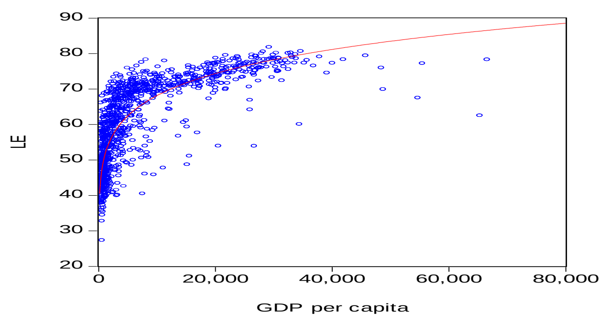
Source: authors' elaboration, based on various sources.
[1] The variables' specific definitions are as follows. GDP: GDP per capita PPP (U$ constant 2005); CMR: child mortality rate under 5 years old per 1000; IMR: infant mortality rate per 1000 live births; LE: life expectancy at birth (in years); ILR: illiteracy rate (% of people aged 15 or more); HEX: public health expenditure as % of GDP; HOS: hospital beds per 1000 people; GINI: Gini index; WAT: improved water source (% of population with access to water); EEX: public expenditure on education as % of GDP.

Figure A1: Child Mortality Rate (CMR) and GDP per Capita



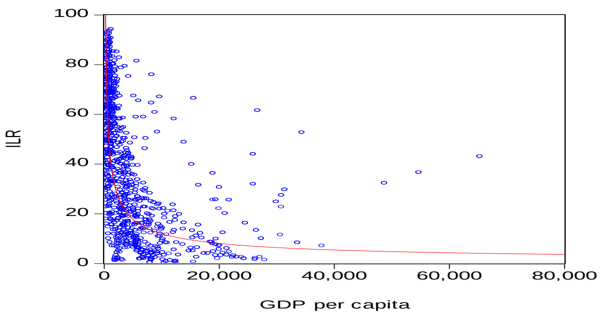
Source: authors' elaboration.

Figure A2: Life Expectancy (LE) and GDP per Capita



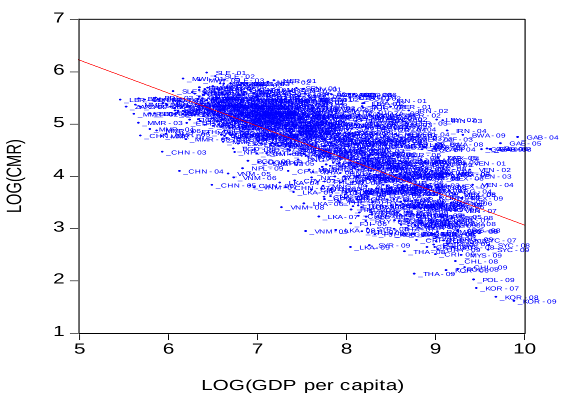
Source: authors' elaboration.

Figure A3: Illiteracy Rate (ILR) and GDP per Capita



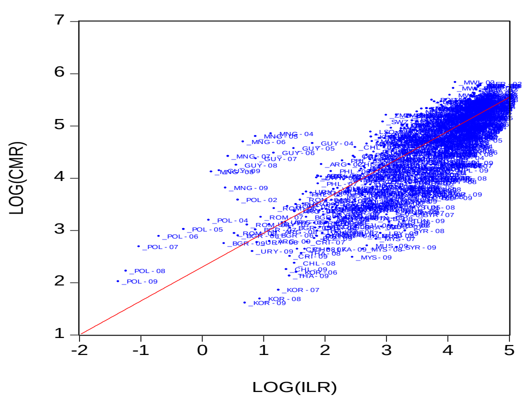
Source: authors' elaboration.

Figure A4: Scattered Plots between Log CMR and Log GDP – Developing Countries



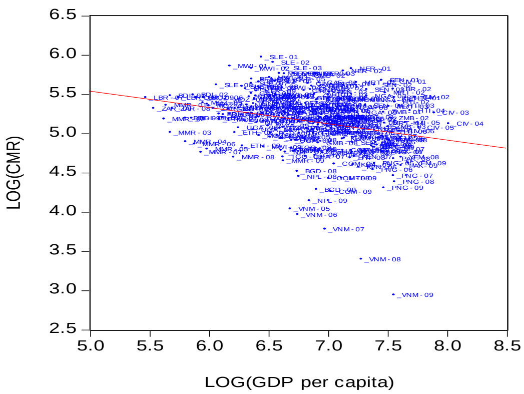
Source: authors' elaboration.

Figure A5: Scattered Plots between Log CMR and Log ILR – Developing Countries



Source: authors' elaboration.

Figure A6: Scattered Plots between Log CMR and Log GDP – LIC



Source: Authors' elaboration.

References

Anand, S. and Ravallion, M. (1993) 'Human Development in Poor Countries: On the Role of Private Incomes and Public Services', Journal of Economic Perspectives, Vol. 7, No 1, pp. 133-50.

Bhalotra, S. (2008) 'Childhood Mortality and Economic Growth', CMPO Working Papers Series, No 08/188, University of Bristol, January.

Easterly, W. (1999) 'Life During Growth', Journal of Economic Growth', Vol. 4, Issue 3, pp. 239-75, September.

Elmirst, S. (2008) 'Analysing the Impact of Economic Growth on Non-Income Poverty: a Literature Review', Save the Children. Unpublished.

Flegg, A. (1982) 'Inequality of Income, Illiteracy and Medical Care as Determinants o Infant Mortality in Underdeveloped Countries', *Population Studies*, Vol. 36, No 3, pp. 441-58.

Gabriele, A. and Schettino, F. (2007) 'Child Malnutrition and Mortality in Developing Countries: Evidence from a Cross-Country Analsysis', University of Rome and UNCTAD paper.

Grosse, M., Harttgen, K. and Klasen, S. (2005) 'Measuring pro-poor growth with non-income indicators' Proceedings of the German Development Economics Conference, Kiel.

Haddad, L., Alderman, H, Appleton, S., Song, L. and Yohannes, Y. (2002) 'Reducing Child Undernutrition: How far does income growth take us?', FCND Discussion Paper No 137, IFPRI, Washington DC.

Hill, A. and King, E. (1992) 'Women's Education in the Third World: An Overview'. In: King, E. and Hill, A. (eds.) *Women's Education in Developing Countries: Barriers, Benefits and Policy*, The John Hopkins University Press, Baltimore.

Kakwani, N. (1993) ‘Performance in Living Standards: An International Comparison’, Journal of Development Economics, Vol. 41, No 2, pp. 307-36.

Panda, M. and Ganesh-Kumar, A. (2007) ‘Impact of Economic Growth on Achieving MDGs’, Indira Gandhi Institute of Economic Research, Mumbai, India. Unpublished.

Pritchett, L. and Summers, L. (1996) ‘Wealthier is Healthier’, *Journal of Human Resources*, XXXI, No 4, pp. 841-68.

Ravallion, M. (2004) ‘Pro-Poor Growth: A Primer’. World Bank

Smith, L. and Haddad, L. (1999) ‘Explaining Child Malnutrition in Developing Countries: A Cross-Country Analysis’, FCND Discussion Paper No 60, IFPRI, Washington DC, April.

Subbarao, K. and Raney, L. (1995) ‘Social Gains from Female Education: A Cross-National Study’, *Economic Development and Cultural Change*, Vol. 44, No. 1, pp. 105-28.

Svedberg, P. (2006) ‘Declining child malnutrition: a reassessment’, *International Journal of Epidemiology*, Vol. 35, No 5, pp. 1336-1346.

Svedberg, P. (2004) ‘Has the relationship between undernutrition and income changed?’ Copenhagen Consensus Opponent Note.

Tandon, A. (2005) ‘Attaining Millennium Development Goals in Health: Isn’t Economic Growth Enough?’ ERD Policy Brief, Economics and Research Department, Asian Development Bank, March.