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The pace and distribution of health improvements during the last 40 years: some preliminary results

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Preliminary, comments welcome

The pace and distribution of health improvements during the last 40 years: some preliminary results

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Abstract. This paper juxtaposes changes over the last forty years in income growth and distribution with the mortality changes recorded at the aggregate level in about 170 countries and at the individual level in 21 countries with at least two Demographic and Health Surveys covering the last twenty years. Over the 1980s-and 1990s, the infant-mortality rate (IMR), under-5 mortality rate (U5MR) and Life Expectancy at Birth (LEB) mostly continued the favourable trends that characterized the 1960s and 1970s. Yet, especially, the 1990s the pace of health improvement was slower than that recorded during the prior decades. In addition, the distribution between countries of aggregate health improvements became markedly more skewed. These trends are in part explained by the negative changes recorded in Sub-Saharan Africa and Eastern Europe, but are robust to the removal of the two regions from the sample. This tendency is observed also at the intra-regional level, with the exception of Western Europe. Thirdly, DHS data for 21 developing countries point to a frequent divergence over time in the within-country distribution of gains in IMR and U5MR among children living in urban vs. rural areas and belonging to families part of different quantiles of the asset distribution, while IMR differentials by level of education of the mother show mixed trends The paper concludes by underscoring the similarities and linkages between changes in income inequality and health inequality and suggests some tentative explanations of these trends without, however, formally testing them.
JEL: I12, I21, I31,J13, J16

1. Introduction.

The debate on the pace of improvement and convergence in levels of well-being between and within developed and developing countries has acquired a particular relevance during the recent decade of economic liberalisation and globalisation. Though health trends can be – and indeed are - affected by non-economic and non-policy factors, sustained improvements and convergence over time in levels of well-being across and within countries could be interpreted as a broad indication of the success of the liberal approach to policy making (Dollar 2001). In turn, slow progress and growing divergence might reinforce the claims of the critics of globalisation who argue that the latter is inefficient and that – both globally and within each nation – 'the rich are getting richer and the poor are getting poorer'. The attention received by such debate in policy circles has substantially increased in the aftermath of the UN Millennium Assembly that set clear targets, among others, for poverty incidence, IMR and U5MR and a number of differentials in well-being, and refocused economic and social policies on the achievement of such targets.

In this regard, the evidence about the pace of growth of GDP per capita in the developed and developing regions in the 1980s and 1990s shows a marked increase in regional variation in relation to the prior decades, with sharp accelerations in some regions and prolonged stagnation in others. As for the trends in the distribution of income per capita, it appears that – while the within-country dispersion has increased in the vast majority of the countries with adequate information – the debate on between-country inequality remains inconclusive as

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the results of alternative analyses vary considerably and are much influenced by the type of statistical assumptions on which they rest.

To break this stalemate, this paper juxtaposes changes in the pace of improvement and in the distribution of wellbeing in both the monetary and health space. While data problems persist also in the evaluation of health-wellbeing, an analysis of between- and within-country convergence in this field does not pose the difficult statistical problems encountered in the analysis of convergence in GDP per capita. Analysis of health convergence is less susceptible of statistical biases and its results should therefore be less controversial than thsoe about income convergence.

2. The valuation of changes in well-being over time

Traditionally, economists measure 'well-being' on the basis of monetary indicators. In this type of analysis, gains (losses) of well-being are normally associated with a rise (decline) in average incomes or consumption, or with increases in the number of people emerging from (falling into) poverty. While useful and widely applied, this approach suffers from considerable theoretical and informational problems and can - particularly during periods of structural transformation such as those experienced by many countries during the last two decades - lead to partial or even erroneous conclusions. First of all, there are several factors other than current income that influence health well-being, including household's assets, human capital, time use, structure and stability, and health practices, as well as income inequality and instability, the relative prices of essential goods, and public health expenditure. Also, an increase (decline) in income normally triggers a series of household and collective responses (including the search for greater efficiency in expenditure, shifts in consumption structure, and so forth) which can cushion households from the negative effects of income reductions, or change consumer behaviour in a way that reduces the positive health impact of income rises. Indeed, it is not uncommon to observe improvements in health indicators concomitantly with declines in household incomes, or a stagnation or decline in health status and growing health differentials in parallel with an income expansion. The income approach, furthermore, suffers from additional problems when used in cross-country comparisons entailing the definition of a common poverty line and the choice of an appropriate exchange rate to convert incomes in national currencies into a common monetary yardstick such as the US dollar. Finally, contrary to an erroneous but common perception, income is not easily measurable, especially during periods of high inflation, radical fluctuations in relative prices and rapid structural change.

Any attempt at measuring convergence in levels of well-being requires therefore that the analyses in the monetary space be integrated with an examination of trends in the capabilities-space. Both approaches are applied below. However, as the changes in monetary well-being are well documented in the literature, the main emphasis of the paper is on the pace and distribution of health improvements, as measured by LEB, its complement to 100 years (an arbitrary upper bound for this variable, see later), IMR and U5MR.

In doing so, we do not concentrate only on average national changes over time but examine – within the limitations imposed by data availability – also the changes intervened in the distribution of such gains between and within countries as well as trends in health differentials within countries. Steep health differentials have been observed for long in many developed and developing world owing to an unequal distribution of

resources and archaic social norms. However, concern for inequality in health has risen during the last decades with the appearance of rigourous studies and the adoption of national or international targets in this area. In the United Kingdom Europe, for instance, the famous Black Report (Black et al. 1980) focussed its attention on the steep health gradient observed among different groups of civil servants. Concern for reducing inequality in health was evident also in the WHO 'Health for All' strategy and the related target setting exercises that in 1984 set average goals for health indicators but also posited that '… by the year 2000, the actual differences in health status between countries and between groups within countries, should be reduced by at least 25%'(Whitehead 1990, cited in Gwatkin 2000). Likewise, the Director General of the World Health Organisation recently stated there is a need to greatly reduce the burden of excess mortality on the poor. Concern for the health impact of economic policies have intensified with the introduction in many countries over the last two decades of structural adjustment programs, that may have inadvertently shifted the policy focus from the search of 'Health for All' and the achievement of the MDG.

The emphasis placed not only on average progress but also on the reduction of health differentials rests on four arguments. First, according to most theories of justice an average improvement in IMR or LEB characterized by high variation around the mean receives a lower social valuation than an equal improvement characterized by a more egalitarian distribution around the mean. Second, targeting health intervention on the deprived groups would permit to achieve faster average improvements than if it were directed to the general population. In many cases, high rates of child or adult mortality in underserved areas can be reduced by low-cost public health interventions, while the further reduction of already comparatively low mortality rates in urban areas is more costly and difficult to achieve. Greater equity in health can thus be a source of greater aggregate efficiency. Third, regardless of their absolute level, large health differentials, or their increase over time, may exacerbate the perception of the unfairness of the social relations prevailing in a given country and raise in this way political instability. Finally, a rise in health differentials, or their persistence at high level, openly collide with the emphasis placed by the Human Rights Convention on the well being of every individual. Rapid rights improvements limited to only a few groups and on average are not sufficient to fulfil the prescription of the HRC and of the MDG.

3. Changes in GDP/capita and its distribution during the last decades

Changes in this area are well documented and are only briefly summarized hereafter to contrast them with the less well documented and analyzed changes in the pace and distribution of health improvements over the last two decades. In addition, as it will appear later in the paper, changes in GDP/c are important determinants of changes in health status, especially in the 120 or so countries with a GDP per capita of less than US$2,000, while shifts in income distribution have been shown to affect health levels and differentials in both developed and developing countries.

3.1 Changes in GDP/C

Table 1 describes a well-known story, i.e. the slowdown in global growth between the 'second Golden Age of Capitalism' (roughly the first two decades in Table 1) and the Era of Liberalisation and Globalisation of the 1980s and 1990s. It documents also the shifts in the sources of world growth from the industrialized countries and towards China, India and other Asian nations. However, given their initial small size, the growth upsurge in

these new engines of growth, was overshadowed by the economic slowdown in the OECD countries, leading in this way to a deceleration in the global growth of GDP/c.

This slowdown in global growth – and its implications for well-being in the monetary space – were somehow unexpected, particularly in the 1990s. While this decade witnessed a rise in the number of civil conflicts and natural disasters, these generally had a limited effect on global growth. At the same time, the decade witnessed a number of positive shocks that – *ceteris paribus* – should have raised growth, family incomes and wellbeing. Among these, low real interest rates on dollar and Euro denominated loand since 1992, a 'peace dividend' equal to 2-3 per cent of the GDP of the OECD countries due to the end of the Cold War, a 'market dividend' expected from the transition to the market economy of the former communist countries, the steady spread of democracy and the diffusion of the information and tele-communication revolution that was expected to raise by one percentage point the long run growth rate of the countries adopting the new technology on a broad scale. Finally, in the 1990s, all developing regions but Africa enjoyed a 'demographic dividend' as the labour force grew faster than the population.

In spite of all this, the last 20 years witnessed a decline in the rate of growth of world GDP per capita (Table 1) that fell from 2.61 per cent a year over 1960-80 to 1.28 over 1980-2000. Growth was particularly weak in the 1990s owing to stagnation in Europe and Japan, economic collapse in the European economies in transition, the persistent difficulties faced by Latin America and Sub-Saharan Africa despite widespread policy reform, stagnation in MENA and – to a lesser extent – the Asian economies affected by a growing number of financial, banking and currency crises. Over 1997 and 1998, for example, the world growth declined by one full percentage GDP point because of the East Asian crisis. In contrast, China and India recorded a rapid acceleration in the tempo of growth following some domestic liberalization, greater export orientation and a general opening up of the economy inspired by a pragmatic, home-grown pattern of reforms considerably more selective and gradual than the standard prescription.

Table 1.Decadal GDP/c growth rates by main regions

	1960-70	1970-80	1980-90	90-2000	1960-80	1980-00
High income countries	4.32	2.58	2.47	1.79	3.45	2.13
Low & middle income countries	2.75	3.34	0.88	1.58	3.05	1.23
Low- Middle Income (excl.China, India)	n.a	n.a	n.a	n.a	n.a	n.a
- East Asia & Pacific	2.39	4.57	5.58	6.39	3.47	5.98
- China	1.49	4.36	7.68	8.95	2.92	8.31
- East Asia & Pacific (excl. China)	2.94	4.36	1.85	2.81	3.65	2.33
- Eastern Europe & Central Asia	5.0*	2.3*	2.1*	-1.82	n.a	n.a
- Latin America & Caribbean	2.47	3.37	-0.84	1.65	2.92	0.40
- Middle East & North Africa	n.a	n.a	-1.31	1.22	n.a	-0.05
- South Asia	1.92	0.65	3.36	3.30	1.28	3.33
- India	1.70	0.68	3.58	3.63	1.19	3.61
- South Asia (excl. India)	2.49	0.54	2.50	2.31	1.51	2.40
- Sub-Saharan Africa	2.56	0.73	-1.15	-0.38	1.64	-0.77
World	3.40	1.82	1.36	1.20	2.61	1.28

Source: authors' calculation on WDI (2004), Notes: the regional aggregates include only developing countries (e.g. East Asia does not include Japan); * The data in the various columns refer to the periods 1950-70, 1970-80, 1980-90 and are from Cornia and Danziger (1997).

The implications of such trends for improvements in the monetary well-being are worth noting. With negative or zero growth in GDP/c in 58 countries, and with growth rising by less than 1% in another 15 nations located mainly in Eastern Europe, MENA, Sub-Saharan Africa, Latin America and part of South Asia, income-poverty either deteriorated or improved slowly (WDI 2004). In contrast, despite growing distributive tensions (see later), poverty declined faster than in the past owing to the rapid growth of the 1980s and a slower but acceptable expansion in the 1990s in East and South East Asia, an acceleration of growth in India in relation to the Golden Age and – especially – the economic miracle of China. Over 1980-2000, this country doubled the already respectable rate of growth recorded over the 1970s. Quite clearly, such acceleration of growth generated large gains in monetary well-being in important sections of these societies, as indicated by the rapid decline in poverty recorded over the last two decades in India, Vietnam and, especially, China (World Bank 2000). These trends together with those recorded in the field of income distribution led to an increasingly more unequal inter-regional distribution of poverty.

3.2 Changes in income distribution

The distribution of per capita income among the citizens of the world can be exactly decomposed into the distribution of average income per capita between-countries and the distribution of income per capita within-countries. Most studies suggest that inequality between-countries accounts for 60-90 percent of global inequality (depending on the index used) and that inequality within countries explains the remaining 10-40 percent[3].

The post-World War II trends in within-country income inequality are fairly well documented and analyzed, especially since the early 1980s, and there is growing agreement in the literature on the fact that within-country inequality has increased in most regions during the last 20-25 years[4]. Indeed, a host of recent works in this area, to which the interested reader is referred to (see Smeeding 2002, Szekely and Hilgert 1999, Milanovic 1998, Cornia 2004,) suggest that in several (if certainly not all) countries inequality declined during the first 20-25 years of the post-World War II period following a fall in unemployment, stable earnings inequality and growing redistribution in the OECD and socialist countries, and the introduction of programs of land reform, educational enlargement and some redistribution in developing countries.

Starting from the mid 1970s, and increasingly so since the early 1980s, frequent reversals in national inequality trends were observed in the OECD countries (beginning with the USA, UK, Australia and New Zealand) and in Latin America. In the latter region, the 1980s were characterised by highly regressive outcomes as inequality rose in all but three countries. In the 1990s, despite the return to full capacity growth, the liberalisation of the external sector and an increase in FDI, inequality worsened further in eight cases and stagnated in seven (Székely and Hilgert 1999).

The 1990s also witnessed growing income polarisation in the economies in transition. Inequality rises were moderate in the countries of Central Europe but explosive in those of the former USSR and South Eastern Europe. Meanwhile, in China inequality rose slowly over 1978-1984 but its rate of increase accelerated over 1985-90 and, even more, after 1990. A reversal of the inequality trend was observed also in the economies of the

[3] This was not true before the industrial revolution when most of global inequality was explained by within-country inequality (see the data for 1820 and 1870 in Table 2)

[4] However, an earlier article (Li, et al. 1998) argued that within-country inequality remained stable over 1950-1990

East Asian miracle known for having achieved in the past rapid export-led growth with falling inequality, as well as in the stable-inequality countries of South Asia. However, in both these two groups of countries, this reversal took place later and was less marked than in other regions. For instance, in South Korea earnings inequality declined steadily over three decades and started rising only in the aftermath of the 1997 crisis. Distributive tensions emerged also in Indonesia and the Philippines already before the Asian crisis and intensified after it. As for India, the gradual liberalisation of the economy in the 1990s led to an acceleration of growth and exports but also to a moderate rise in both urban and rural inequality and a larger rise in overall inequality due to the widening of the urban-rural income gap (Deaton and Drèze 2002). This tendency was less marked in Sub-Saharan Africa and remains largely undocumented in the MENA region due to lack of data.

In summing up this empirical evidence, Cornia (2004) concludes that income inequality rose – though by different extents, with a different timing and with likely different effects on well-being - in 53 of the 73 countries analyzed in his work, including most large economies such as China, India, Indonesia, the USA, Japan, all large Latin American nations, Russia and practically all other countries in transition. Only in nine small and medium sized countries (such as Honduras, Jamaica, France and Malaysia) there was evidence of a decline in inequality over time and only in 16 (including Germany) inequality remained broadly constant.

Such overall trend towards rising within-country inequality is captured also in studies of global inequality (Sala-I-Martin 2002, Bourguignon and Morisson 2002), in which the latter is decomposed into within-country and a between-country components. Table 2 below, for instance, shows that after having declined since 1910, the aggregate within-country component of total inequality started rising around 1970s.

Table 2. Trend in global, within- and between-country income inequality, 1820-1992

	1820	1870	1910	1950	1960	1970	1980	1992
Gini Coefficient (global inequality)	0.500	0.560	0.610	0.640	0.635	0.650	0.657	0.657
Theil Coefficient								
Inequality *within* country groups	0.462	0.484	0.498	0.323	0.318	0.315	0.330	0.342
Inequality *between* country groups	0.061	0.188	0.299	0.482	0.458	0.492	0.499	0.513
Total (global) inequality	0.522	0.672	0.797	0.805	0.776	0.808	0.829	0.855
Mean logarithmic deviation								
Inequality *within* country groups	0.370	0.382	0.399	0.303	0.300	0.304	0.321	0.332
Inequality *between* country groups	0.053	0.162	0.269	0.472	0.466	0.518	0.528	0.495
Total (global) inequality	0.422	0.544	0.668	0.775	0.766	0.823	0.850	0.827

Source: Bourguignon and Morisson (2002)

This brief summary suggests that the declines in income inequality observed during the Golden Age were often reversed over the last two decades. As a result, the domestic Gini coefficients followed in several cases a more or less pronounced and symmetric U-shaped trend, with the turn-around year placed most frequently between 1980 and 1990. Though other factors have contributed to this trend, the inequality reversals of the last two decades suggests are likely to be associated with the widespread shifts from a

Keynesian to a neoliberal policy stance[5]. Obviously, this trend should not be extrapolated into an inexorable rise in inequality in the future as, when the policy shift has fully taken place, the right arm of the U should stabilize at the 'steady state inequality level' typical of the new policy regime, as observed for instance in the UK where – after a rise of 11 points over 1979-90 – the Gini coefficient of disposable income stabilized over the subsequent decade.

2.3 Studies of changes in between-country and global inequality.

The evidence on the trends on between-country inequality are, in contrast, far less conclusive, and indeed there are as many studies claiming that the average income gap between rich and poor countries diminished (mainly because of rapid growth in China, India and East Asia) while several others claim precisely the opposite. The inconlusiveness of this debate does not allow to draw any conclusion about convergence in incomes per capita across countries and about the global equity of the liberalisation and globalisation policies adopted to a different extent by most countries over the last few decades.

Indeed, as indicated in Table 3, studies in this area point to different results about the trend of between-country (and, given its predominance, global) income inequality and do not allow to come to robust conclusions on whether the relative income gap between countries has converged, stagnated or diverged[6]. This situation is explained by the fact that the measurement of the level and trend of between-country and global inequality depends to a considerable extent on a long series of methodological choices made by each researcher. These include the inequality index chosen; the period of analysis considered; the 'correct measurement' of the (presumably overstated) Chinese rate of growth in the 1990s; whether the comparisons are carried out on the basis of GDP/c derived from the National Accounts or the disposable income per capita derived from Household Income and Expenditure Surveys; whether average GDP/c or income/c of each country are weighed by their population size; whether the converison in dolalr is ewffected by means of the market exchange rate or the PPP exchange rate; whether it is assumed that all citizens of one nation have the same income per capita, or synthetic statistics of the distribution of income (such as the Gini or Theil coefficients) are used, or on micro-data depicting precisely the distribution of income/c are relied upon; the hypotheses made about the shape of income distribution for countries and years with missing data; the treatment of large highly dualistic countries, such as China and India, as a single nation, two separate sub-nations (each comprised of an urban and rural sector) or as multiple nations (as in the case of the

[5] Other hypotheses put forward to account for the observed rise in within-country income inequality focus on South-North trade and migration, and technological change. These explanations may apply in a few cases but are not sufficiently general to explain for the widespread increase in inequality observed in very different country settings (Cornia 2004)

[6] Things are quite different if between-country inequality is assessed not as a ratio of but as the absolute differences between the GDP/c of the countries involved. In the latter case, the evidence clearly points to a growing North-South polarization. For instance, even if China grows at 8% a year from a GDP/c of 2000 US$PPP per capita, and Europe grows at only 1.5% a year from an intial base of 30.000 US$PPP per capita, after the first year, the relative income gap (the ratio of the GDP/c of China vs Europe) declines but the absolute income gap rises by 290 US$PPP. Given the differences in initial GDP/c capita, the absolute income gap between China, India and SEAsia has continued widening and – on current trends - will continue to do so for another 30-40 years, despite the much faster rate of growth of the latter economies. This apsect of convergence has, however, escaped most of the debate. As noted by Wade (2002, p.23) 'The other strong conclusion is that absolute income gaps between the West and the rest are widening, even in the case of relatively fast growing countries like China and India and are likely to go on widening for another half century at least. No one disputes this, but globalists tend to focus on relative incomes only' (emphasis added).

Chinese provinces or Indian states); and the inclusion of the 'special case' of China in the calculation of between-country and global inequality. As the table shows, different approaches lead to different conclusions about between country and global inequality.

Table 3. Findings of studies on changes over time in within-county, between-country and global inequality

	Period Covered	Exchange rate used	Inequality measure	Within countries Inequality	Between countries Inequality	Total (global) inequality	Approach followed and main assumptions
UNCTAD (1997)	1980-90	Market	Gini	…..	Up	….	Uses GDP/c and income shares
UNDP (1999)	1960-97	Market	Quintile ratio	…..	Up	….	Uses GDP/c
Korzeniewicz and Moran (1997)	1965-92	Market	Gini Theil	….. …..	Up Up		Uses GDP/c
Schultz (1998)	1968-89	PPP	Gini Gini(excl China)	Up Up	Down Stable	Down Up	Uses GDP/c and income shares
Sala-i-Martin (2002)	1970-98	PPP	7 ineq. indexes 7 ineq. indexes (excl. China)	Up Stable	Down Slightly up	Down Slightly up	GDP/c and quintile shares for 125 countries (for 57 of them assumptions made on shape/stability of distribution) National trends in quintile shares are obtain through linear regression.
Bourguignon and Morrissson (2002)	1980-92	PPP	Gini Theil MLD	….. Up Up	….. Up Down	Stable Up Down	GDP/c and income shares to proxy the distribution of 33 large countries/groups
Dowrick and Akmal (2001)	1980-93	Afriat	Gini Theil SCV	Up Up Up	Slightly up Up Up	Up Up Up	Uses GDP/c and income shares
Milanovic (2000)	1988-93	PPP	Gini Theil	Up Up	Up Up	Up Up	Income/c and original distributions from 91 nations. Large Asian countries are separated into rural and urban
Li, Squire, Zou (1998)	1980-92	n.a.	Gini	Stable	n.a.	n.a.	49 countries linear trend regression
Cornia (2002)	1980-95	n.a.	Gini	Up	n.a.	n.a.	73 countries quadratic trend regression

Source: Cornia (2004) which includes also the bibliographical references reported in the table.

4. The pace of improvement and distribution of health gains during the last decades

In most regions, the last 20 years have witnessed a continuation of the improvements in key health indicators (IMR, U5MR) recorded over 1960-1980 (Fox 1998). However, to be able to offer an unambigously favourable evaluation of this encouraging news, it is necessary that such aggregate gains occurred at a pace similar to or faster than that realized over the preceding two decades; concerned all or most regions and countries; and

benefited most groups within each country (including young girls, residents of rural areas and children born to mothers with low education).

4.1 Evidence from the literature

There is a small but growing literature on changes in health status and convergence in LEB, IMR, U5MR and the death rate of specific age groups. For reasons of space, only the most salient studies in this literature are reviewed hereafter. We divide such literature in three parts corresponding to the empirical analysis we carry out below.

(i) pace of improvement in health status. Quite apart from the literature developed in the context of the achievement of the MDG, most of the literature in this area mainly focuses on whether positive changes were continued over time, regardless of their pace. In reviewing changes in IMR, LEB and life expectancy at age 1, for instance, Fox (1998) emphasizes that progress continued uninterrupted for all these indicators for both developing and developed countries, but does not explore whether the gains he refers to have taken place at the same, faster or slower pace than in the past. Likewise, in analyzing changes in LEB over 1980-2000, Goesling and Firebaugh (2004) note that in the 1990s the increase in LEB in rich countries was smaller than that recorded in the developing countries but do not compare it with that they recorded over the prior decade or two. However, Wagstaff and Cleason (2004) note that, in the 1990s, progress in U5MR reduction has been slower than in the 1980s and than the progress needed to achieve the MDGs in this area. However, Deaton (2004) points to a worldwide reduction in the rate of decline of child mortality and to slower gains in child mortality. In turn, Deaton and Drèze (2002) as well as others have underscored that in India IMR declined during the 1990s by only 12.5 percent as against 30 percent in the 1980s. This is an important point to which we shall return in section 5.

(ii) between-country convergence in health status. Many demographers have, over the past three decades, pointed to growing convergence in health status between the developing and the developed countries. Wilson (2001), for instance, found that life expectancy converged across countries starting from 1950. Meyer (2001), in turn, focuses on club convergence, by emphasizing that the (unweighed) distribution of life expectancy across countries remained twin peaked over 1960-1997 despite the 'migration' of several countries from the left to the right peak and the increase over time in the mode of each of the two components of this bi-modal distribution. In this way, a trend towards convergence is evident only within the low-LEB club of poor countries and within the high-LEB club of rich ones. Poor nations appear to be converging to a life expectancy of 45-50 years, while the better off ones are coming together at a level of 75-80 years.

Likewise, Micklewright and Stewart (1999) find that the standard deviation of the distribution of underfive mortality of the 15 members of the European Union declined over 1970-95 by some 90 percent as death rates in the countries of Southern Europe moved closer to those of the Northern European countries. Convergence was also found – if at a lower pace – for the mortality rate of children of 5-14 years of age, while the standard deviation of the mortality rates of those of 15-24 years (that depend more on behaviours than access to health care) declined only marginally. Convergence for the first two indicators was to a considerable extent policy-driven. Indeed, the Maastricht Treaty established a Cohesion Fund that provides structural and regional funds equivalent to 3-4 % of the GDP of the reciepient countries to help the four nations with relatively lower GDP per capita to catch up with the EU average. Participation in the EU may have also

favourably influenced the convergence in GDP/c and most health indicators, as all members of the union had to gradually adopt advanced standards – the so called *acquis communautaires* - in several health–related areas.

Recent analyses point, however, to growing between-country divergence in health status owing to the dramatic worsening of health trends in Sub-Saharan Africa and Eastern Europe, the slow gains recorded in China despite a quadrupling of GDP/c over 1980-2000 (see later) and the underperformance of some countries of the other regions. In this regard, Goesling and Firebaugh (2004) analyze the distribution of life expectancy at birth of 169 countries for the period 1980-2000. They note that while 1980-1990 LEB increased in all regions, it then declined over 1990-2000 in Sub-Saharan Africa and the transition economies. These divergent paths have led to a polarisation of the cross country distribution of LEB, as confirmed by the upward trend recorded since 1992 in relative measures of dispersion of the distribution of life expectancy such as the Gini coefficient (that best captures changes in the middle of the distribution), the Theil index and the squared coefficient of variation (both particularly sensitive to changes at the top of the distribution), and the mean logarithmic devation (that best captures changes at the bottom of the distribution). Thus, health inequality declined until 1992 but then increased significantly between 1992 and 2000. A decomposition of this increase in LEB inequality into changes in population shares and life expectancy ratios led them to conclude that – although only one-tenth of the world's population lives in Sub-Saharan Africa – the HIV/AIDS driven decline in LEB (- 3.5 years on average, as opposed to a worldwide increase of 1.2 years) was the main factor in the recent divergence. When Sub-Saharan Africa was remouved from the sample, the cross-country divergence in LEB disappeared as, he argues, the increased divergence caused by the fall in life expectancy in the transition economies was compensated by the rapid rise recorded in populous India.

Also McMichael et al. (2004) question the empirical evidence of LEB convergence. They identify in fact three sets of countries, the first (composed mainly of advances nations) with a plateauing trend, a second group of middle-income countries converging rapidly towards the LEB of the advanced nations, and a third group comprising at least 42 countries (mostly from Sub-Saharan Africa and the economies in transition, but including also the Bahamas, the Dominican Republic, Fiji, Haiti, Honduras, Iraq and North Korea) that had in 2001 a lower life expectancy than in 1960, 1980 or 1990. In their view, the usual explanation of health convergence (i.e. the rapid fall in deaths due to infectious diseases in poorer countries and the slowlier decline in mortality due to chronic diseases) has to be enlarged so as to take into account the new life-threatening challenges faced in the economic, social and environmental areas.

(iii) within-country convergence in health indicators and mortality differentials. Average improvements in aggregate within-country health indicators may result from widely different rates of improvements among social groups identified on the basis of gender, rural-urban residence, region, income class, ethnic group, level education and labour market status of the head of the household. In the worst cases, an average improvement may result from progress among the top 'x' percent of the population and retrogression among the remaining (100-x) percent. Hereafter we review some of the common findings of the literature on health differentials, particularly the analyses that focus on their changes over time.

The first observation in this regard is that large health differentials are observed in practically all countries, including the most advanced one. Ruzicka et al (1989) provide a comprehensive discussion of trends and methodological problems in the field of differential mortality for a variety of countries.

One of the most important differentials in infant mortality is that by level of education of the mother (Caldwell 1979, Bicego and Boerma 1993). Greater education among mothers is also found to reduce the IMR differential by gender (Murthi et al. 1995). The region and, in particular, the type (rural or urban) of residence are among the strongest correlates of infant and child mortality, the common presumption being that the place of residence accounts for different access to sanitation, housing and health and educational services (Defo 1996, Sastry 1996, Lalou and Le Grand 1996, Jhamba 1999). Health differentials by income level are equally marked. In an analysis of ethnic differentials in child mortality in 11 African countries, Brockerhoff and Hewett (2000) identify significant and growing differentials which are closely linked to economic inequality and uneven access to services by different tribes (Table 4).

Table 4. Mortality differentials among ethnic groups in selected African countries

Ivory Coast (Others/Baulé)		Kenya (Others/Kikuyu)		Senegal (Others/Serer)	
- 1970-4	1.32	- 1968-72	1.71	- 1968-72	0.84
- 1980-4	1.47	- 1978-82	3.27	- 1978-82	0.90
- 1990-4	1.21	- 1988-92	2.87	- 1988-92	1.28

Source: Brockerhoff and Hewett (2000)

The third point, central to the analysis of this paper, is that in more egalitarian societies, mortality differentials are not as glaring as in unequal societies. This is an important point that needs underscoring, as mortality differentials narrow with an improvement of the average only if development policy explicitly focus on equity. Hardly ever, a class-neutral, gender-neutral and region-neutral development policy is able to reduce mortality differentials, even in the presence of sizeable average improvements. For instance, in the USA, IMR declined to a then record low of 7.9 per 1,000 live births in 1994. At the same time, the black/white IMR ratio grew from 1.6 in 1950 to 2.2 in 1991 (Cornia and Danziger 1997). Likewise, an analysis of survey data on inequalities in U5MR by consumption quintiles for 9 developing countries finds statistically significant inequalities for most cases. U5MR differentials were particularly pronounced in highly unequal Brazil where an IMR concentration index of –0.322 was found. At the opposite end of the spectrum, the concentration index was -0.016 in Vietnam and -0.028 in Ghana, i.e. countries where consumption inequality was less pronounced (Wagstaff 2000). In turn, Wilkinson (1996) reports a comparison in infant mortality rates by social class between England & Wales and Sweden, which shows a marked social gradient in the first one but not in the latter, as Sweden was strongly committed to reducing health inequality.

The recent increase in within-country income inequality (section 3) does not bode well for the future of health inequality, though – in some countries – the negative effect of growing income inequality might have been compensated by the introduction of public health programmes with a progressive or proportional incidence. In this regard, growing mortality differentials by income level are reported by Delamonica and Minujin (2003) on DHS data for 24 developing countries. The study covers changes intervened over the 1980s and 1990s in the ratio of the U5MR of children of families belonging to the bottom

20 per cent of the household distribution ordered in ascending order of an "asset index"[7] to the U5MR of children of households belonging to the top 20 per cent of the same distribution. In the 1980s, such ratio was found to range between 1.3 to 4.7 in the 1980s, with an average of 2.2. However, over the next ten years such ratio worsened in 11 of the 24 countries considered, remained constant in 10 and improved in three with relatively small populations. Such trend was observed not only in countries in which the average U5MR worsened or remained constant but also in 7 (out of 13) where the average declined. In these countries, the average U5MR reduction was mostly driven by the decline in child mortality of the middle and top income groups. Meanwhile, among the poor such reduction was considerably lower or statistically not different from zero.

A recent analysis of IMR differentials in China making use of census and population survey data by Zhang and Kanbur (2003) found that, while the nationwide IMR declined sharply from the 1960s to the 1980s, it then levelled off or was reversed in recent times due mainly to the surge in rural IMR from 37 to 44.8 per thousand between 1981 and 1995. As a result the ratio of rural/urban IMR rose from 1.5 to 2.1, while the female/male IMR ratio rose from 0.9 to 1.3. In addition, there was a sharp increase in regional variability of health outcomes as signalled by the respective rise in the Gini and Theil coefficient of the regional distribution of IMR from 22.4 to 34.8 and from 9.3 to 19.4. A decomposition of the Theil index into within-urban plus within-rural versus between urban-rural inequality shows that both components contributed to the overall surge in IMR inequality by region but that the between-component rose faster that the within-component. The authors link these adverse effects to the fiscal decentralisation of 1978, the dissolution of the communes, the authorisation of private medical practices in 1984 and the freedom granted to urban-based SOEs to lay off workers and cut health subsidies. The authors conclude by noting that, given the weakness of safety nets and social insurance arrangements in urban areas and the limited fiscal power of villages, it was to be expected that increases in income inequality would translate into increasing health inequality. This conclusion is confirmed by the modest gains in LEB recorded in China over 1980 and 2000 (Table 5) despite the quadrupling of GDP/c over the same period.

5. Empirical evidence: a slowdown in the pace of health improvement

In this section we focus on the pace of improvement over 1960-2000 of IMR, U5MR and LEB. We extract from the WDI values for these variables for 1960, 1970, 1980, 1990 and 2000 for 168 countries (see Annex 1) with available information. Missing data for 1960 and 1970 for several former communist countries of Europe were filled in on the basis of the data of the UN Population Prospects, 2002 Revision. We then computed average, population weighted, compounded rates of change over the decades of the 1960s, 1970s, 1980s and 1990s for all the main regions and country groupings, and for China and India separately.

(i) A steady and widespread decline in the rates of improvement in LEB. Table 5 presents trends in the level of LEB and its annual compounded percentage rate of change over the last four decades. The regional averages are obtained by weighting the country data for the population size[8]. The table documents the rapid gains recorded in the

[7] The "asset index" is used to proxy household wealth and income and is used to stratify households into quintiles. It is constructed following the procedure described in Filmer and Pritchett (1998) and is based on the availability of certain household durables (such as radios and bicycles), the quality of dwellings (as revealed by the type of roof and floor) and access to different of water and sanitation facilities.

[8] The regional averages and measures of dispersion presented in the paper are always weighted by the appropriate populations (live births for IMR, and the whole population for LEB). Because of their large

developed and, even more, in the developing countries over the 1960s. In the latter, the development of national health systems in newly independent states and the transfer of Western public health technologies led to rapid gains in LEB. In the socialist countries of Europe such gains were less pronounced and indeed the 1970s they recorded a decline in life expectancy due to'chronic stress' (Bobak and Marmot 1996) while the 1990s witnessed an even more pronounced fall because of the sharp rise in stress related cardiovascullar an violent deaths caused by the 'acute stress' induced by a highly problematic transition to the market economy (Cornia and Paniccià 2001). As a result, in 2000 LEB in this region was not significantly different than in 1960. The table documents also the massive loss of life expectancy caused in Sub-Saharan Africa in the 1990s by the HIV/AIDS pandemic and, to a lesser degree, by economic stagnation, the weakening of health services, rising inequality and the spread of local conflicts.

Table 5. Levels and annual average rates of change in LEB, 1960-2000

LEB	Levels					Average annual % rate of change			
	1960	1970	1980	1990	2000	60-70	70-80	80-90	90-00
High income countries	68.9	70.9	73.8	75.9	77.9	0.28	0.40	0.29	0.25
Low & middle incombe countries	44.4	55.2	60.0	63.1	64.4	2.20	0.83	0.50	0.20
- Low & Middle Income (excl. China & India)	48.8	53.8	58.6	61.7	62.2	0.99	0.85	0.53	0.08
- East Asia & Pacific	38.8*	59.1	64.3	67.2	69.0	4.29*	0.86	0.43	0.27
- China	36.3 *	61.7	66.8	68.9	70.3	5.45*	0.80	0.30	0.20
- East Asia & Pacific (excl. China)	45.9	51.7	57.8	63.0	66.0	1.21	1.13	0.86	0.47
- Eastern Europe & Central Asia	65.5	67.9	67.7	69.4	68.5	0.37	-0.03	0.24	-0.12
- Latin America & Caribbean	56.3	60.4	64.6	67.9	70.3	0.71	0.67	0.50	0.35
- Middle East & North Africa	46.9	52.3	58.1	64.3	67.9	1.09	1.06	1.02	0.55
- South Asia	43.9	48.9	53.6	58.5	62.4	1.08	0.93	0.88	0.66
- India	44.3	49.4	54.2	59.1	62.9	1.08	0.93	0.88	0.62
- South Asia (excl. India)	42.3	47.1	51.7	56.5	61.0	1.08	0.94	0.88	0.77
- Sub-Saharan Africa	40.2	44.2	47.6	50.0	46.5	0.94	0.75	0.48	-0.71
World	50.2*	58.6	62.6	65.3	66.5	1.55*	0.65	0.42	0.19
World excluding SSA	50.2*	60.4	63.9	66.9	68.9	1.51*	0.56	0.46	0.30
World excluding SSA and EECA	50.1*	59.4	63.5	66.6	68.9	1.72*	0.67	0.48	0.34

Source: authors' calculations on WDI (2004) and UN Population Prospects, 2000 Revision (2002). Notes: the regional aggregates include only developing countries (e.g. East Asia does not include Japan);* values are influenced by the famine that hit China during the Big Leap Forward of 1959-1961.

However, the main message emerging from the table concerns the steady and generalized decline over time in the rate of progress in LEB, a decline that is robust to the remouval of Sub-Saharan Africa and Eastern Europe from the sample. The second message is that such slowdown was most pronounced in the 1990s, possibly suggesting – with the two exceptions mentioned above – the emergence of systemic problems with the development

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populations, China and India exert a strong bias on the regional and even world averages and measures of dispersion. In order to better grasp the recent regional and global trends in health well-being we calculated also the unweighted averages and measures of dispersion that are presented in Annex 2 for reasons of space. As expected, the unweighted dispersion indexes are greater than the weighted ones, but broadly confirm the regional and global trends in LEB, (100-LEB), IMR and U5MR and LEB.

pattern followed during this decade, or the influence of unknown factors. This conclusion, however, might be biased by the method of calculation of the 'average annual percentage rate of change in LEB'. Indeed, such variable is upper bounded at, say, 100 years of age[9], thus authomatically forcing smaller absolute and relative gains in countries with an already high life expectancy. Thus, barring cases of extreme deteriorations, this method of calculation is unable to capture changes in the real rate of progress of LEB.

(ii) A widespread decline over the 1990s in the rate of improvement in (100-LEB). To avoid this problem, typically met in measuring progress in upper bounded variables, we calculated (Table 6) the average annual compounded rate of change of the difference between 100 (the arbitrarily assumed upper bound of LEB) and its observed values, i.e. the variable 'life years lost in relation to the maximum attainable LEB'. This variable has the advantage of being scale invariant, which means that the computation of rates of improvement is independent from the base value of the variable. For instance, in this framework, a 2 year rise in LEB in a country with a LEB of 80 generates a 10 percent fall, that is identical to that generated by a rise of 6 years in a country with a LEB of 40.

Table 6. Levels and annual average rates of change in (100-LEB), 1960-2000

	Levels					Average annual rate of change			
	1960	1970	1980	1990	2000	60-70	70-80	80-90	90-00
High incombe countries	31	29	26	24	22	-0.64	-1.04	-0.86	-0.84
Low & middle incombe countries	56	45	40	37	36	-2.14	-1.12	-0.80	-0.35
Low & Middle Income excl. China & India	51	46	41	38	38	-1.03	-1.08	-0.79	-0.14
- East Asia & Pacific	61*	41	36	33	31	-3.94*	-1.37	-0.83	-0.56
- Cina	64*	38	33	31	30	-4.97*	-1.42	-0.63	-0.45
- East Asia & Pacific excl. China	54	48	42	37	34	-1.14	-1.35	-1.30	-0.85
- Eastern Europe & Central Asia	35	32	32	31	32	-0.73	0.06	-0.52	0.28
- Latin America & Caribbean	44	40	35	32	30	-0.99	-1.10	-0.98	-0.78
- Middle East & North Africa	53	48	42	36	32	-1.06	-1.29	-1.58	-1.05
- South Asia	56	51	46	42	38	-0.92	-0.97	-1.11	-0.99
- India	56	51	46	41	37	-0.94	-0.99	-1.14	-0.97
- South Asia excl. India	58	53	48	44	39	-0.86	-0.91	-1.03	-1.08
- Sub-Saharan Africa	60	56	52	50	53	-0.68	-0.63	-0.45	0.66
World	50*	41	37	35	34	-1.83*	-1.00	-0.74	-0.36
World without SSA	48*	40	36	33	31	-1.91*	-0.92	-0.86	-0.62
World without SSA and EECA	50*	41	37	33	31	-2.04*	-1.06	-0.88	-0.71

Source: authors' calculations based on WDI 2004 and the UN Population Prospects, 2000 Revision (2002).
Notes: the regional aggregates include only developing countries (e.g. East Asia does not include Japan);* these values are influenced by the famine that hit China during the 1958-1962 Big Leap Forward

[9] Such upper bound is obviously arbitrary, as the maximum attainable life duration varies over time with the development of medical techologies and other factors. Over the medium term, however, it is undeniable that we face some kind of immutable genetic maximum that cannot be changed by an increase in resources and medical services. The results of the analysis would not change if instead of an upper bound of 100 years we had chosen one of, say, 95 or 105 years.

Table 6 points to some of the results identified in Table 5, as in the case of Eastern European and Sub-Saharan Africa, but offers a different picture in terms of the trends over time in rates of improvement. To start with, it appears that the rate of decline in (100-LEB) varies considerably over time, and that the best results were achieved in different regions during different decades, i.e. the 1960s in SSA and Eastern Europe (this confirming the results of table 5), the 1970s in East Asia, Latin America and the high-income group, the 1980s in MENA and India and the 1990s in the South Asian countries other than India (likely because of the rapid mortality decline recorded in Bangladesh). Thus, gone is the conclusion of a steady and generalized decline in rates of improvement.

However, Table 6 confirms – with the usual exception of South Asia other than India – the generalized decline in rates of improvement over the 1990s. Besides the cases of Eastern Europe and Sub-Saharan Africa, a marked slowdown in relation to the prior decade is evident in China and the East Asian economies, and a less pronounced one in Latin America, MENA and India. Interestingly, the decline recorded in the high income countries is modest, suggesting the possibility of continued gains at high levels of LEB.

(iii) A fairly widespread decline over the 1990s in the rate of improvement in IMR and U5MR. Table 7 presents the population weighted levels and average annual compounded rates of change of IMR over the period 1960-2000.

Table 7. Levels and annual average percentage rates of change in IMR, 1960-2000

	Levels					Average annual rate of ch'ange			
	1960	1970	1980	1990	2000	60-70	70-80	80-90	90-00
High income countries	36	22	12	8	6	-4.8	-5.9	-4.0	-2.8
Low & middle incombe countries	138	107	86	69	62	-2.5	-2.2	-2.2	-1.1
Low & Middle Income (excl. China & India)	129	111	94	75	70	-1.4	-1.7	-2.2	-0.7
- East Asia & Pacific	134*	85	56	43	34	-4.4*	-4.1	-2.6	-2.3
- China	150*	85	49	38	32	-5.5*	-5.4	-2.5	-1.7
- East Asia & Pacific excl. China	91	85	72	52	38	-0.7	-1.7	-3.1	-3.2
- Eastern Europe & Central Asia	68	53	45	37	32	-2.5	-1.6	-1.9	-1.4
- Latin America & Caribbean	102	86	61	43	31	-1.7	-3.4	-3.4	-3.2
- Middle East & North Africa	163	131	94	57	46	-2.2	-3.3	-4.9	-2.1
- South Asia	147	129	115	88	71	-1.3	-1.1	-2.6	-2.1
- India	146	127	113	84	68	-1.4	-1.2	-2.9	-2.1
- South Asia (excl. India)	150	135	121	99	79	-1.0	-1.1	-2.0	-2.3
- Sub-Saharan Africa	164	141	116	110**	104**	-1.5	-1.9	-0.5**	-0.6**
World	122	97	79	64	57	-2.3	-2.0	-2.1	-1.2
World excluding SSA	115	91	72	54	45	-2.3	-2.2	-2.8	-1.9
World excluding SSA and EECA	119	93	75	56	45	-2.4	-2.2	-2.9	-2.0

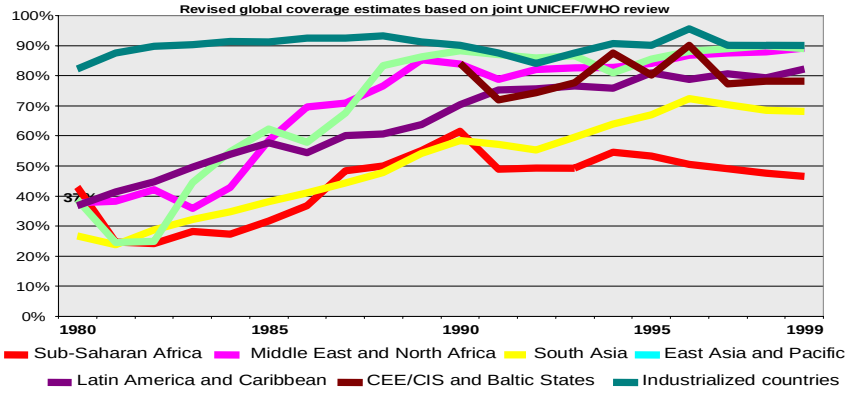
Source: authors' calculations on WDI (2004) and the UN Population Prospects, 2000 Revision (2002). Notes: * these values are influenced by the famine that hit China during the 1959-1961 Big Leap Forward; ** The WDI IMR data for Sub-Saharan Africa for the 1980s and 1990s have been recently revised and describe a less dramatic trend in the 1990s as they spread the deterioration over the last two decades. Such revision is however puzzling as a main factor in infant and child mortality has been the rise in HIV adult prevalence rate, a phenomenon that has sharply accelerated in the 1990s in relation to the 1980s.

In many developing countries, infant deaths represents a large share of the total, and IMR is generally considered a key indicators of overall health status. U5MR is an even more accurate predictor of health wellbeing, but information on such variable – that correlates closely with IMR – is available for only 156 countries. For this reason, as well as for reasons of space, this subsection presents only the results of the analysis of IMR trends[10]

As noted in Fox (1998), the last two decades witnessed a continuation of the improvements in key child welfare indicators recorded over 1960-1980. In fact, the 1980s recorded the fastest rate of decline in IMR in Latin America, MENA and India (in the rest of South Asia the fastest improvements were recorded in the 1990s, owing to the rapid fall in mortality recorded in Bangladesh), while fairly high rates of IMR decline were sustained in East Asia, Eastern Europe and the advanced countries, the only exception to this rule being Sub-Saharan Africa.

The fast IMR decline in Latin America and MENA during 1980s is both remarkable and puzzling, in view of the recession experienced by both regions and the debt, public finance and inequality crisis experienced by Latin America during the same period[11]. The 1980s gains in child survival in these two regions were therefore likely due to the rise in parents literacy and female education that are known to enhance the use of family resources and facilitate the absorption of health knowledge and appropriate health practices. An even greater role was played by the spread of low cost health technologies and community-based approaches to health, among which immunisation and oral rehydration plaid an important part. As shown in Figure 1, the coverage of DPT3 immunisation rose in Latin America from below 40 percent in 1980 to 75 percent in 1990, to level off during the subsequent decade at around 80 percent. In MENA, the expansion in immunisation was even more rapid and the rate levelled off at around 85 percent. In India, progress in immunisation in the 1980s was accompanied by a widespread and fairly egalitarian growth that reduced steadily rural poverty.

Figure1. DPT3 Percentage Immunization rate, 1980-1999



Source: Unicef (2001)

[10] The results of the U5MR can be obtained from the authors and comparisons among the main trend are reported in Annex 2. The points identified above in the analysis of IMR are broadly confirmed. The only difference worth mentioning concerns the more pronounced convergence in U5MR for Western Europe in the 1990s.

[11] In contrast, in MENA the public health expenditure/GDP ratio remained at a fairly high 4-5 % of GDP during the entire decade. In addition, the region recorded a massive rise in female education made possible by large allocations of public funds to education staring from the 1970s.

Table 7, however, shows also that the rate of IMR reduction decelerated in the 1990s in all but two regions where progress continued at broadly the same pace of the 1980s. In China, India, MENA and Eastern Europe the decline was sizeable. This decline is evident also at the global level, and is robust to the elimination of Sub.-Saharan Africa and eastern Europe from the sample.

It has been argued that such a deceleration has been caused by three main factors. First, the levelling off of vaccination (and oral rehydration) coverage at still inadequate rates of 'herd immunity'. Second, in regions with IMR below 30-40 per thousand, the slowdown might be due to the elimination of all 'easy-to-remove'causes of infant death and the difficulties faced in dealing with complex and costly perinatal problems. Third, the quasi-stagnation (or, according to other data, the rise) of IMR and, even more so, U5MR in Sub-Saharan Africa was undoubtedly related to the rise in AIDS deaths among infants and young children. Regression analysis by Cornia and Zagonari (2002) for instance estimated that any percentage increase in the adult HIV prevalence rate raised U5MR and IMR by 1.57 and 0.88 points respectively. This means that in countries with high prevalence (say, 20%) the IMR rises by about 17 points per thousand, while the corresponding increase in U5MR is almost 32 points per thousand. While pertinent, these explanations do not tell the whole story and can hardly explain the slowdown in IMR in MENA, the economies in transition, China and the high-income countries. A broader set of factors is, therefore, likely at play.

6 Empirical evidence: rising global and intra-regional divergence in the distribution of health gains

The last decade has also witnessed a perceptible increase in between-country health inequality, as rates of progress varied substantially across regions and as in several cases (not only in Sub-saharan Africa and Eastern Europe) heath indicators worsened, at times substantially. This increase in dispersion is observed also within several regions, suggesting that the gains in health well-being became increasingly skewed even among countries characterized by broadly similar socio-economic conditions. If continued, growing regional and global divergence in mortality may lead to an unsustainable situation, not only in the areas directly concerned but also globally, as with growing regional polarisation in social conditions, spillovers of 'international public bads' (conflicts, refugees, drugs and illegal migration) are likely to multiply.

(i) rising global dispersion in LEB and global and regional dispersion in (100-LEB)

To analyze the evolving dispersion in average life duration, we computed the weighted and unweighted coefficient of variation and Gini coefficient[12] of the global and regional

[12] The Coefficient of Variation (CV) is the ratio of the standard deviation to the average

$$CV = \frac{\sqrt{\sum_i (y_i - \bar{y})^2 n_i}}{\sum_i y_i n_i}$$

The Gini-type index used for the study of IMR disparities is

$$GINI_{IMR} = [\sum_{i=0}^{N-1} (y_{i+1} + y_i)(x_{i+1} - x_i)] - 1$$

in which the countries (i) are ordered by decreasing IMR level, y is the cumulated proportion of infant deaths, and x is the cumulated proportion of the infant population.

distributions of LEB and 100-LEB, (the 'life years lost in relation to the maximum attainable LEB') for the years 1960, 1970, 1980,1990 and 2000.

Table 8 presents the trend over time of the coefficient of variation and the Gini coefficient of 100-LEB for the world and its main regions. At the world level, the trend of both the coefficient of variation and Gini coefficient follows a U shaped pattern, with such variable converging until 1990 and then diverging since then. However, as also suggested by Goesling and Firebaugh (2004), such divergence disappears if Sub-Saharan Africa is remouved from the sample, as the fairly rapid convergence recorded in South Asia (in India and Bangladesh in particular) and in countries of Central Europe (the Czech Republic and Poland) compensated the divergence registered in many countries of the former Soviet Union and nations such as Iraq, North Korea, Haiti and so on.

Table 8 shows also that while the intra-regional dispersion in (100-LEB) followed a U-shaped trend in Eastern Europe but a slow but continously diverging one in all other regions with the exception of East Asia and Western Europe which registered a clear convergence. Interestingly, in SSA there was a 'downward convergence' in 100-LEB between 1990 and 2000 as the countries that suffered the biggest losses of life expectancy (South Africa, Zimbabwe, Botswana and so on) where those which had previously recorded the largest gains. Except for East Asia, that is dominated by China, these trends are more pronounced when the coefficient of variation and the Gini coefficient are computed without weighing the life expectancies for the population of each country.

Table 8. Trend in the coefficient of variation and Gini coefficient of the intra-regional and global distribution of 100-LEB, 1960-2000

100- LEB	Coefficient of variation (pop. weighted values)					Gini coefficient (pop. weighted values)				
	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000
East Asia and Pacific (22)	0.18	0.16	0.16	0.15	0.15	7.98	7.23	7.48	6.51	6.17
L. America & Caribbean (32)	0.12	0.12	0.12	0.12	0.13	6.54	6.17	6.4	6.2	6.49
Middle East & N.Africa (20)	0.10	0.10	0.10	0.12	0.14	3.61	4.06	4.99	6.06	6.78
Sub Saharan Africa (45)	0.07	0.08	0.09	0.11	0.09	3.7	4.33	5.1	5.9	4.59
South Asia (7)	0.05	0.06	0.07	0.07	0.08	1.61	1.89	2.11	2.12	1.94
Eastern Europe & C.Asia (29)	0.15	0.13	0.08	0.05	0.10	6.81	5.55	4.18	2.88	5.44
Western Europe (18)	0.05	0.04	0.04	0.04	0.04	2.29	2.12	2.29	2.10	1.92
North America (2)	Na	na	Na	Na	Na	Na	na	Na	na	Na
World (175)	0.27	0.24	0.24	0.23	0.27	15.2	13.32	13.19	12.86	14.18
World excl. SSA (130)	0.28	0.22	0.22	0.20	0.19	15.63	12.57	11.98	10.87	10.31
World excl.SSA & EECA (101)	0.26	0.22	0.22	0.20	0.20	14.47	12.21	12.32	11.31	10.67
Memo item: unweighted values										
World (175)	0.27	0.27	0.28	0.30	0.35	15.4	15.6	16.0	16.8	19.4
World excl. SSA (130)	0.25	0.24	0.23	0.23	0.24	14.2	13.3	12.5	11.8	12.5

Source: authors calculations on WDI (2004). Notes: the regional aggregates include only developing countries (e.g. East Asia does not include Japan); the number of countries in each area is in parenthesis.

The analysis of the trends in the CV and Gini coefficient of LEB (the related table is omitted for reasons of space) confirms the U shaped trend identified above at the global level, indicating that the distribution of life expectancy converged until 1990 and then

started to diverge. Also in this case, such divergence disappears if Sub-Saharan Africa is removed from the sample for the reasons illustrated above. However, when the analysis is conducted on LEB the intra-regional trends in the CV and Gini coefficient are confirmed for most regions, but not for MENA and Latin America. Indeed, in these two regions, the trends are opposite to those identified on the basis of 100-LEB.

It must finally be noted that, for both LEB and 100-LEB, when the coefficients of dispersion are computed without weighing for population size, the global divergence in health inequality perists in the 1990s even after removing Sub-Saharan Africa from the sample (see bottom of Table 8 for 100-LEB; a similar tendency emerges for LEB, if in an attenuated form). All this means that – in terms of countries rather than people - the derailment of the long-term convergence in life expectancy predicted by Preston (1976) and Wilson (2001) is due to more than the spread of HIV/AIDS and adverse economic and conditions in Africa. This is an important point already noted in McMichael et al.(2004) that should attract greater attention by policy-makers.

(ii) increasing global and intra-regional dispersion of IMR and U5MR. Table 9 presents the trend of the coefficient of variation and Gini coefficient of the distribution of the population weighed regional and global IMRs for the years 1960, 1970, 1980, 1990 and 2000. The table confirms that, because of the different rates of IMR reduction recorded over the last three decades in the different regions (Table 7), the coefficient of variation and Gini coefficient of the global distribution of IMR have shown a clear upward trend, particularly from 1980 onward, while during the prior two periods there was only a modest increse in divergence. This trend is robust, if in a slightly attenuated way, to the removal of Sub-Saharan Africa and Eastern Europe from the sample. This means that the gains in IMR recorded during the last 2-3 decades have been distributed in an increasingly unequal way across countries and that several countries have been left behind in this competition.

Table 9. Coefficient of variation and Gini coefficient of the intra-regional and global distribution of IMR

	Coefficient of variation (pop. weighted values)					Gini coefficient (pop weighted values)				
	1960	1970	1980	1990	2000	1960	1970	1980	1990	2000
East Asia and Pacific (22)	0.31*	0.28	0.38	0.39	0.46	15.2*	12.5	18.4	17.1	17.8
L. America & Caribbean (27)	0.26	0.26	0.34	0.38	0.40	14.2	13.8	18.0	19.9	19.7
Middle East & N.Africa (20)	0.21	0.26	0.29	0.37	0.56	10.6	13.5	15.6	20.3	28.4
Sub Saharan Africa (45)	0.24	0.23	0.25	0.28	0.25	12.8	13.0	13.9	15.3	13.8
South Asia (8)	0.09	0.11	0.13	0.17	0.27	2.50	4.0	4.4	5.3	8.8
Eastern Europe & C.Asia (26)	0.57	0.78	0.68	0.60	0.61	28.5	38.8	33.8	31.9	32.9
Western Europe (18)	0.37	0.35	0.26	0.14	0.18	19.0	17.5	12.6	6.5	9.4
North America (2)	Na	na	Na	na	Na	na	Na	na	na	Na
World (168)	0.41*	0.43	0.51	0.57	0.64	22.2*	24.0	29.0	33.1	35.1
World excl. SSA (123)	0.42*	0.44	0.53	0.55	0.61	22.6*	24.3	30.1	30.5	32.6
World excl. SSA&EECA (97)	0.39*	0.41	0.51	0.54	0.60	20.4*	22.4	28.8	29.7	32.1
Memo item: unweighted values										
World (168)	0.54*	0.61	0.71	0.82	0.90	30.2*	35.1	39.9	44.8	48.8
World excl. SSA (123)	0.58*	0.67	0.77	0.85	0.96	32.9*	37.3	41.5	44.5	48.3

Source: authors' calculations on WDI 2004; Notes: * these values are influenced by the famine that hit China during the 1959-1961 Big Leap Forward. The regional aggregates include only developing countries (e.g. East Asia does not include Japan).The number of countries in each area is in parenthesis.

Global divergence is found also if the analysis is conducted without weighting the national IMR and U5MR for their child populations, though in this case, remouving Sub-Saharan Africa from the sample reduces visibly the divergence (bottom of Table 9). Thus, also in this case, Africa accounts for a good part of the divergence but for not its entereity. Other forces are at work in retarding IMR decline across and within regions.

An increase in dispersion in the distribution of country IMR since 1980 is evident also at the regional level, i.e. in Latin America, MENA, South Asia and East Asia. In three of them, the fastest increase in intra-regional divergence in IMR is observed over 1990-2000, a period characterized by slow growth, mounting inequality and instability and the levelling off or decline in the coverage of key public health interventions in favour of children. The exception to this rule are the two 'crisis regions' of Eastern Europe and Sub-Saharan Africa both of which show a fluctuating trend characterized by 'downward convergence' in the 1980s and 1990s as in both regions, the worst performance was recorded in countries with already fairly low levels of IMR. In contrast, the dispersion of the distribution of national IMRs diminished steadily (save for a blip over 1990-2000, that disappears when the regional trend is computed on unweighted data) in Western Europe confirming the findings of the literature about the policy-driven equalisation of living standards within this region (Micklewright and Stewart 1999). The same analysis carried out on U5MR data for 125 countries yields – unsurprisingly – results similar to those identified in the case of IMR. For reasons of space the results are not reported.

Also in this case, if the coefficients of dispersion are computed without weighing the national IMR for their population size, the trend towards growing global inequality in health appears more pronounced and persists after the remouval of Sub-Saharan Africa from the sample. The intra-regional trends towards growing health divergence are also mostly confirmed, and indeed in several cases are more prominent.

To conclude, the analysis of health convergence carried out on IMR and U5MR confirms – more clearly than in the case of (100-LEB) or of LEB - that the recent global and intra-regional health gains were distributed in an increasingly less egalitarian way, particularly over the last decade. This conclusion is robust to the choice of the inequality and health indicator, and to the weighting or less of the national indicators by means of the appropriate national populations. Particularly disturbing is the finding that the increase in health divergence across countries is particularly marked for IMR and U5MR.

7 Empirical evidence: frequent rises in within-country IMR differentials

In this section, we analyze the changes over the last two decades in within-country IMR differentials. This kind of analysis is now made possible by the increasing numer of countries[13] with at least two Demographic and Health Surveys[14] over the last twenty years.

[13] The countries with at least two DHS surveys are, at this date, 36. At the present stage of our research we have analysed IMR differentials in the following sample of 21 countries: Bolivia (89, 94,97) Brazil (86,91,96) Colombia (86,90,95) Dominican Republic (86,91,96) Guatemala(87,97,99) Peru (85,91,96) Burkina Faso(92/93, 99) Cameroon (91, 98) Ghana (88,93,99) Kenya (89,93,98) Madagascar(92,98) Mali (87, 96) Niger (92,98) Senegal (86,92/93,97) Tanzania (91/92, 96) Togo (88,98) Uganda (88,97) Zambia (92,96) Zimbabwe(88/89, 96) Egypt (92,95) Indonesia (87,91,94,97). We are now expanding the analysis to all other countries with at least two point in time, including for the most recent years.

An assessment of changes in health differentials could, in principle, be carried out on the basis of several health indicators. Information gaps, however, limit severely the choice of the differentials that can be calculated on a sufficiently large number of countries and, for this reason, our analysis will focus exclusively on IMR[15] differentials for children (a) belonging to different quintiles of the income distribution (proxied by an asset index) (b) residing in rural vs rural areas, and (c) with mothers with different levels of education.

(i) trends in IMR differentials by income level (proxied by an asset index). As shown in the received literature (section 4), one key IMR differential is that by household income. The DHS, now permit to estimate the mortality risk of various population groups (including IMR and U5MR) ranked by an assets index that is used to proxy household income. The new evidence we provide in this subsection draws on tabulations of the risk of deaths faced by infants belonging to five quintiles of the households' asset distribution (World Bank, Research Group on Health, Nutrition, Population and Poverty Division).

In this regard, Table 10 presents the values of IMR at two different points in time for the total sample and the bottom and top quintile of the household distribution. The table provides also two measures of dispersion, i.e. the interquitile ratio (IQR) i.e. the ratio of the IMR of children belonging to the bottom and top quintiles of the asset distribution and the concentration coefficient (CC) of the same distribution. While the former only captures changes in the tails of the distribution, the concentration coefficient is more sensitive to distributive changes affecting the three central quintiles.

Table 10 permits to evaluate the changes over time in average IMR and whether these average changes were distributed in an increasingly emore equal or unequal way (as signalled by a fall/rises in the interquitile ratio and concentration coefficient). An examination of the evidence shows that average IMR fell over time in 12 of the 16 countries analyzed, stagnated in 1 and worsened in 3. Progress in average IMR, however, was accompanied in 60 percent of the 'cases' by a rise of the two dispersion measures (used here jointly as they provide different information about health inequality[16]).

A cross-tabulation of the changes in average IMR and IMR inequality (Table 11) further shows that there were many off-diagonal observations, meaning that in many instances an average improvement in IMR was accompanied by growing (or unchanged) IMR inequality. The upper right box of Table 11 shows, for instance, that in 12 cases

[14] DHS are large-scale household sample surveys carried out at periodic intervals. At present DHS exist in more than 60 developing and transitional countries. Almost all surveys are representative at the national level for the main age groups. Their sample size varies from country to country and, for each country, from survey to survey. In our analysis we used data from the children recodes, selections of the main survey (the individual recode based on interview of women aged 15-49 or 15-44) containing information about the children of 60 (or 36) months of age at the time of the survey.

[15] The IMRs used in the analysis of differentials by rural-urban and mother's education are calculated dividing the number of infant deaths under one year of age by the number of births in the three complete years preceding the survey, considering also half of the deaths occurred at age 12 months, strictly speaking in the second year of life, but which probably occurred in the first year. In contrast, the mortality differentials by the asset index are computed on the years preceding the survey.

[16] The worsening of IMR differentials was more frequent in the case of the concentration coefficient.

Table 10. Trends in IMR rates and differentials for 16 developing and transition economies, 1990s and early 2000s

	First period					Second period				change in interquintile ratio	change in concentration coefficient
Country (and survey years)	Total IMR	1st Q IMR	5th Q IMR	1st/5th Ratio		Total IMR	1st Q IMR	5th Q IMR	1st/5th Ratio		
Turkey (1993, 1998)	68.3	99.9	25.4	3.9		48.4	68.3	29.8	2.3	Decline	Decline
Kazakhstan (1995-99)	40.7	39.2	35.1	1.1		54.9	67.6	42.3	1.6	Rise	Rise
Colombia (1995,2000)	30.8	40.8	16.2	2.5		24.4	32.0	17.6	1.8	Decline	Rise
Guatemala (1995, 1998)	57.2	56.9	35.0	1.6		49.1	58.0	39.2	1.5	Decline	Constant
Haiti (1994-5, 2000)	87.1	97.3	74.3	1.3		89.4	99.5	97.2	1.0	Decline	Decline
Nicaragua (1997-98, 2001)	45.2	50.7	25.8	1.9		35.3	49.6	16.3	3.0	Rise	Rise
Peru (1996, 2000)	49.9	78.3	19.5	4.0		43.2	63.5	13.9	4.6	Rise	….
Egypt (1995, 2000)	72.9	109.7	31.8	3.4		54.7	75.6	29.6	2.6	Decline	Decline
Bangladesh (1996-7, 1999-00)	89.6	96.5	56.6	1.7		79.7	92.9	57.9	1.6	Decline	Rise
India (1992-3, 1999)	86.3	109.2	44.0	2.5		73.0	96.5	38.1	2.5	Constant	.....
Nepal (1996, 2001)	93.0	96.3	63.9	1.5		77.2	85.5	53.2	1.6	Rise	Rise
Cameroon (1991,1998)	80.3	103.9	51.2	2.0		79.8	108.4	55.8	1.9	Decline	.....
Ghana (1993,1998)	74.7	77.5	45.8	1.7		61.2	72.7	26.0	2.8	Rise	Rise
Malawi (1992, 2000)	136.1	141.2	106.1	1.3		112.5	131.5	86.4	1.5	Rise	Rise
Mali (1995, 2001)	133.5	151.4	93.2	1.6		126.2	137.2	89.9	1.5	Decline	Rise
Uganda (1995, 2000-1)	86.1	109.0	63.2	1.7		89.4	105.7	60.2	1.8	Rise	.....

Source: authors' elaboration on data from the World Bank, Health, Nutrition, Population and Poverty Division (www.worldbank.org/hnp). Note: the IMRs are calculated over the 10 years preceding the survey.

concerning 8 countries most of the benefits of the IMR decline accrued to the middle class and the rich. In three cases concerning two countries IMR inequality worsened, as expected, in parallel with a rise in average IMR while in another three IMR inequality fell despite a rise in IMR. These results, that mainly refer to the period 1992-2001, confirm closely the findings of Minujin and Delamonica (2003) on the middle 1980s-middle 1990s about a widespread rise in U5MR inequality despite an improvement in the mean.

Table 11. Cross tabulation of changes in average IMR versus the interquartile ratio (IQR) and concentration coefficient (CC) for 26 inequality changes concerning 16 countries.

	Falling IMR inequality	Constant IMR inequality	Rising IMR inequality
Average Improvement in IMR	Turkey IQR Turkey CC Colombia IQR Guatemala IQR Egypt IQR, Egypt CC Bangladesh IQR Mali IQR	Guatemala CC India IQR	Colombia CC Nicaragua IQR Nicaragua CC Peru IQR Bangladesh CC Nepal IQR, Nepal CC Ghana IQR Ghana CC Malawi IQR, Malawi CC Mali CC
Average Stagnation in IMR	Cameroon IQR		
Average Worsening in IMR	Haiti IQR, Haiti CC		Kazakhstan IDR, Kazakhstan CC Uganda IQR

Source: authors' compilation on the basis of the data report in Table 10. Note: changes of less than 4% are considered to indicate that the variable has remained constant

(ii) Trends in IMR differentials by rural vs urban residence. In this case we calculated the rural/urban IMR differential on DHS surveys spanning the period 1985-99. DHS analysts normally compute IMR differentials over a 10 year period so as to reduce the sampling and estimation error. This procedure has the disadvantage, however, to preclude practically all analyses of changes over time in the IMR level and differentials. For this reason, we have calculated the IMR over 3-year periods so as to be able to capture the changes in IMR over the medium term and because the longer the period considered, the likelier that the mothers included in the sample are age selected and the more frequent the recall errors. Our choice however reduces sample size and risks to affect the stability of the IMR estimates. As in other cases, the data may also be affected by errors common in this kind of survey, such as omission of registrations, misreporting of age, recall error an so on. The analysis is conducted assigning each of the above surveys to three sub-periods: mid-late-80s, early-90s and to mid-late-90s.

In the mid-late-80s, in the majority of the Sub-Saharan African countries had fairly high IMR averages but moderate rural-urban gap, ranging between 0.7 and 1.7. Differentails were, however, somewhat more pronounced in Latin America (Table 12, 5th column). In many cases, the changes observed between the 1980s and 1990s point to an exacerbation of such differentials though there were also cases of narrowing of the gap. Altogether,

Table 12. IMR by rural/urban residence and rural-urban IMR ratio in selected countries

Country	Mid-late-80s				Early-90s				Mid-late-90s			
	IMR	Urban IMR	Rural IMR	R/U Ratio	IMR	Urban IMR	Rural IMR	R/U ratio	IMR	Urban IMR	Rural IMR	R/U Ratio
B. Faso	….	…..	….	….	104	71	110	1.54	111	64	116	1.81
Cameroon	63	61	64	1.05	….	…..	…..	….	76	75	76	1.01
Ghana	89	75	94	1.26	62	50	66	1.31	64	48	69	1.43
Kenya	71	69	72	1.03	71	74	71	0.96	68	54	71	1.33
Madagascar	95	63	100	1.58					81	89	79	0.89
Mali	142	98	156	1.59	109	80	119	1.49	….	…..	…..	….
Niger	134	84	144	1.70	….	….	….	….	91	58	98	1.70
Senegal	109	94	117	1.24	72	50	83	1.65	80	56	912	1.63
Tanzania	91	121	83	0.69	90	68	95	1.40	….	…..	….	…..
Togo	97	83	102	1.24	….	….	….	….	69	61	71	1.17
Uganda	121	114	122	1.07	76	79	75	0.96	….	….	….	….
Zambia	110	90	126	1.41	115	113	117	1.04	….	….	….	….
Zimbabwe	55	36	62	1.72	54	47	57	1.23	….	….	….	….
Bolivia	91	77	105	1.36	65	56	76	1.35	67	47	92	1.98
Brazil	75	55	116	2.10	79	59	100	1.68	41	32	68	2.13
Colombia	36	36	39	1.11	….	….	….	….	33	30	37	1.23
Peru	94	64	127	1.98	54	37	80	2.14	47	33	68	2.08
Guatemala	89	72	96	1.34	53	37	61	1.66	.....	....	....	....
Dominican R	70	70	70	1.00	...	...	...	...	51	41	64	1.56
Egypt	70	50	81	1.63	65	47	76	1.61	.....	.....	.....	.....
Indonesia	73	55	80	1.46	68	34	81	2.41	46	31	52	1.67

Source: authors' calculations on selected DHS

there were nine cases in which the rural-urban IMR ratio worsened, four in which it remained broadly unchanged and six in which the gap narrowed. In addition in Egypt and Indonesia the rural-urban gap remained very high despite a decline in the nationwide IMR. As a whole, the trends observed in Sub-Saharan Africa appears rather composite with no clear relation between IMR reduction and r/u convergence. The rural areas continue to be disadvantaged with respect to infant health. In contrast, all Latin American countries experienced either the persistence of the r-u IMR gap at a high level (around 2)

or its further widening, suggesting the operation of a very skewed urban-based pattern of development. As for Egypt, the data refer to two immediately contiguous 3-year periods in the late-80s and early-90s, during which only limited reductions in IMR were achieved while the r/u ratio remained unchanged at a high level (1.6).In Indonesia the decline in IMR accelerated during the 90s, but the r/u rate remained broadly constant. Also in this case, more focus on rural areas would have allowed to achieve a faster overall decline – and a more balanced distribution of welfare.

Also in this case, a cross-tabulation of changes in average IMR versus the rural/urban IMR ratio shows there are many off-diagonal observations, meaning that in many countries nationwide progress in IMR was accompanied by growing (or unchanged) rural/urban IMR ratio. The top-right quadrant of Table 13 shows in fact that in 7 countries most of the national IMR decline was recorded in urban areas. In another four countries experiencing a fall in average IMR, rural/urban gap remained unchanged at fairly high levels, revealing in this way the limits of location-neutral policies. The gap worsened also in two countries where there had been no changes in the nationwide IMR tare. In brief, as seen in Table 13, 12 countries (those above the main diagonal) out of 20 registered an unsatisfactory change in the r/u IMR ratio suggesting further divergence in rural-urban health inequality or the persistence of a high urban bias despite gains in average IMR.

Table 13. Cross tabulation of IMR changes in relation to changes in the r/u IMR ratio in selected developing countries, mid-late 1980s to mid-late 1990s

	Falling r/u IMR ratio	Constant r/u IMR ratio	Increasing r/u IMR Ratio	
Average Improvement in IMR	Madagascar, Mali, Togo, Uganda	Niger Brazil Egypt Indonesia	Ghana, Senegal Bolivia Colombia, Peru Dominican Republic Guatemala	15
Average Stagnation in IMR	Zimbabwe, Zambia		Tanzania, Kenya	4
Average Worsening in IMR		Cameroon	Burkina Faso	2

Source: author's elaboration on selected DHS; Note: changes of less tha 4% are supposed to indicate that the variable has remained constant

(iii) IMR differentials by level of education of the mother. For this analysis, we computed the IMR by the following levels of education of the mother: no education, primary education, secondary/higher education. For some countries of Sub-Saharan Africa, the comparison was limited to mothers with no or primary education, as mothers with higher education were very too few to estimate IMR for that educational group.

Table 14 shows that in the early 1980s, IMR varied markedly with the level of education of the mother, thus confirming, unsurprisingly, the findings of a vast body of literature (Section 5). Infants born to illiterate mothers had a risk of death 10% to125% higher than that of infants borne to mothers with primary education (but Tanzania, Togo and Uganda and Guatemala were an exception to this rule) and 149 and 521 % higher than infants borne to mothers with secondary or higher education. The risk of death of children with

mothers with primary in relation to those whose mothers completed at least the secondary education showed considerable variability.

The trends in these three IMR differentials (no education/primary in panel A, and no education/secondary and primary/secondary in panel B) show a composite picture, not always easy to interpret. The first IMR gap (no education/primary) declined in ten cases out of 17, rose in 5 and remained broadly constant in two. However, in seven of the ten cases of decline (Cameroun, Ghana, Kenya, Mali, Senegal, Zambia, Zimbabwe and Guatemala) such decline resulted from 'downward convergence', as the IMR of children borne to mothers with primary education rose while that of those borne to illiterate

Table14. IMR by level of education of the mother in selected countries

Country	Mid-late-80s			Early 90s			mid- and late-90s		
Panel A.									
	IMR No educ	IMR Prim educ	No educ/ primary	IMR No educ	IMR Prim educ	noed/prim ratio	IMR No educ	IMR Prim educ	Noed/prim ratio
B. Faso	...	...	...	105	107	**0.99**	113	88	**1.28**
Cameroon	96	43	**2.25**	...	...	**...**	92	73	**1.26**
Ghana	97	81	**1.20**	75	56	**1.33**	67	71	**0.94**
Kenya	83	73	**1.13**	68	81	**0.84**	72	89	**0.81**
Madagscar	121	102	**1.18**	...	...	**...**	107	79	**1.36**
Mali	152	77	**1.97**	111	100	**- 1.11**	...	...	**...**
Niger	138	116	**1.19**	...	...	**...**	94	71	**1.32**
Senegal	114	84	**1.35**	78	56	**1.39**	85	73	**1.17**
Tanzania	90	92	**0.98**	115	82	**1.40**	…	…	**…**
Togo	101	98	**1.03**	…	…	**…**	68	72	**0.95**
Uganda	127	119	**1.07**	81	77	**1.05**	…	…	**…**
Zambia	134	109	**1.23**	119	119	**1.00**	…	…	**…**
Zimbabwe	79	49	**1.60**	66	60	**1.11**	…	…	**…**
Egypt	81	66	**1.24**	91	51	**1.79**	…	…	**…**
Indonesia									
Bolivia	120	103	**1.17**	96	79	**1.21**	99	84	**1.18**
Brazil	106	82	**1.29**	135	63	**2.14**	102	53	**1.94**
Peru	177	100	**1.77**	84	78	**1.08**	69	62	**1.12**
Guatemala	93	94	**0.98**	67	51	**1.32**	48	59	**0.82**
Panel B.									
	IMR 2ary education	No-educ/ secondary	Primary/ secondary	IMR 2ary education	No-educ/ secondary	Primary/ secondary	IMR 2ary education	No-educ/ secondary	Primary/ secondary
Cameroon	41	2.36	**1.05**	...	...	**...**	61	1.51	**1.19**
Kenya	46	1.79	**1.58**	48	1.42	**1.7**	41	1.77	**2.19**
Madagascar	52	2.31	**1.95**	...	...	**...**	53	2.02	**1.49**
Zambia	89	1.49	**1.21**	102	1.16	**1.17**	...	...	**...**
Zimbabwe	50	1.57	**0.98**	45	1.48	**1.33**	...	...	**...**
Egypt	50	1.64	**1.32**	40	2.28	**1.27**			
Indonesia									
Bolivia	50	2.40	**2.06**	35	2.72	**2.25**	37	2.67	**2.26**
Brazil	20	5.21	**4.02**	25	5.39	**2.52**	25	4.16	**2.15**
Peru	47	3.74	**2.11**	29	2.85	**2.65**	31	2.23	**1.99**
Domin. Rep.	58	...	**1.30**	30	...	**1.58**	36	...	**1.54**

Source: authors' estimates on selected DHS

mothers remained constant or fell. It is unclear at this point whether such 'downward convergence' reflects some real local dynamics (such as higher HIV infection rates among educated women, as reported in the literature for some African countries), inaccurate reporting or sampling errors in estimating the IMR of children borne to mothers with primary or secondary education.

Likewise, the mortality gap of infants borne to mothers with no education in relation to those borne to mothers with no secondary and higher education fell in 5 of the 8 countries analyzed in panel B of Table 14. In this case, in contrast, we observe a kind of 'upward convergence' as in almost all cases the decline in the gap is due to a stagnation or slow decline in mortality among infants of mothers with secondary/higher education and a more pronounced fall in that of mothers with no education. Here too, more detailed investigations are needed to understand what drives this phenomenon. Yet, even in countries where this mortality gap declined the infants born to mothers with secondary education continued having a much lower mortality risk than the children of mothers with no or primary education.

Finally, the IMR gap between women with primary to secondary and higher education increased in 5 countries out of 9, declined in 2 and remained constant in another two, thus possibly pointing to an emerging mortality divergence between people with low and medium-high levels of education. Also in this case, what sems to drive this growing differential is the rise in IMR among children of mothers with primary education.

In conclusion, Table 14 seems to be pointing – though with considerable variation - to a broadly favourable trend in the IMR of infants of uneducated mothers, a less favourable but still broadly positive one for those mothers with secondary and higher education and an often negative one for mother with primary education. As noted above, in view of the peculiarity of this last trend, these results need further probing.

8. Summary, conclusions and indications for further work

The data problems mentioned throughout this paper – as those encountered in the estimation of aggregate IMR and LEB in Sub-Saharan Africa or the instability of IMR estimates derived from narrow DHS sample – suggest some caution in interpreting the results presented above. Yet, the above discussion points to a few important conclusions (summarized in Table 15), some fairly robust, some still tentative.

To start with, the rate of improvement of both income and health indicators slowed down over the last twenty years in relation to the 1960s and 1970s. In developing and transitional countries, the slowdown in growth was most pronounced in the 1980s and that in health in the 1990s. The reasons for this lag have still to be worked out. Furthermore, in both cases, there are important exceptions that need to be investigated more in detail to grasp the reasons of their comparatively favourable performance. In MENA and Latin America, for instance, the 1980s witnessed considerable gains in health wellbeing inspite of flat or negative income growth and, in the case of Latin America, rising inequality. However, except for these exceptions, the slowdown in rates of progress was sufficiently general to suggest the working of some systemic factors. Indeed, for both income and health, the slowdown is robust to the remouval of Sub-Saharan Africa and Eastern Europe from the sample, thus invalidating the viewpoint that attributes the current slowdown exclusevly to the difficulties faced by the Eastern European transition and the spread of AIDS, civil conflicts and economic stagnation in

Sub-Saharan Africa. Thus, though with exceptions and different time profiles, the slowdown in the aggregate rates of improvement in well-being in the 1908s and 1990s seems to be fairly general.

Table 15. Summary of gains in well-being over the 1980s and 1990s in relation to the two prior decades.

Type of indicator / Evaluation space	Average rate of improvement in well being	Distribution of improvements in well-being between countries and regions	Distribution of improvements in well-being within countries
Income space - (GDP/capita)	Sharp slowdown in 80s. Slower growth in 90s than in 60/70s (robust to removal of SSA & EECA from sample)	Unclear. Results depend on statistical methods/ hypotheses made	Divergence in 2/3 of countries (80% of world pop)
Main Exceptions to dominant trend	China India	n.a.	France, Malaysia
Health space - (100-LEB)	Slower in 80s and 90s (robust to removal of SSA &EECA)	Global divergence (not robust to removal of SSA and EECA)	.....
- IMR	accelerates in 80s, but slow downs markedly in 90s (robust to removal of SSA and EECA)	Global divergence (robust t removal of SSAand EECA) Intra-regional divergence	-IMR by 'asset index': 15 divergences and 2 constants out of 28 cases - IMR by r/u: 13 divergences and 2 constant out of 21 cases - IMR by mother educati mixed
- U5MR	same as IMR	same as IMR	.....
Main exceptions to dominant trend - (100-LEB)	India , Bangladesh, MENA, advanced countries	Intra-regional convergence Western Europe and East Asia	
- IMR/U5MR	South Asia	Intraregional convergence Western Europe and EECA (but...latter is due to downward convergence)	

Source: authors' compilation

Second, while it is impossible to come to a simple conclusion about the changes in the distribution of income between-countries during the Era of Globalisation as these hinge crucially on the statistical conventions followed for the construction of the global income distribution, our paper shows that the between-country distribution of health well-being has unambigously deteriorated, regardless of the removal of Sub-Saharan Africa and Eastern Europe from the sample. In addition, with the exception of Western Europe and

East Asia (in the case of 100-LEB) and of Western Europe and Eastern Europe (in the case of IMR/U5MR), the intra-regional distribution of health gains shows increased divergence. These are important conclusions as, so far, there was little agreement in the literature on the convergence in well-being during the last two turbulent decades. Our paper also suggests that where public policy actively aimed at reducing well-being differentials among groups of countries, as in the European Union, both incomes per capita and health well-being converged steadily.

Finally, the within-country distribution of well-being appears to have worsened in the majority of the cases analyzed. As noted, there is substantial evidence that within-country income inequality increased in two thirds of the countries with available data. In the case of mortality data, such trends is less universal and needs to be confirmed on a longer time period and broader sample of DHS than that we were so far able to access. Be as it may, our results show there is initial evidence of divergence in IMR differentials by an asset index and rural/urban location in about 55-60% of the cases, while the trend of the IMR differentials by the level of education of the mother is unclear.

What are the factors behind the changes in health well-being discussed above? In view of data problems and level of aggregation of the analysis, these points made below are in some cases speculative and must be taken as suggestions for further work rather than firm conclusions on causality.

To start with, there is no doubt that spread of HIV/AIDS exerted a major influence on IMR, U5MR and LEB in most of Africa and a few Carribean countries and that – barring new breakthroughs in medical research – will likely continue to do so in a growing number of countries in the years ahead. It is important to note, in this regard, that future AIDS-related mortality – as that of the 1990s – will be influenced by the way globalisation (and in particular the TRIPS agreement) will affect the cost and transfer of health technology (antiretrovirals in particular) in the areas affected by the epidemic. As noted by Deaton (2004), if this trasmission is delayed or retarded, mortality differentials will continue to diverge because of wrong policies.

Yet, it is not possible to place all the blame for the unsatisfactory health performance of the last decade on HIV/AIDS, especially in the those nations and regions, where HIV adult prevalence rates are low or zero, that have nevertheless recorded slow health improvements and growing health inequality. In this regard, a second, not too controversial, possible cause of the slow health improvement and growing divergence concerns health spending and health programmes. The debate about globalisation has often highlighted the risk posed to revenue collection by liberal tax reforms, tax competition among developing countries and globalisation-driven outsorcing and informalisation of the economy. Yet, the evidence in this regard is mixed. While there are examples of countries (such as China and the economies in transition) that reduced sharply public health expenditure and access to health services, in others (such as several ones from MENA and Latin America) public health expenditure actually increased or remained constant at a pretty high level. However, public health expenditure may be too noisy a variable to clearly influence health changes. In contrast, it is generally accepted that an expansion of key public health programs such as child immunisation, oral rehydration, the provision of antibiotics and pregnancy control can deliver important health gains even during periods of stagnation of health expenditure. Simmetrically, it is possible that a stagnation or decline in the coverage of such programs (as often observed

in the 1990s) may have affected adversely IMR and U5MR even in the presence of an expanding health budget. Research can help quantifying the relative mortality impact of changes in coverage rates of key interventions versus health spending.

Third, mortality has also been affected by a raising wave of local conflicts and natural disasters. Those of Afghanistan, Angola, Bosnia, Burundi, Cambodia, El Salvador, Ethiopia, Guatemala, Iraq, Kosovo, Mozambique, North Korea, Rwanda, Somalia, Sri Lanka, Sudan and Uganda are just a few of the most acute humanitarian crises in which death rates have risen markedly. Yet, only crude estimate of the health impact of such crises are available and only in few cases is it possible to capture the impact of these tragic events on aggregate mortality trends. Existing databases likely under-report and under-estimate the direct mortality cost of these events.

Fourth, changes in the structure and stability of households – and social cohesion more generally - may have also affected, if more subtly, current health trends. The traditional family has in fact been eroded in many places thus exposing its members to greater health risks, as suggested by micro studies that identify a greater death risk for children, elderly and adults living in incomplete families. In this regard, the last twenty years have seen a rise in the number of people living in incomplete households because of divorce, separation, lone parenthood, single-hood, migration of the head of the household or death of parents or a spouse. For instance, lone-parent families represent 10-15 per cent of all OECD families with dependent children and a higher percentage in Latin America, the Carribean and parts of South East Asia. Such trend has surfaced even in China where traditional values usually left no space for such type of family arrangement. And, in the HIV-AIDS affected countries the number of orphans affected by a risk of non-AIDS mortality has risen well above the level that can be handled through extended family arrangements. In other countries, such as Bosnia and Ethiopia, war and ethnic conflicts have caused a sharp increase in the number of incomplete families. Meanwhile in Russia, Moldova and other economies in transition, the number of biological or social orphans has risen rapidly because of soaring parental mortality and migration and child abandonment.

Last but not least, a host of empirical data and theoretical arguments make it difficult to accept that the slower growth and higher income inequality[17] of the last twenty years are unrelated to botched liberalisation and globalisation policies, and in particular to the impact of loose domestic banking deregulation, premature external liberalisation and

[17] Much is known about the relation between income inequality and health inequality. To start with, it is generally accepted that, as the relation between income per capita and life expectancy is concave, an increase in income inequality will – *ceteris paribus* - cause a fall in life expectancy among the poor and middle class bigger than the gain in life expectancy among the rich. Second, high inequality reduces access to health care by the poor both because these have a lower amount of income to buy it in the market and as hign inequality reduces the state capacity to to tax the élites, thus reducing its ability to provide subsidized health services. Third, it is also accepted that – *ceteris paribus* - high inequality raises the crime rate and the violent deaths. Fourth, there is initial evidence that – at least in advanced countries and transitional economies – high inequality leads to more stratified societies and loss in social cohesion that affect the ability of communities to undertake collective action , to a more hierarchal organisation of work causing loss of control and worse health outcomes, and to rising psychosocial stress. Finally, there is considerable – though not universally accepted – evidence that high incomr inequality affects health status via a decline in GDP growth. Indeed, most theories and empirical analyses suggest that lower growth GDP would result because of low investment in human capital, increased macroeconomic disequilibria and balance of payment instability, decreasing returns to capital, rising social instability, declining work incentives, and growing policy distortions and government fauilures.

regressive tax reforms, and that all this has had no impact on health trends. Indeed, both theory and empirical evidence show that slower growth, greater income inequality and rising volatility affect health progress and inequality. Thus, it is likely, that the recent health trends were influenced by the sluggish growth and mounting income inequality of the last twenty years, especially in the 120 or so countries with a GDP per capita of less than US$ 2000, in which health improvements are particularly income-elastic, or in the transitional economies affected by huge and unanticipated changes in economic variables. The precise extent and mechanisms of such an impact remain however undocumented in most cases. This is a priority area for research in which the existing theories linking economic growth and income inequality to health and health inequality have to be tested on enlarged datasets and time periods. Perhaps, this new research will help bringing about a more humane globalisation promoting faster health progress and health convergence over the next decades.

REFERENCES

Bicego, G. T., and Boerma, J. T. (1993), "Maternal Education and Child Survival: a Comparative Study of Survey Data from 17 Countries", in *Social Science & Medicine*, vol. 36(9):1207-1227

Black, D., Morris, J., Smith, C. and Townsend, P. (1980), *Inequality in Health: Report of a Working Group (The Black Report)*, Department of Health and Social Security, London

Bobak, M., and Marmot M. (1996) "East-west mortality divide and its potential explanations: proposed research agenda" *British Medical Journal* 312: 421-423

Bourguignon, F. and Morrisson, C. (2002), "Inequality among World Citizens: 1820-1992" The *American Economic Review*, vol. 92(4): 727-744

Brockerhoff, M., and Hewett, P. (2000), "Inequality in Child Mortality among Ethnic Groups in Sub-Saharan Africa", in *Bulletin of the World Health Organization*, vol. 78 (10):30-41

Caldwell, J. C. (1979), "Education as a Factor in Mortality Decline: an Examination of Nigerian Data", in *Population Studies*, vol. 33(3):395-413

Cornia, G.A. (2004), "*Inequality, Growth and Poverty in an Era of Liberalisation and Globalisation*", Oxford University Press

Cornia, G. A., and Danziger, S. (1997), *Child Poverty and Deprivation in the Industrialized Countries, 1945-1995*, Clarendon Press, Oxford

Cornia, G.A. and Paniccià R. (2000), "*The Mortality Crisis of Transitional Economies"*, Oxford University Press,

Cornia, G. A. and Zagonari, F. (2002) *An Econometric Investigation of Changes in IMR and U5MR in AIDS Affected Countries During the Last Twenty Years*, mimeo, UNICEF-IRC, Florence

Deaton, A. and Drèze, J.(2002), "Poverty and Inequality in India: A Reexamination", Working Paper No. 107, Centre for Development Economics, Dheli School of Economics, www.cdedse.org/pdf/work107.pdf

Deaton, A. (2004) *Health in an age of globalization*, mimeo, Princeton University, Princeton (http://www.wws.princeton.edu/~rpds/downloads/deaton_healthglobalage.pdf)

Defo, B. K. (1996), "Areal and Socioeconomic Differentials in Infant and Child Mortality in Cameroon", *Social Science & Medicine*, vol.42(3):399-420

Dollar, D. (2001), "Is globalisation good for your health?", *Bulletin of the World Health Organisation*, Vol.79 (9): 827-833

Eastwood, R., and Lipton, M. (2000), *Rural-Urban Dimensions of Inequality Change*, WIDER Working Paper No. 2003, UNU-WIDER, Helsinki

Filmer, D., King, E. M., and Pritchett, L. (1998), *Gender Disparity in South Asia: Comparison between and within Countries*, Policy Research Working Paper 1867, World Bank, Washington DC

Fox, J. W. (1998), *Gaining Ground. World Well-Being 1950-95*, USAID Evaluation Special Study Report No. 79, USAID, Washington DC

Goesling, B. and Firebaugh, G. (2004), "The trend in International Health Inequality", *Population and Development Review*, 30(1):131-146

Gwatkin, D. R. (2000), "Health Inequalities and the Health of the Poor: What Do We Know? What Can We Do?", in *Bulletin of the World Health Organization*, vol. 78 (10):3-18

Hunter, S., and. Williamson, J. (2000), *Children on the Brink. Updated Estimates & Recommendations for Intervention*, USAID, Arlington, VA

Jhamba, T. (1999), "Regional Variation in Childhood Mortality in Zimbabwe", in *Geography*, vol. 84(4):319-330

Li, H., Squire, L. and Zou, H. (1998) "Explaining International and Intertemporal Variations in Income Inequality", *Economic Journal*, Vol. 108 (446)

McMichael, A, McKee, M., Skolnikov, V. and Valkonen, T. (2004), "Mortality trends and setbacks: global convergence or divergence?', *The Lancet*, Vol. 363(9415): 1155-1159

Meyer, D. (2001), 'Convergence Clubs in Cross-Country Life Expectancy Dynamics', *WIDER Discussion Paper* N. 2001/134, UNU WIDER, Helsinki

Micklewright, J. and Stewart, K. (1999), 'Is the Well-being of Children Concverging in the European Union?', *The Economic Journal*, 109(459): F692-714

Milanovic, B. (1998), *Income, Inequality, and Poverty during the Transition from Planned to Market Economy*, The World Bank, Washington D.C.

Minujin, A. and Delamonica, E. (2003), "Mind the Gap! Widening Child Mortality Disparities", *Journal of Human Development*, Vol.4 (3)

Murthi, M., Guio, A.-C., Drèze, J. (1995), "Mortality, Fertility and Gender Bias in India: A District-Level Analysis", in *Population and Development Review*, vol.21(4):745-782

Preston, S. H.(1976), *Mortality Patterns in National Populations*, Academic Press, New York

Rutstein, S. O. (2000), "Factors Associated with Trends in Infant and Child Mortality in Developing Countries During the 1990s", in *Bulletin of the World Health Organization*, vol. 78(10):1256-1270

Ruzicka, L., Wunsch, G. and Kane, P. (1989), *Differential Mortality: Methodological Issues and Biosocial Factors*, Clarendon Press, Oxford

Sala-i-Martin, X. (2002), "The Disturbing 'Rise' of Global Income Inequality", *NBER Working Paper Series* 8904, National Bureau of Economic Research, Cambridge, MA

Sastry, N. (1996), "Community Characteristics, Individual and Household Attributes, and Child Survival in Brazil", in *Demography*, vol. 33(2), pp.211-229

Sastry, N. (1997), "What explains rural-urban differences in child mortality in Brazil?", Social Science and Medicine, 44 (7): 989-1002.

Smeeding, T. (2002), "Globalisation, Inequality and the Rich Countries of the G-20: Evidence from the Luxemburg Income Study (LIS)" Paper prepared for the G-20 Meeting on Globalisation, Living Standards and Inequality: Recent Progress and Continuing Challenges, Sydney Australia, May 26-28, 2002

Székely, M. and Hilgert, M. (1999), "The 1990s in Latin America: Another Decade of Persistent Inequality", Working Paper 410, Research Department of the Inter-American Development Bank, Washington, DC.

United Nations Population Division (2002), *World Population Prospects: the 2000 Revision,* United Nations, New York

Wade, R. (2002), "Globalization, Poverty and Inequality" paper presented at the CESifo Conference 'Globalisation, Inequality and Well-being', Munich 8-9 November 2002.

Wagstaff, A. (2000), "Socioeconomic Inequalities in Child Mortality: Comparison across Nine Developing Countries", in *Bulletin of the World Health Organization,* vol.78(1):19-29.

Wagstaff, A. and Cleason, M. (2004), "*Raising to the Challenge*", the World Bank, Washington D.C.

Wilkinson, R. G. (1996), *Unhealthy Societies: The Afflictions of Inequality,* Routledge, London & New York

Wilson, C. (2001), "On the scale of of global demographic convergence", *Population and Development Review,* 27 (1):155-171.

World Bank (2004) *World Development Indicators 2004 Cd-Rom,* World Bank, Washington.

World Bank (2000) *World Development Report 2000-2001. Attacking Poverty,* Oxford University Press, New York.

Zhang, X. and Kanbur,R. (2003), 'Spatial Inequality in Education and Health in China', mimeo, IFPRI, Washington and Cornell University.

Annex 1. List of countries included in the calculation of the IMR trends and coefficients of dispersion in the text

(i) IMR. Western Europe (18): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom. East Asia and Pacific (22) Australia, Brunei, Cambodia, China, Fiji, Indonesia, Japan, Korea (Democratic Republic), Korea (Republic), Lao, Malaysia, Mongolia, Myanmar, New Zealand, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Island, Thailand, Vanuatu, Vietnam. Latin America and Caribbean (27) Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, Venezuela. Eastern Europe and Central Asia (26) Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russian Federation, Serbia and Montenegro, Slovak Republic, Turkey, Turkmenistan, Ukraine, Uzbekistan. Middle East and North Africa (20) Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen. North America (2) Canada, United States of America. South Asia (8) Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka. Sub Saharan Africa (45) Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic), Congo (Republic), Cote d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

(ii) Life Expectancy. Western Europe (18): Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom. East Asia and Pacific (22) Australia, Brunei, Cambodia, China, Fiji, Indonesia, Japan, Korea (Democratic Republic), Korea (Republic), Lao, Malaysia, Mongolia, Myanmar, New Zealand, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Island, Thailand, Vanuatu, Vietnam. Latin America and Caribbean (32) Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, St. Lucia, St. Vincent, Suriname, Trinidad and Tobago, Uruguay, Venezuela. Eastern Europe and Central Asia (29) Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Russian Federation, Serbia and Montenegro, Slovak Republic, Slovenia, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan. Middle East and North Africa (20) Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Malta, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, Yemen. North America (2) Canada, United States of America. South Asia (7) Afghanistan, Bangladesh, India, Maldives, Nepal, Pakistan, Sri Lanka. Sub Saharan Africa (45) Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo (Democratic Republic), Congo (Republic), Cote d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe.