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The uneven tides of the health transition

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Abstract

As spectacular mortality reductions have occurred in all developing nations at all national income levels, the epidemiologic transition theory suggests that cause-of-mortality patterns should shift from communicable diseases especially prevalent among infants and children to problems resulting from non-communicable conditions at older ages. Global estimates confirm this expectation, and mortality from these latter conditions has become predominant worldwide, leading some observers to argue for a corresponding shift in the public health agenda. In this paper, we nuance this finding by studying the important poverty-gradient concealed in the global estimates.

Our results demonstrate the remaining cause-of-death disparities between the world's poorest and richest populations. We find that the poorest population (1st quintile) experiences higher mortality than the richest population (5th quintile) in each of the three main groups of mortality causes but that the excess mortality of the poorest population is mostly due to the higher incidence of communicable diseases (77% of excess deaths). Overall, those diseases only account for 34.2% of deaths in the world but still dominate mortality causes among the poorest 20% of the world population (58.6% of all deaths). Moreover, these results appear robust to alternative estimates of the international distribution of the world's poorest people.

While recognizing the emerging agenda of the non-communicable conditions, we thus underscore the "unfinished agenda" of communicable diseases in many countries. As populations affected by these diseases are predominantly among the poorer, equity considerations should caution against a premature shift away from these diseases.

Keywords

Communicable diseases; Poverty; Mortality; Health transition; Health policy

Twenty years ago in Alma-Ata, participants in the WHO–UNICEF-sponsored conference called attention to wide disparities in health and mortality around the world. Declaring "health for all by the year 2000" as their ambitious goal, conference participants advocated the deployment of an accessible yet comprehensive first-line health care system (World Health Organization, 1978). The monetary and human cost of this ambitious strategy, often referred to as "Primary Health Care," quickly appeared beyond the reach of national and

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international programs given the health-care needs of so many developing countries. As "an interim strategy", Walsh and Warren (1979) suggested prioritizing health-care needs based on the prevalence of morbidity and mortality causes and the feasibility of control for each cause. Although this "Selective Primary Health Care" approach had its critics (e.g., Unger & Killingsworth, 1986), it has since been widely endorsed by many international and bilateral cooperation agencies (Pebley, 1993). Several infectious childhood diseases that were readily preventable and responsible for a large number of deaths among the world's poor were targeted; with some success judging from improvements in childhood mortality (Hill & Pebley, 1989).

By definition, an interim strategy needs to be replaced or at least amended. Ewbank and Zimicki (1990) recommend that the successor strategy be based on an analysis of the local cause-of-death pattern, even if the goal is to promote health more generally, because health and morbidity are much more difficult to measure than mortality. In many areas, however, even cause-of-death data are unavailable or incomplete. Death certificates recording cause of death were available for less than 30% of deaths in 1990 (Murray & Lopez, 1996a). In recent years, the World Bank and the World Health Organization have coordinated *The Global Burden of Disease Study* (Murray & Lopez, 1996a, b), the most ambitious effort to date to estimate mortality by cause for eight geographic divisions of the world.

The global estimates emerging from that study suggest that communicable diseases, maternal and perinatal causes, and nutritional deficiencies (Group-I) caused about one third of deaths worldwide in 1990, but that a majority of those deaths were due to non-communicable diseases (Group-II). Even in the developing regions, Group-I causes were no longer responsible for a majority of deaths, their contribution having declined to 40% of all deaths. These findings are consistent with the paradigm of the epidemiological transition (Omran, 1971), but many experts did not expect the "developing world" in 1990 to have reached the stage of transition at which non-communicable diseases dominate. Presented as a major new tool for "public health policy formulation" (Murray & Lopez, 1996c), the results of *The Global Burden of Disease Study* seem to convey unambiguous implications. The list of the top causes of death is clearly at odds with the emphasis on vaccination and oral rehydration programs whose genesis was the Selective Primary Health Care approach taken 20 years ago. Vehement calls to the World Health Organization have occasionally been heard, claiming that "current strategies to improve the world's health may have to be reassessed" (The Lancet, 1997, Seymour, 1996).

Of course, one may ponder the meaning of terms such as "the world's health", and question whether health policies should be designed on such a global scale at all but the impact that these global estimates on health policy formulation within international agencies should not be dismissed. In this paper, we caution against some possible consequences of a policy shift based solely on global estimates and argue that international assistance, in particular, should be guided by equity considerations. A simple re-examination of the regional data from *The Global Burden of Disease Study* suffices to illustrate the important disparities within what is conveniently labeled as the developing world.[1] Group-I causes still account for a majority of deaths in India and in sub-Saharan Africa (51% and 65%, respectively), as opposed to 16% in China, 31% in Latin America and the Caribbean, and slightly more than 40% in the other two developing regions (Murray & Lopez, 1996a). Since India and sub-Saharan Africa are the poorest regions, even these aggregated data suggest that the tides of the health transition

[1]By 1974, Alfred Sauvy had already denounced the expression "Third World" that he himself had coined in 1952, arguing that the label had become misleading as Third World countries were becoming too disparate (Sauvy, 1952, 1974; Bairoch, 1992). The expression has since been replaced by the euphemism "developing world", which does not address Sauvy's justified concern.

have not lifted all boats evenly and that the world's poorest may continue to die more often of Group-I than of other causes of death.

This simple illustration can easily be dismissed as too simplistic to provide a sound basis to any health policy. In particular, it is clear that the world's poorest, those who should benefit most under an equity perspective (Rawls, 1971), do not all live in the poorest regions of India and sub-Saharan Africa. In this paper, we move below the surface of these global estimates to provide a more accurate assessment of the mortality differentials between the world's poorest and richest. In spite of data challenges that require brave assumptions at times, we document here why we withstand the basic argument that infectious diseases continue to account for a majority of deaths among the world's poorest. In a nutshell, as we refine the assessment of the world's poorest from the entire population of a unit to the populations of several sub-units, two effects counter-balance one another. On the one hand, the geographical location of the world's poorest becomes more diverse, shifting people to areas where infectious diseases are less prevalent on average. On the other hand, the mortality pattern of the poor population of each area becomes increasingly distinct from the average mortality pattern of their respective area; specifically the proportion of deaths due to infectious diseases is higher among the poorest in the area.

While global estimates and projections of causes of death provide useful background data for planning purposes, employing such estimates and projections to influence international health interventions requires at least some understanding of the extent of variation within the aggregates. Twenty years ago, the cost-and-benefit results of the Selective Primary Health Care approach were congruent with those yielded by an equity perspective. Preventable causes responsible for the largest number of deaths were also those affecting the worse-off. With the partial success of the Selective Primary Health Care, the design of successor policies has become more complicated if an equity orientation is to be maintained. In spite of the common view that the world population is fast converging toward the low mortality and cause-of-death structure of the most developed nations, we continue to find at a more local level of analysis, a strong, persistent income gradient in the relative importance of different causes. Communicable diseases, maternal and perinatal causes, and nutritional deficiencies may no longer claim a majority of lives in the "developing world", but they continue to account for the majority of deaths among the population most in need of assistance.

Data and methods

Locating the world's poorest and richest

We compare the mortality patterns of the world's poorest 20% and richest 20% as of 1990, the reference date used here for consistency with *The Global Burden of Disease Study* estimates.[2] To identify these populations requires international data on income. Most data on income is aggregated at the country level as measured by the gross national product per capita (GNP/c). Some of the shortcomings of GNP/c for international comparative purposes are addressed by the purchasing power parity (PPPs) derived by Summers and Heston (1991). The United Nations Development Program (UNDP) provides estimated PPPs for most countries in the world as of 1990 (UNDP, 1993, pp. 135–137). Because of their population size, China and India were further divided into provinces or states, with each treated as a separate unit. Their respective national PPP estimate was prorated to the distribution of income per province or state in local currency provided in national statistical yearbooks. The national and provincial composition of the two reference populations was

[2]The 20% threshold was selected to compare between the roughly one billion poorest and the one billion richest since as of 1990 the world population was estimated at 5.28 billion.

obtained by ranking these countries, provinces, and states by PPPs, and cumulating population size from the top and the bottom of the rankings up to 20% of the world population size.

The World Bank has recently begun to provide better estimates of the geographical of the "global poor", defined as people with less than 1$ a day, by using household survey data. These data make possible an assessment of national income distribution from which to estimate the number of people living under $1 a day in each country (World Bank, 2000, pp. 62–65). For countries with available data, these estimates add up to about 24.6% of the world's population in 1990. This improved method to locate the world's poorest thus yields a population comparable in size to that we estimated from national data. It has several shortcomings for our analyses, however. The first one is that only 88% of the world population was covered by a survey that provided data on household income, while one can expect the missing values not to be randomly distributed across countries with respect to national income. For the purposes of our comparison, a second problem is that no similar data is provided about the world's richest. More importantly, even with these data the world's poorest can be identified within countries, data on the mortality patterns of people with less than 1$ a day within each of these countries are not generally available.

Assessing mortality patterns

For the first time, *The Global Burden of Disease Study* provides a comprehensive assessment of cause-specific mortality patterns worldwide. The study gathered available data on causes of deaths and estimated the cause-of-death structure for countries with missing or inaccurate data (Murray & Lopez, 1996a, pp. 142–148). The estimation procedure rests on the pioneering work of Preston (1976) who demonstrated the empirical relationship between the level of mortality and the cause-of-death structure by age- and sex-group. Unfortunately, the results of *The Global Burden of Disease Study* are only presented for the world as a whole and for eight regions.

To apprehend the relationship between poverty and mortality patterns, we assessed cause-of-death patterns of the 20% of the world population living in the poorest countries, provinces and states, and the 20% of the world population living in the richest countries. Our estimation of the number of deaths by large groups of causes[3] paralleled *The Global Burden of Disease Study* approach. It first required estimating age- and sex- specific mortality rates for each country. As such rates are not readily available, age- and sex-specific mortality rates were obtained from an estimate of life expectancy at birth in 1990 as estimated by the United Nations (1999) and the choice of a model life-table.[4]

The second step consisted of obtaining numbers of deaths by age, sex, and cause from the age- and sex- specific mortality rates in each constituent country. Following Preston (1976), Murray and Lopez re-estimate the equations predicting death rates in each age- and sex-group for each set of causes (I–III) from the age- and sex-specific mortality rates for all causes (1996a, pp. 142–148). We used the same equations to predict age-, sex-, and cause-specific mortality rates in each constituent country. A final adjustment was performed because each region of the world has its idiosyncratic cause-of-death pattern and, when data are available, Murray and Lopez note that actual cause-of-death patterns differ from the

[3]There are three large groups of causes: Group-I and Group-II are described above, injuries are classified separately as a third group.
[4]For purposes of consistency, national life expectancies at birth were adjusted so that the regional average life expectancy would match Murray and Lopez's life expectancy figure for each region. A model life table was selected from either the Coale and Demeny (1983) system or from the United Nations (1982) system of model life tables. The table selected was that best fitting the age-specific mortality rates (all causes) estimated by Murray and Lopez for the region at the appropriate mortality level. The pattern of mortality selected was then used for each country in the region with country-specific estimates of life expectancy at birth.

prediction in each region. Again, we used the same region-specific correction factors as estimated by Murray and Lopez (1996a, pp. 169–174) to adjust the prediction in each constituent country. Applying these age-, sex-, and cause-specific mortality rates to the population by age and sex in each country (from United Nations, 1999) produces deaths by a group of causes in each constituent country.

Comparing mortality patterns across populations

The method outlined above provides estimated numbers of deaths by a group of causes among the world's richest and the world's poorest, allowing us to compare both the absolute cause-specific mortality differences between the two populations, and their respective cause-structure of mortality. Differences in cause-of-death pattern between two populations can be due to their different age-structures because the different causes of death themselves have different age patterns (Preston, 1976). We thus performed an age-standardized comparison by applying the age distribution of the world population to each set of age- and cause-specific mortality rates.

Finally, we performed another standardized comparison of the two sets of age- and cause-specific rates in the two populations by applying the world's richest rates to the world's poorest age distribution. Comparing the corresponding number of deaths to the actual number of deaths among the 20% of the world population living in the poorest countries provides an estimation of the number of excess deaths in that population. Building on the earlier work by Kohler and Alcock (1976), the number of excess deaths shows the number of deaths that would be avoided had the age- and cause-specific death rates among the world's poorest been reduced to the rates to which the world's richest were exposed. While Kohler and Alcock based their estimates on life expectancy at birth differentials and thus jointly include all causes of deaths, our cause-specific estimates allow us to provide a breakdown of excess deaths by cause.

Results

Geographical distributions

The regional distribution of the global poor as defined by the World Bank is compared to the regional distribution of the world's poorest 20% and the world's richest 20% estimated from PPP data in Table 1. As expected, the regional distribution of the global poor estimated from household data is more than the distribution estimated from national income data. Taking into account within-country distribution, fewer inhabitants of the poorest regions (India, sub-Saharan Africa) are included, while Some inhabitants of richer regions now appear among the global poor.

To a large extent, the household survey data provide an improved distribution of the world's poorest population. As discussed above, the results are some-what susceptible to the problem of missing values. The global poor distribution is based on the average proportion of global poor in countries with available household survey data in each region, applied to the population size of the region. As countries with no income information at the household level are more likely to be poor countries with a higher than average proportion of people below the global poverty line, regions with a larger proportion of their population not covered by household survey data might be under-represented in Table 1, column (2). The regions less covered by such data are the Middle Eastern Crescent, Other Asia and islands, and sub-Saharan Africa. Those are three regions that are indeed less represented among the global poor (column (2)) than among the world's poorest 20% calculated from the more comprehensive sets of national PPP estimates (column (4)), yet the differences are reasonably small for these regions. The largest redistribution is between India and China,

with the share of China among the global poor increasing by 17% and the share of India decreasing by roughly the symmetrical amount when household survey data are substituted to Chinese Provinces and Indian States income data.

Cause-of-death distribution

A quick estimation of the cause-of-death breakdown in the different populations consists in weighing the regional total numbers of deaths in each group of causes (Murray & Lopez, 1996a, pp. 443–468) by the proportion of the regional population included in each population (columns (1), (3), and (5) in Table 1). The corresponding breakdowns are shown in Table 2, columns (2) to (4) and compared with *The Global Burden of Disease Study* estimated distribution for the world, shown in column (1). This fast estimation shows a clear contrast in mortality patterns among the world's poorest quintile population and the world's richest quintile population. Causes of death based on communicable diseases, maternal and perinatal causes, and nutritional deficiencies (Group-I) claimed 34.2% of all deaths in the world, while non-communicable causes (Group-II) accounted for a majority of those deaths in 1990 (55.7%). But Group-I diseases appear to have caused 53.8% of deaths among the world's poorest quintile population, and only 9.0% of deaths among the world's richest quintile population in 1990. As expected, the estimated breakdown for the global poor is closer to the world's average than that of the world's poorest quintile population because of its slightly larger and more evenly located population. With 48.1% of all deaths, Group-I diseases still appear as the most fatal diseases of the three groups among the global poor.

As useful as these results might be as a fast approximation of the actual pattern differential between the two world population quintiles, they might be severely biased because the mortality patterns of the poorest and richest countries in each region are likely different from the regional average pattern. The last two columns in Table 2, show the cause-of-death distribution of the world's poorest and richest quintiles when both the geographical distribution and mortality patterns are estimated at the national level. As expected, taking into account the largest proportion of deaths due to infectious diseases in poorer countries within each region reinforces the disparity of the mortality patterns between the two world population quintiles. With these refined estimates, 58.6% of all deaths appear due to the first group of causes as opposed to 32.0% for the second in the poorest 20%, almost exactly the reverse of the breakdown for the world population. Meanwhile, in the richest 20% of the world population, non-communicable causes now predominate, as argued by the epidemiologic transition, accounting for 85.2% of all deaths.

Mortality differentials by income

The differences between the death distribution in the different populations are in part due to the younger age structure of the world's poorest quintile. To assess the importance of the contribution of the demographic composition, we used the age- and cause-specific mortality rates in each world population quintile and applied to both the age distribution of the world population. The difference in mortality patterns is reduced by the age-standardization, but continues to tend in the same direction. The proportion of Group-I cause of deaths would remain 49.5% among the world's poorest quintile and 11.3% among the world's richest quintile had both populations the age distribution of the world population.

More importantly, the computation of age- and cause-specific rates revealed that the population of the poorest countries was in fact exposed to higher death rates from each of the three large cause-of-death groups. We estimate that if the world's poorest quintile enjoyed the low age- and cause-specific mortality rates of the world's richest quintile, a staggering 9.76 million deaths or 70.1% of all actual deaths would have been avoided in 1990 (columns (2) and (3), Table 3). The extent of their excess mortality varies greatly by a

group of causes, and for communicable and other Group-I diseases, the proportion of excess to total mortality reaches 92% (column (4), Table 3). These causes of death account for 77.0% of the excess mortality among the world's poorest quintile population compared to 14.7% for non-communicable diseases and 8.3% for injuries.

Discussion

Declines in mortality throughout the developing world constitute arguably the most salient achievement of the latter part of the twentieth century. These undeniable successes have lead some to view all parts of the world as converging toward the mortality levels and patterns now exhibited by the industrialized countries. While on average, the demographic gap between developed and developing regions appears to be closing, progresses have been achieved at a variable pace resulting in an increasing heterogeneity among the developing countries. Wilson (2001) estimates that the difference in life expectancy at birth between the 10th and 25th percentiles of the cumulative mortality distribution of the world population has increased from 3.4 years in 1950–1955 to 10.2 years in 2000. Increasing mortality disparities within the "developing world" implies that the distinction between more-developed and less-developed regions is becoming largely irrelevant for health policies. The persistent income-dependence of these disparities implies that global health strategies should adopt an equity-sensitive approach, which would direct greater attention to the morbidity and mortality patterns of the population most in need of assistance.

Until recently, however, data were too incomplete to assess the needs of the most deprived populations. For the first time, the estimates and projections prepared for *The Global Burden of Disease Study* provided a comprehensive assessment of causes of death worldwide. These global estimates document the changing mortality and morbidity patterns, and show that non-communicable diseases have replaced communicable diseases, maternal and perinatal causes, and nutritional deficiencies as the leading causes of mortality. The fact that this was also the case in the "developing world" surprised many observers who did not anticipate these regions to be so advanced in their "health transition" by 1990.

But income-related disparities are just as strong with respect to causes of death as they are with overall mortality level. Rather than comparing the "developed world" and the "developing world", we demonstrate by assessing the cause-of-death patterns among the poorest and the richest countries of the world, and, further, by assessing the number of excess deaths by large groups of causes in the former countries. Regional data from *The Global Burden of Disease Study* readily suggest huge disparities in mortality patterns, with Group I causes of death accounting for 51% and 65%, respectively, of all deaths in the two poorest regions presented in the study, India and sub-Saharan Africa. If one-half to two-thirds of all deaths were still due to Group I causes among the world's poorest, an equitable global health policy would have to maintain the emphasis on those causes. The argument could easily be dismissed as resting on too simplistic a logic, however, since a global equity perspective requires to take into account the need of the world's poorest people; and they do not all live in India or in sub-Saharan Africa.

In the analyses presented here, we refined the estimates by aiming beyond the surface of regional averages. By and large, we remained constrained by data availability to use national population as the unit of analysis (or provincial and state populations in the cases of China and India). Using national income data and the population of countries as opposed to entire regions yields a wider geographical basis for the world's poorest segments. However, also recognizing the persistent relationship between national income and national mortality patterns returned our estimate of the proportion of deaths due to Group-I causes among the

world's poorest quintile population to 58.6%, or again roughly between one-half and two-thirds.

Data permitting, we would have refined the estimates further. Clearly, poor people in a rich country might be poorer than some habitants of a poor country, so that the population living in the poorest countries in the world does not perfectly correspond to the poorest population of the world. Ignoring national boundaries and deriving estimates pertaining to the poorest 20% of the world population regardless of their country of residence would have been even more relevant to the equity argument made here. Such estimation poses formidable data challenges but its results can readily be anticipated. Using household data, we can estimate more precisely the geographical distribution of the global poor. This distribution is more diverse than when people are lumped by countries on the basis of national income. Were the same average patterns of mortality by location used, this refined distribution would thus yield lesser differences in mortality patterns with the global rich. But these poorest households also constitute an even more selected sub-group of the region they are located in than were the poorest national populations in the region. Unfortunately, data on intra-national differences in mortality are not consistently enough available among poor countries to fully carry out the assessment at the sub-national level. Average mortality patterns by region and the regional distribution of the global poor estimated from household survey data yield an estimated 48.1% of all 1990 deaths accounted by Group-I causes among the global poor, as opposed to 53.8% with the same mortality patterns and a distribution based on national incomes. Since the corrective effect of using the appropriate mortality pattern for these selected households should be even larger than was the case when we worked with national data, in the end the estimate of Group-I-related deaths would likely to be close to the 58.6% estimate derived then. In any event, we can confidently claim that one-half to two-thirds of deaths among the world's poorest quintile were still due to infectious diseases and other Group-I causes of death in 1990.

Unfortunately, these estimates refer to more than a decade ago. A simple extrapolation of the health transition up to that point would indicate that by now, rich/poor differentials in mortality patterns should not be as stark today as they were then. While we can expect past reductions in infectious diseases prevalence to continue, some observers warn against the emergence of new infectious diseases or re-emergence of older ones (e.g., Garrett, 2000; Olshansky, Carnes, Rogers, & Smith, 1997). To take only the most obvious example, HIV-infection was only estimated to have caused 300,000 deaths worldwide in 1990 (Murray & Lopez, 1996a), while the figure had already reached 2.3 million by 1997, according to the Joint United Nations Programme on HIV/AIDS (UNAIDS, 1998). Moreover, these new infections display the same income disparities as the more established ones. UNAIDS (1998, pp. 8) estimates that "89% of people with HIV live in sub-Saharan Africa and the developing countries of Asia, which between them account for less than 10% of global Gross National Product." The inequalities in exposure to the risk of fatal infectious diseases thus appear unlikely to fade away soon by the sheer momentum of the epidemiological transition.

The robustness of the estimation, at different levels of analysis, with respect to the distribution of deaths by causes among the world's poorest quintile may surprise. It is produced in part by the similarity of the income disparities in survival, which Kohler and Alcock (1976) first referred to as "structural violence", at the global and at the more local scale, a property seemingly common to socially constructed structures (Abbott, 2001).[5] In this particular case, the greater proportion of Group-I deaths in the developing world than in

[5]Abbott (2001:xi) credits anthropologist Evans-Pritchard for the insight that "many social structures look the same in large scale and in small scale". For an application of the concept of structural violence at a national level, see for instance, Gilligan, 1996.

the developed world is echoed, within the developing world, by the greater proportion of those deaths in the two poorest regions, India and sub-Saharan Africa. But the same structure of excess mortality can be found among the different countries in sub-Saharan Africa or the different Indian states. Also while data in the poorest countries are not available to satisfactorily test this claim, it is likely that again within each of the poorest geographical sub-units, one would find that deaths in the poorest households are more often related to Group-I causes than in the relatively better off households.[6]

We also expect the results presented here and based on national mortality patterns and income levels to be robust because in spite of important within-country inequality most of the worldwide variance in income remains due to between-country variance (over 90% according to Korzeniewicz & Moran, 1997). Moreover, age-standardization shows that the greater proportion of Group-I deaths is mostly due to the differences in mortality structures between the richest and poorest countries, not to differences in age structures. While age-standardization is useful to disentangle the relative impact of different age distributions and different cause incidences, it is not clear from a policy perspective that the age-standardized numbers of deaths by cause would be more relevant than the actual numbers of deaths in the population under study. The actual number of deaths from a given cause is a valid measure of its importance in the population whether it is produced by high rates or by high numbers of people at risk.

A better basis for designing equitable health policies in our view is the distribution of excess deaths resulting from a different standardization, specifically the substitution of the mortality rates of the richest segments of the population instead of the rates actually faced by the poorest segments of that population. The actual distribution of deaths provides a somewhat inappropriate policy guide because mortality rates cannot be reduced exactly to zero, whereas the death rates already enjoyed by the better-off segments of the population provide a more realistic target. This approach can be traced to the global assessment of "structural violence" by Kohler and Alcock (1976) but they conducted their estimation on the basis of all-cause life expectancies at birth. Using cause-specific mortality rates yield a distribution of the number of excess deaths among the world's population poorest quintile by cause. We estimate that 77.0% of excess deaths in the 20% of world population living in the poorest countries are due to communicable and other Group-I causes.

To some, the global results suffice to demonstrate that the time has come to shift resources and international assistance away from Group-I causes of death in order to address Group-II causes, which are now affecting larger numbers in these regions. In this paper, we argued that such a shift away from previous priorities in communicable diseases, maternal and perinatal causes, and nutritional deficiencies would be detrimental to the sizable, poor population that has been left behind in the epidemiologic transition and for whom these causes of death continue to dominate. While global results are invaluable for enabling policy makers to better prepare for the emerging health needs of different populations, these global results constitute an inappropriate guide for refocusing health priorities in international assistance programs. The "emerging agenda"—the burden of non-communicable deaths and the "unfinished agenda" of Group-I causes of death are both important but pertain to different perspectives (Gwatkin & Heuveline, 1997). [7] The emerging agenda shows which causes are likely to become the main burden, and that agenda is most relevant for planning purposes. The unfinished agenda, we argue, should guide intervention to alter current

[6]In country after country, researchers have found that the disadvantaged segments of national populations suffer from worse health and higher mortality. See Gwatkin (1993) on developing countries; for example, among many studies and reviews on developed countries see Mackenbach et al. (1997), Williams and Collins (1995), Preston and Taubman (1994), Pappas, Queen, Hadden and Fisher (1993), Valkonen (1993).

predictions toward more equity in the burden of mortality and morbidity.[8] From an equity perspective, we maintain that as long as the most disadvantaged populations are primarily affected by communicable diseases, maternal and perinatal causes, and nutritional deficiencies, any programmatic shift of resources away from these causes of death would have detrimental effects.

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[7]Of course, the optimum allocation of resources between the two agendas is difficult to determine. Our emphasis on the unfinished agenda is largely a response to what we saw as a hasty shift away from it. In turn, this plea has come under attack. The most vehement to date—an editorial in The Lancet (2000, p. 1923)—even sees therein “the forces of small-mindedness and big tobacco”. In spite of its unnecessarily polemical tone, the editorial echoes the genuine concern that this equity emphasis on the worse-off in the world might conflict with the interests of the majority in the developing world, “the middle 60% of the world’s population who live mostly in less-developed regions”. If the distribution of deaths by cause is taken as the standard, the majority in the developing world appears more exposed to non-communicable diseases. But as argued above, this is a poor standard for health policies because mortality rates cannot decline to zero across the board: people will continue to die from *some* cause. The more realistic standard—although still beyond reach for decades to come is to compare the current distribution of deaths to distribution obtained had the cause-specific mortality differentials with the richest been eliminated. Thus defined excess deaths among the middle 60% are also due to Group-I causes (6.5 million deaths) more often than to Group-II causes (3.9 million deaths). With 7.5 million excess deaths from Group-I causes for a third of the population, the world’s poorest quintile would thus benefit more from a strengthened emphasis on these causes of death than the middle 60% but not at the expense of the majority in the developing world.

[8]The analysis described above for mortality can be extended to morbidity using Murray and Lopez’s estimates of disease-adjusted life years (DALYs). The same national-income gradient is obtained with causes in Group-I accounting for 64% of DALY loss in the 20% of the world population living in the poorest countries as opposed to a global estimate of 44% for the world (Gwatkin, Guillot, & Heuveline, 1999)

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Table 1

Distribution of the global poor, World's poorest 20%, and World's richest 20% by region, 1990[a]

Region	Distribution based on population with less than $1 per day (global poor)		Distribution based on PPP estimates			
			World's poorest quintile		World's richest quintile	
	Proportion of the region among the global poor	Proportion of the global poor in the region	Proportion of the region in the quintile	Proportion of the quintile in the region	Proportion of the region in the quintile	Proportion of the quintile in the region
	(1)	(2)	(3)	(4)	(5)	(6)
EMEs	—	—	—	—	100.0%	75.7%
FSEs	6.3%	1.3%	—	—	44.7%	14.7%
LAC	11.1%	4.9%	1.5%	0.6%	0.6%	0.3%
China	18.5%	20.1%	2.9%	3.1%	1.2%	1.3%
MEC	2.4%	1.3%	2.9%	1.4%	6.4%	3.1%
OAI	19.7%	14.0%	25.6%	16.6%	7.7%	5.0%
India	44.2%	35.4%	64.2%	51.7%	—	—
SSA	43.0%	23.0%	54.9%	26.6%	—	—
World	24.6%	100.0%	20.0%	100.0%	20.0%	100.0%

[a]Notes: Regions are those presented in *The Global Burden of Disease Study* (Murray & Lopez, 1996a): established market economies (EMEs), the formerly socialist economies of Europe (FSEs), Latin American and the Caribbean (LAC), China, Indian, other Asia and islands (OAI), Middle Eastern crescent (MEC), and sub-Saharan Africa (SSA). To facilitate comparisons, regions are presented in the same order as in Table 1, i.e., decreasing order of life expectancy in 1960–1965.

Sources: Population with less than 1$ a day estimated by the authors from household survey data from World Bank (2000, pp. 62–65). Population by PPP is estimated by the authors from United Nations (1999, pp. 448–455) demographic data and Penn World Tables, Mark 5.6 from the website of the National Bureau for Economic Research (www.nber.org/pwt56.html).

Table 2

Distribution of deaths by group of causes among different population groups, 1990[a]

Causes of Death	Estimated based on regional totals				Estimates based on national totals	
	World's population (1)	Global poor (2)	World's poorest quintile (3)	World's richest quintile (4)	World's poorest quintile (5)	World's richest quintile (6)
Group-I	34.2	48.1	53.8	9.0	58.6	7.7
Group-II	55.7	41.3	35.9	83.7	32.0	85.2
Group-III	10.1	10.7	10.3	7.3	9.4	7.1
All causes	100.0	100.0	100.0	100.0	100.0	100.0

[a]Note: Causes of death are grouped as in *The Global Burden of Disease Study* (Murray & Lopez, 1996a). Group-I consists of communicable diseases, maternal causes, conditions arising in the perinatal period, and nutritional deficiencies. Group-II encompasses all non-communicable diseases. Group-III comprises all injuries.

Source: Regional total numbers of death by cause from Murray and Lopez (1996a). National total numbers of death by cause estimated by the authors (see text).

Table 3

Excess deaths among the poorest 20% of the world population, 1990 (in thousands)[a]

Causes of death	Actual number of deaths (1)	Number of excess deaths (2)	Contribution of excess mortality (3)	Distribution of excess deaths (4)
Group-I	8159	7517	92.1%	77.0%
Group-II	4449	1438	32.3%	14.7%
Group-III	1315	805	61.2%	8.3%
All causes	13,923	9760	70.1%	100.0%

[a]Note: Causes of death are grouped as in *The Global Burden of Disease Study* (see Table 2). Excess deaths are computed by applying the age-, sex-, and cause-specific mortality rates estimated for the world's richest 20% to the estimated distribution by age and sex of the world's poorest 20%; and subtracting the resulting number of deaths by cause from the actual number of deaths by cause in the world's poorest 20%. The contribution of excess mortality is the ratio of the number of excess deaths to the actual number of deaths.