DEMOGRAPHIC RESEARCH

Research Article

Out of sync? Demographic and other social science research on health conditions in developing countries

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Abstract

In this paper, we present a framework for considering whether the marginal social benefits of demographic and social science research on various health conditions in developing countries are likely to be relatively high. Based on this framework, we argue that the relative current and future predicted prevalence of burdens of different health/disease conditions, as measured by disability-adjusted life years (DALYs), provide a fairly accurate reflection of some important factors related to the relative marginal social benefits of demographic and social science research on different health conditions. World Health Organization (WHO) DALYs projections for 2005-30 are compared with (a) demographic and other social science studies on health in developing countries during 1990-2005, and (b) presentations made at the Population Association of America annual meetings during the same time period. These comparisons suggest that recent demographic and social science research on health in developing countries has focused too much on HIV/AIDS, and too little on non-communicable diseases.

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1. Introduction

Health is of considerable interest to researchers, both because of its intrinsic value, and because improved health contributes directly to people's welfare. Improved health may also prove to be of instrumental importance if better health saves resources that otherwise would have been used to deal with morbidity, and if better health increases productivity. Recent estimates have suggested that the benefit/cost ratios for a number of investments in better health and nutrition in developing countries have been overwhelmingly positive, and indeed rank very highly among a wide range of alternative investments in the developing world (e.g., Lomborg 2004, Copenhagen Consensus 2008). Further, health may be closely associated with a range of demographic concerns. For reasons such as these, health in developing countries has long been of interest to demographic and other social science researchers.

But health in developing countries is a very broad topic, and the available resources, both in terms of funding and of researchers' time, for demographic and other social science research (hereafter, "social science research") on health in developing countries are limited. Therefore, the question of how well are these resources allocated is important.

We address some important dimensions of this question in this paper. In Section 2, we provide a framework for thinking about what the socially optimal distribution of social science research resources among health conditions in developing countries is. In Section 3, we describe the distribution of recent social science research on health in developing countries in terms of the three aggregate disease/health conditions categories used by the Global Burden of Disease/World Health Organization (GBD/WHO): (1) communicable, maternal, perinatal, and nutritional conditions (CMPNC); with disaggregation to separate out HIV/AIDS, (2) non-communicable diseases (NCD), and (3) injuries. In Section 4, we describe the projected levels and changes in health/disease categories in the developing world. In Section 5, we describe how these/health/disease categories relate to social science research on health in developing countries.

Before turning to the analysis, we clarify that our emphasis in this paper on the use of resources for research in demography and other social sciences on various health conditions in developing countries is distinct from two related literatures. (1) A separate question, and one that has been examined previously, is that of the appropriate allocation of resources for prevention and care among various health conditions in developing countries (e.g., Shiffman, Beer and Wu 2002; Suhrcke et al. 2005; England 2007; Halperin 2008; Bongaarts and Over 2010a, b; Barry and Townsend 2010; Nattrass and Gonsalves 2010; Asiimwe et al. 2010; Holmes et al. 2010; Reddi and Leeper 2010). The answer to the question about the allocation of resources for

prevention and care need not be closely related to the answer to the less-researched question of interest in this study, which is the allocation of social science research resources among health conditions. It is possible, for example, that the expected rates of return on basic (social science and/or biomedical) research on some health conditions are high because so little is known about them, but that the rates of return on preventative and curative measures for these health conditions are expected to remain very low until more advances are made in basic research. (2) Another question that is also separate from the main issue addressed in this paper is that of how best to allocate resources for biomedical research on various health conditions in developing countries. While this is an interesting and important question, it is definitely separate from the main question of the current paper. It might be the case, for example, that results from biomedical research on certain health conditions in developed countries could transfer readily to developing country conditions, but that social science research would not transfer because of the considerable differences in markets, policies, resources, and culture.

2. Framework for thinking about the socially optimal distribution of social science research among health conditions in developing countries

We adopt a very simple perspective in determining the optimal number of social science studies on different health conditions in developing countries, in addition to the social science studies that have already been conducted.

Figure 1 illustrates the simple static framework that we use. In this figure, the expected marginal social benefits and expected marginal social costs of social science studies of specific health conditions in developing countries are measured on the vertical axis, and the number of social science studies of each particular health condition are measured on the horizontal axis. The solid lines labeled MSB_1 and MSB_2 are the expected marginal social benefits from further social science studies of health conditions 1 and 2, respectively.[4] Both of these expected marginal social benefit curves are downward sloping because of the assumed diminishing marginal social benefits of additional social science studies on a particular health condition. For example, if n_1 studies of health condition 1 have already been conducted, the marginal social benefit

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[4] These MSB curves are drawn as straight lines that do not cross for simplicity. The MSC curve discussed next is also drawn as a straight line at a constant level for simplicity. The basic points below hold if the curves are not linear, if the MSB curves cross, and/or if the MSC curve is upward-sloping.

Figure 1: **Marginal social benefits of social science research on any health condition (MSB) and marginal social costs for social science research on any health condition (MSC)**
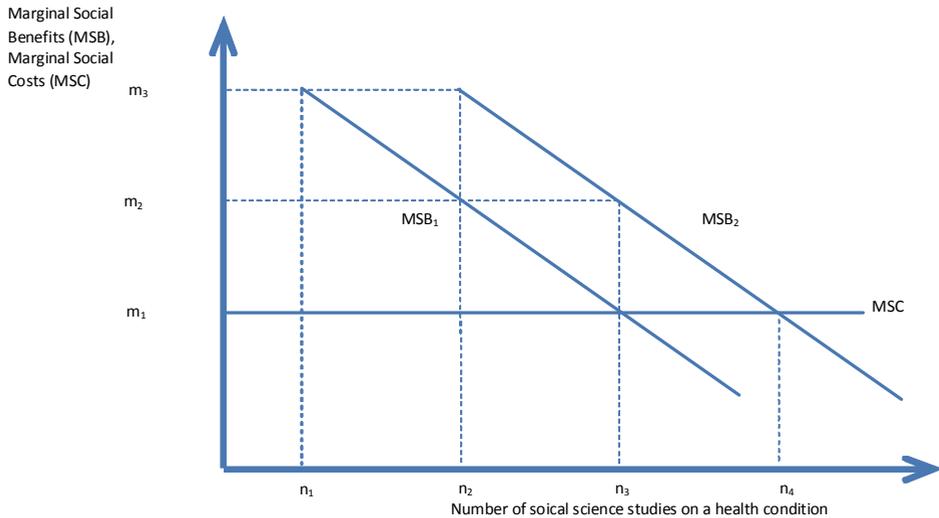
of an additional study is m_3. If, however, n_2 studies of health condition 1 have already been conducted, where $n_2 > n_1$, the marginal benefit of an additional social science study is lower at m_2. The solid line labeled MSC is the expected marginal social cost of additional social science studies of health conditions. Assuming that the basic cost of such studies is the time of the social science researchers and complementary research inputs, and that these resources are fairly fungible when studying different health conditions in developing countries, as well as other topics, the MSC curve is approximately linear at m_1. Under these assumptions, the socially optimal distribution of social science studies for any one health condition is where the expected marginal social benefit equals the expected marginal social costs, or for n_3 studies for health condition 1 in the figure. If there are fewer than n_3 studies of this health condition—if, for example, there are n_2 studies—the expected marginal social benefits (m_2) are greater than the expected marginal social costs (m_1), so more benefits than costs are obtained by increasing the number of studies until the level n_3, and vice versa if there are more than n_3 studies. Therefore, in this simple case, the optimal number of social science studies across health conditions depends solely on how the expected marginal social

benefits differ across health conditions, with the optimal number for health condition 2 at n_4 in the figure being at a higher level than the optimal number for health condition 1 at n_3, because the expected marginal social benefits of more studies for health condition 2 are greater than the expected marginal social benefits for more studies for health condition 1 at any given level of studies in the figure.

The relative desirability at a given point in time of further demographic social science research can be decomposed into two factors: movements along given MSB curves, and different locations of different MSB curves. *(1) Movements along a given MSB curve*: We define the knowledge gap for a given health condition to be the difference between the number of studies to date (e.g., n_1 for health condition 1 in Figure 1) and the optimal number of studies for that health condition (n_3), so that the knowledge gap for health condition 1 is $n_3 - n_1$. *(2) Different locations of MSB curves for different health conditions*[5]*:* The MSB for one health condition may be higher than that for another (as MSB2 is higher for MSB_1 for any given number of studies in Figure 1) for a number of reasons, some major examples of which are:

- Higher future prevalence of a health condition, ceteris paribus, means that any useful insight from social science research on the health condition will be applicable to more individuals than would be the case for health conditions with very limited prevalence. The basic idea is that there are likely to be increasing returns to scale or public good characteristics for research. Therefore, the marginal social benefits are likely to be larger, ceteris paribus, for social science research on a widespread health condition, such as malaria, than on a health condition with much lower prevalence, such as Ebola. The degree of prevalence would seem to be forward-looking, reflecting both the current level of prevalence and the expected future development of prevalence.

- Greater losses due to the health condition means that the welfare gains from contributions of social science research are likely to be greater. This may be the case because of a combination of several factors, including the impact of the health condition on productivity levels, as well as on welfare and the duration of healthy life lost due to the disease. The gains are likely to be greater, ceteris paribus, for studies of conditions such as HIV/AIDS than of the common cold because of the greater impact on productivity per infected person, and the greater potential for the loss of healthy life years.

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[5] These same factors, of course, determine whether the MSB curve for any health condition moves away from or closer to the origin over time.

- A greater diversity of contexts with regard to markets, policies, culture, and resources increases, ceteris paribus, the value of social science research on a particular health condition. Just because there is considerable social science research on obesity in Manhattan, for example, does not mean that the value of social science research on obesity is very limited in Mexico or South Africa. Because the market, policy, cultural, and resource contexts in these places are very different, social science research conducted in Manhattan is not likely to transfer well to (or have much external validity for) Mexico or South Africa. It should be noted that this factor is likely to counterbalance to a certain extent the first one on prevalence if wider prevalence is accompanied by wider variations in contexts. As was mentioned in the introduction, social science research may differ from biomedical research in this regard. There may be contexts—e.g., between high per capita and low per capita income countries—across which the results of biomedical research transfer well, but the results of social science research do not because of the different institutions and resources.

- Social science research has greater relevance because of the greater importance of individual behaviors and governmental actions in determining the degrees of susceptibility to and the impacts of a given health condition. If there were a health condition for which the degrees of susceptibility and the effects were independent of all current and potential individual and governmental behaviors, the marginal benefits of social science research on this health condition would seem to be very low, as this research would do little to improve society's capacities for dealing with the health condition, though social science research would still be informative about the effects of the condition. But for most, if not all, health conditions, individual and governmental behaviors do influence degrees of susceptibility and impacts. For example, individual behavior affects levels of exposure to infectious health conditions through sanitation, hygienic practices, and water preparation. Similarly, the likelihood of contracting a chronic health condition or of sustaining an injury is influenced by individual behaviors such as diet, physical activity, and levels of exposure to carcinogens. At the same time, governmental policies affect the levels of susceptibility to and effects of infectious diseases, chronic diseases, and injuries through a variety of means, ranging from infrastructure investments, to information campaigns, to regulations designed to limit exposure to disease risks, to public subsidies for preventative and curative health. While the relative effects of these actions on specific health conditions may differ, we have little evidence to suggest that they vary greatly among broad health condition categories, such as communicable diseases, chronic diseases, and injuries.

Factors such as these mean that there is a gap between the optimal number of studies for health condition 1 and health condition 2 that is equal to $n_4 - n_3$. There are, undoubtedly, other important factors, particularly for specific health conditions, but these four seem to be the most important general determinants of the locations of the marginal benefit curves for social science research on health conditions that hold across most health conditions.

Therefore, the relative desirability of undertaking future social science research at a given point of time depends on the combination of these two effects for the alternative health conditions being considered; i.e., on where we are on each MSB curve, and on the relative location of the MSB curves. When comparing, for example, the expected relative gains from undertaking research for health condition 1 versus health condition 2 in Figure 1, we must first determine (1) the starting points on the declining MSB curves based on previous research, and (2) the relative locations of the two curves. If, for example, the starting point for condition 1 is n_2, and the starting point for condition 2 is also n_2, there is an advantage in concentrating on health condition 2 in the next study because $MSB_2 > MSB_1$ for additional studies immediately beyond n_2. This does not mean that it is optimal to focus exclusively on health condition 2 with more and more studies. This would not be optimal because, as more studies of health condition 2 are undertaken, there is movement down the MSB_2 curve to a point like n_3, at which the MSB_2 is equal to the MSB_1 at n_2, and then beyond, in which $MSB_2 < MSB_1$. Therefore, once studies of health condition 2 have expanded to n_3, the socially optimal allocation would be for some of the subsequent studies to focus on health condition 1. Of course, the location on a particular MSB curve at which society is at any point in time depends on the history of the health condition related to that MSB curve. For a relatively novel health condition, such as HIV/AIDS in 1990, the starting point is likely to be to the left, such as at n_1 on MSB_1, because prior to that time there had been relatively few social science studies of HIV/AIDS. But for long-established health conditions, such as malaria, the starting point for the same time is likely to be much further down the relevant MSB curve because of the relatively large number of previous studies.

We note that relative *private* incentives for social scientists to undertake research on different health conditions in developing countries almost surely overlap in some important respects with the factors underlying the relative marginal *social* benefits for conducting research on different health conditions. Many social scientists may, for example, be interested in to what extent their research contributes to the "social good," and their perception of social good may be highly correlated with factors such as those discussed above with regard to current positions on the marginal social benefit curves, or relevant locations of the marginal social benefits curves for various health conditions. But there may also be some important differences between the private and the social incentives for research. Most social scientists perceive that their financial

rewards and reputational gains are important, and these considerations may lead them to decide to invest their research efforts in ways that diverge from considerations regarding the positions on and locations of the marginal social benefits. For example, there may be substantial financial and reputational rewards from being among the first to investigate some new phenomenon, regardless of whether the marginal social gains are large. In addition, the resources available to social scientists for investigating different health conditions may differ substantially from those suggested by the social marginal benefits because the private interests of the funders (whether private or public entities) may differ from the global social interests of developing countries. For example, national funders of social science research in a high-income country may have a greater interest in investigating certain health conditions in developing countries when these health conditions are also prevalent in their societies, than they have in funding research into other health conditions that are not common in their own countries. Similarly, private pharmaceutical firms may be much more interested in supporting social science research into health conditions for which the potential drug markets are relatively large because of a combination of disease prevalence and strong patent protection, even if the marginal social benefits are not as great.

The framework that we present in this section clearly has some limitations. While it incorporates the possibility of movements along a given MSB curve, and provides insights into the effects of shifts in MSB curves, it does not, for example, provide insight into what causes shifts in MSB curves. To use this framework to provide intuition for the analysis below, we therefore effectively assume that, by 1990, the MSB curve for HIV/AIDS that prevailed in the following decades was basically approximately known, even though the possibility of considerable movement along that MSB curve existed because prior social science research on HIV/AIDS had been relatively limited. But if, for example, the MSB curve for HIV/AIDS was instead shifting out over that period, it would not significantly affect the interpretations below. Another possible limitation of our framework is that the assumption of a constant MSC curve may not hold, particularly for a relatively recent health condition, such as HIV/AIDS from the perspective of 1990. If the MSC curve were upper-sloping from m_1, rather than constant at m_1, in Figure 1 because of increasing marginal social costs of investigating a new health condition, that would mean that the optimal number of studies for that health condition would be less than with the horizontal MSC. Again, however, this limitation would not seem to have implications for the interpretations below. Finally, a more general limitation is that, because the information is not available to estimate directly the MSB and MSC curves, or the parallel private curves, the link between this framework and the empirical exploration below is less tight than would be ideal. Nevertheless, we think that the link between this framework and the

empirics below is sufficiently strong for the framework to provide useful intuition for understanding the patterns in empirical data considered in the following.

3. What has been the focus of recent demographic and other social science research on health in developing countries?

To characterize recent demographic and other social science research on health in developing countries, we first conducted a search using two online databases: (a) *Sociological Abstracts* (http://www.csa.com/factsheets/socioabs-set-c.php) and (b) *EconLit*, the American Economic Association's electronic bibliographic database (http://www.econlit.org).[6] These online databases abstract and index an international array of demographic, sociology, and economic journal articles, books, book reviews, collective volume articles, working papers, and dissertations, with a greater emphasis on published studies and on studies conducted in English. We searched for studies written between 1990 and 2005 in order to discern whether there have been any trends over this decade and a half. We limited our search to studies on developing countries. We conducted searches for the three aggregate disease/health conditions categories noted in the introduction used by the Global Burden of Disease/World Health Organization (GBD/WHO): (1) communicable, maternal, perinatal, and nutritional conditions (CMPNC); (2) non-communicable diseases (NCD); and (3) injuries. Appendix Table A gives the major more disaggregated disease and health conditions within each category. In our search, within each category we listed as many descriptors as possible so that the most complete record would be generated (i.e., for communicable diseases we listed Tuberculosis OR STDs OR HIV OR AIDS OR Syphilis etc.). The broadest category was injuries, which includes injuries caused by everything from routine automobile accidents to large-scale ethnic violence.

After completing our initial searches, we downloaded the records into a database that enabled us to check our classification more carefully by, for example, examining

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[6] We selected these two databases because of the breadth of their coverage on demographic and social science research on health in developing countries. They certainly involve some selectivity, as do all alternatives, but we perceive that their breadth, as well as their prominence in their disciplines, are strong points. Alternatives are not as satisfactory with regard to selectivity for the purpose of this paper. Pubmed, for example, includes medical as well as social science research, does not cover a number of social science journals related to demography, and in some cases only indexes a select number of volumes. JSTOR, for another example, does not include articles published in the last 1-5 years, depending on the agreements with particular journals. Popline, for a third example, does not index the contents of all journals in their entirety or for the years in which we are interested, although many of the same journals are indexed in Popline as in the two databases that we use.

abstracts. While such a procedure undoubtedly gives a noisy measure of the distribution of social science research on health in developing countries in these aggregate categories for a number of reasons (e.g., some applied research never appears in venues covered by *Sociological Abstracts* or *EconLit*), it does cover systematically the major peer-reviewed studies that tend to set the tone for what research issues are considered important in the field. In the subsequent discussion, we refer to the data that we assembled in this process as data on *demographic and other social science studies* (or "social science studies" or "studies" for short).

To provide additional complementary information, we undertook a similar search of presentations of papers at sessions or postings at the Population Association of America (PAA) annual meetings for the same 1990-2005 period. These arguably reflect a slightly more current perspective (due to publication lags) on research topics of particular interest to the demographic community that have been selected for presentation at a major demographic annual professional meeting.[7] In the discussion that follows, we refer to the data we assembled in this process as data on *PAA presentations*, as distinguished from the data described above on *social science studies*.

Charts 1-3 summarize various dimensions of the time patterns and cross-sectional patterns in social science studies and in PAA presentations on the three major GBD/WHO health conditions/disease categories in developing countries during 1990-2005. Because of year-to-year fluctuations, we use the averages for 1990-2 and 2003-5 throughout this paper to characterize the patterns at the start and the end of the 1990-2005 period. For 1990-2, the average number of studies on health in developing countries recorded in *EconLit* and *Sociological Abstracts* was, at 126 per year, relatively small. The average number of PAA presentations was, at 36 per year, also small (Charts 1A and 1B). There was considerable growth between 1990-2 and 2003-5, averaging 10.0% per year for studies, and 8.9% for PAA presentations (Chart 1C), so that the average number of studies was 466 per year and the average number of PAA presentations was 120 per year for 2003-5. *Sociological Abstracts* accounted for the vast majority of the studies, or 81% of the total for 1990-2005. But the number of studies covered in *EconLit* increased at almost twice the rate as those covered in Sociological Abstracts between 1990-2 and 2003-5 (Chart 1C), which suggests the

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[7] A referee suggested that PAA submissions rather than PAA presentations could be a better representation of what the profession as a whole considers important. Data on PAA submissions are not available with which we can test over the time period of interest whether the distribution among health conditions of submissions differs from the distribution among presentations. But we think that the distribution among presentations is an important indicator of what at least the leaders in the profession—i.e., the overall meeting organizers and the organizers of individual sessions—consider to be the more interesting and important topics given the submissions that they receive.

presence of a disciplinary shift towards *relatively* more studies in economics over this period (though still with absolutely more studies in sociology at the end of the period).

The basic GBD/WHO category with the most rapid growth in studies was CMPNC (11.4% per year, Chart 2A), the category that traditionally—at least prior to the initiation of the epidemiological and nutritional transitions in the developing world—has been considered to be the dominant locus of health/disease problems in developing countries. Close behind in terms of growth was injuries (10.1% per year). Over the entire period, injuries accounted for a little over half (51%) of the studies (Chart 3A). But by the end of the period in 2003-5 (Chart 3B), the CMPNC category had expanded to make up half of the studies (50%). A distant third in respect to both the level of and the increase in studies was the NCD category, which covers conditions that have traditionally been considered to be diseases primarily of developed countries. NCD accounted for only 11% of the studies in the 1990-2005 period and 7% of the studies for 2003-5, and had an annual growth rate in studies of only 4.0%. Thus, in what economists would characterize as "revealed preference," demographers and other social scientists producing these studies on health in developing countries apparently thought that their research contributions would have the greatest impact if they focused on CPMNC and injuries, with some shift from injuries to CPMNC; while devoting very little and declining amounts of attention to NCD relative to the other categories.

For PAA presentations, we found related, but somewhat different patterns with regard to the three basic GBD/WHO categories. CMPNC were even more dominant in PAA presentations than in demographic and other social science studies over 1990-2005 (74%, Chart 3C) and for 2003-5 (68%, Chart 3D). As for demographic and other social science studies, NCD were the subject of a relatively small share of PAA presentations (15% in 1990-2005, Chart 3C; 16% for 2003-5, Chart 3D), and this category saw relatively slow growth between 1990-2 and 2003-5 (6.2% per year, Chart 2B). PAA presentations did, however, focus to a much lesser extent on injuries than did studies produced by social scientists (11% for 1990-2005, Chart 3C; 16% for 2003-5, Chart 3D). For the PAA presentations, the most rapid growth was in the three major GBD/WHO categories (20.4% per year, Chart 2B). Thus, when we consider the "revealed preferences" of those giving PAA presentations on health in developing countries, our findings seem to indicate that the presenters believed their research contributions would confer the greatest private benefits, including altruistically motivated "social benefits," if they focused on CPMNC, with some shift from CPMNC to injuries, while giving little attention to NCD.

But in an important respect for this paper, the CPMNC aggregate only reveals part of the story. A large and increasing share of social science research on health in developing countries has been directed towards one disease that is part of the CPMNC aggregate, HIV/AIDS. The annual rate of growth of studies on HIV/AIDS between

1990-2 and 2003-5 was 12.8% (Chart 4A), and the share of studies on HIV/AIDS of the total studies on health in developing countries was 34% for the whole 1990-2005 period (Chart 5A), and 43% for 2003-5 (Chart 5B). The annual rate of growth of studies on injuries (10.1%) was almost as high as that of studies on HIV/AIDS. But the annual growth rates in studies on NCD (4.0%) and on CPMNC other than HIV/AIDS (hereafter CPMNC – HIV/AIDS) (5.7%) have been less that half the annual growth rates of studies on HIV/AIDS (Chart 4A). Thus, our statement above about the revealed preferences of authors of studies may be better rewritten to say that, in a revealed preference sense, demographic and other social science researchers working on health in developing countries have apparently thought that the private returns on their research contributions would be greatest if they focused on HIV/AIDS and on injuries, with an increasing emphasis on HIV/AIDS relative to injuries, and a lesser focus on NCD and CMPNC - HIV/AIDS.

The average annual growth rate of PAA presentations on HIV/AIDS between 1990-2 and 2003-5 was, at 21.7% (Chart 4B), much higher than for studies on HIV/AIDS, at 12.8%(Chart 4A). The share of PAA presentations on HIV/AIDS of the total presentations on health in developing countries was 33% for 1990-2005 (Chart 5C) and 42% for 2003-5 (Chart 5D). The annual rates of growth of PAA presentations on injuries noted above (20.4%) was almost as high as for that HIV/AIDS. In sharp contrast, the annual growth rates in PAA presentations were much lower for NCD (6.2%) and for CPMNC-HIV/AIDS (1.8%) (Chart 4B). Thus, the last sentence two paragraphs above probably should be rewritten to say that, in a revealed preference sense, researchers giving PAA presentations on health in developing countries have apparently thought that the private returns on their research contributions would be greatest if they focused on the CMPNC category, with a substantial shift within that category to HIV/AIDS, but with a much lesser focus on NCD and injuries (though with a rapid growth from a low base in the latter).

4. Dominant health problems in developing countries, and how they are expected to evolve

In Section 2, we presented a stylized framework for thinking about the factors that underlie socially desirable choices about whether to conduct additional social science research on a range of health conditions. These decisions are related to where on the MSB curves for various health conditions social science research is at the start of the period of interest, and what the relevant locations of the MSB curves are for different health conditions at that time. Unfortunately, we do not believe that there is much

information available that would allow us to identify directly detailed aspects of the framework laid out in Section 2 for the developing world.

But we do think that the data described in this section provide some crude indicators of some important aspects of these factors. These data are the projected DALYs (disability-adjusted life years) for 2005, 2015, and 2030, because DALYs seem to us to be the best available indicators that are comprehensive in terms of geographical and disease/health conditions coverage, and that include future projections of at least the intrinsic value of good health. In particular, we use the DALYs in the basic scenarios that are available in Annexes 15-26 on the World Health Organization (WHO) website on the Global Burden of Diseases (GBD).[8] These cover many health/disease conditions that are aggregated into the same three categories used in Section 3: CMPNC, NCD, and injuries. There has been considerable discussion about the limitations of DALYs,[9] some of which are shared by other indicators of health conditions; for example, in identifying a particular disease with a health condition or mortality that is related to a number of diseases. But despite such limitations, as noted above, these data seem to be the best available indicators that are comprehensive in terms of geographical and disease/health conditions coverage, and that include future projections of at least the intrinsic value of good health. While it is possible that social scientists had projections of evolving health conditions that they used to guide the composition of social science research on various health conditions in developing countries that differed on average substantially from the patterns in the projected DALYs, we have no information about such beliefs that would permit us to test this possibility. Therefore, we proceed under the maintained hypothesis that projected DALYs reflect on average expected future patterns in health conditions in developing countries.

DALYs may also be used to measure some important aspects of the severity of disease, one of the broad factors underlying the location of the MSB curves noted in Section 2. They are designed to capture the severity with regard to which diseases cause a loss of healthy life years, so AIDS is weighted much more heavily than minor diseases such as headaches. They also explicitly take into account whether the impact of health conditions that last until death occurs earlier in the life cycle, as is the case for

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[8] These data were downloaded from (http://www.who.int/healthinfo/statistics/bodprojections2030/en/). The current URL for these data is http://www.who.int/healthinfo/global_burden_disease/projections/ en/index.html.

[9] See Lopez et al. (2006) and the references therein for extensive discussion of DALYS, and Mathers and Loncar (2006) for extensive discussion of the GBD/WHO projections of DALYS. Appendix Table A for this paper gives the percentage distribution of DALYs, with various subaggregates, in the GBD/WHO projections for 2005, 2015, and 2030 for all the categories and subcategories that account for at least 1% of the total for all developing countries or for low-income developing countries in at least one of these three years for females, males, or females and males combined.

AIDS; or primarily at older ages, as is the case for as a number of forms of cancer. Thus, they explicitly incorporate several aspects of the severity of health conditions. But they do not incorporate all dimensions of the severity of health; for example, the DALYs that we use do not capture productivity effects that may differ over the life cycle.

From the perspective of social science research in the 1990-2005 period covered in Section 3, the expected relative prevalence of disease characteristics at the end of the period (2005) or in the future (2015, 2030) ties in with at least one more factor emphasized in the discussion about the determinations of the location of MSB curves in Section 2: i.e., the greater the prevalence of health conditions, ceteris paribus, the higher the MSB curves are likely to be. If society is forward-looking, then both the prevalence within this period, as well as the projected future prevalence, are factors that determine the location of the MSB curves. Furthermore, the faster future prevalence is projected to expand, and the MSB curves in Figure 1 to move out over time, the more likely it would seem that past social science research has moved society to date only to a point some distance to the left of the socially optimal level of research, such as to point n_1, rather than close to the optimal at points n_3 and n_4 in Figure 1.

In summary, measuring the prevalence over time of DALYs in developing countries has limitations in capturing all of the major points suggested by the framework in Section 2. For example, DALYs do not seem to provide information about differential relevance across health conditions of contexts or of individual and governmental behaviors, two of the points affecting the locations of MSBs that were discussed in Section 2. Nevertheless, they seem to capture some important dimensions of that framework better than the available alternatives. Thus, the rest of this section describes patterns in DALYs with regard to the three major categories of health conditions considered in Section 3: CMPNC, NCD, and injuries. Because of the importance of HIV/AIDS in the CMPNC aggregate, we also consider HIV/AIDS and CMPNC –HIV/AIDS.

Charts 6A and 6B summarize for the three GBD/WHO aggregate categories the projected composition of DALYs for all developing countries and for low-income developing countries. For all developing countries, the estimates for 2005 indicate that CMPNC accounted for 41%, NCD for 46%, and injuries for 13% of the DALYs (Chart 6A). The projections for all developing countries for 2030 indicate a decrease to 32% for CMPNC, an increase to 54% for NCD, and an increase to 14% for injuries (Chart 6A). For low-income developing countries, the 2005 estimates are that CMPNC accounted for 53%, NCD for 35% and injuries for 12% of the DALYs (Chart 6B). The projections for low-income developing countries for 2030 indicate a decrease to 41% for CMPNC, an increase to 45% for NCD, and an increase to 14% for injuries (Chart 6B).

Table 1: **(2030 DALYs per capita)/(2005 DALYs per capita): Overall and three major GBD/WHO aggregates with HIV/AIDS also separate**

Causes	All Developing Countries			Low-Income Developing Countries		
	Total	Males	Females	Total	Males	Females
All Causes	90%	93%	86%	82%	87%	78%
CMPNC	69%	75%	64%	63%	68%	59%
HIV/AIDS	166%	177%	156%	151%	158%	144%
CMPNC - HIV/AIDS	53%	57%	49%	50%	54%	47%
NCD	107%	105%	108%	106%	107%	105%
Injuries	95%	102%	87%	101%	112%	85%

The composition of DALYs projected for different years does not, of course, tell us whether the projections show that health will be getting better or worse. Table 1 provides the ratio of DALYs per capita projected for 2030 to DALYs per capita for 2005 for all developing countries, and for low-income countries and for females and males, both combined and separately. These ratios are given for all causes, for the three major aggregates, and, because of the probable importance of HIV/AIDS, for the CMPNC category subdivided into HIV/AIDS and CMPNC - HIV/AIDS. These projections were made before the recent downward revisions of estimated prevalence of HIV/AIDS (WHO 2007), so they may overstate somewhat the currently perceived importance of HIV/AIDS. Nevertheless, arguably they reflect better than estimates that incorporate the recent revisions of HIV/AIDS prevalence what the projections were at the time when researchers were deciding how to allocate their research efforts among health conditions over the period considered in this paper.

Overall health is projected to improve, with a 10% decline in per capita DALYs for all developing countries, and a larger 18% decline in per capita DALYs for low-income developing countries. The disaggregations indicate that these projected declines are primarily due to large declines in CMPNC - HIV/AIDS for males, and even larger declines for females (by 2030 to about half the 2005 levels); as well as, secondarily, to decreases in injuries for females. The decline in CMPNC – HIV/AIDS led to a decline in CMPNC from 25% to 41%, despite increases in HIV/AIDS from 44% to 77%. By contrast, for NCD for both females and males, and for injuries for males, slight increases have been projected in the range of 5% to 8% and 2% to 12%, respectively.

5. Implications for social desirability of composition of recent social science research among health conditions in developing countries

Social science research and PAA presentations on health in developing countries have expanded rapidly since 1990 (Section 3). Both the composition of and growth in such studies during 1990-2005 have been dominated by an increased focus on HIV/AIDS and injuries, with a partial shift away from injuries towards HIV/AIDS. The PAA presentations also tended to focus heavily on communicable, maternal, perinatal, and nutritional conditions (CMPNC) other than HIV/AIDS, despite the very low growth rate for studies of these health conditions. Meanwhile, relatively little attention was paid to non-communicable diseases (NCD).

The framework in Section 2 suggests some important criteria for selecting the health conditions that may be considered to be socially desirable topics for social science research, albeit with the caveats mentioned above. We argue that there is some very useful—though hardly complete or perfect—information regarding these criteria in the relative prevalence of the burden of different diseases/conditions, as measured by DALYs at various points in time. An examination of GBD/WHO projections for DALYs for all developing countries and for low-income developing countries for 2005-2030, subject to qualifications about measurement and projections, provides some useful information about the social merits of the composition of health conditions in recent social science research.[10]

Charts 7A-D vividly illustrate the relationships between the shares of social science studies and the shares of PAA presentations across major health/disease conditions in developing countries (the three basic GBD/WHO categories and HIV/AIDS and the total minus HIV/AIDS) relative to the shares of DALYs across these conditions. Chart 7A presents the distribution of the shares of studies for 2003-5 relative to the distribution of the shares of DALYs for 2005. This chart shows that the numbers of studies per DALY on HIV/AIDS (719% of the average), and, to a lesser extent, on injuries (330%), are far above average, with the result that the share of CMPNC including HIV/AIDS is also above average (122%). In sharp contrast, the shares of NCD (15%), CMPNC-HIV/AIDS (19%), and the total excluding HIV/AIDS (60%) are far below average. These percentages imply that there are about 48

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[10] These comparisons do not provide information about whether the absolute levels of research are appropriate; i.e., whether there is too little or too much research on any particular health condition as indicated by whether current research is to the right or left of points such as n_3 and n_4, at which the MSB equal the MSC in Figure 1. We would require much more information to address that question because it would require estimating numerical values for MSBs and MSCs. But, independent of whether there is too much or too little social science research on health conditions in developing countries, it is useful to know whether the composition of that research currently is socially desirable.

(=719%/15%) studies per DALY due to HIV/AIDS for every one study per DALY due to NCDs. If the only criterion for the distribution of studies were the DALY shares for 2005, then this pattern suggests a substantial misallocation from a social perspective, particularly towards HIV/AIDS, and, to a lesser extent, towards injuries.

But if the social benefits of research are based on looking forward, then the shares of DALYs projected at some future time may be more relevant. This is because, as noted above, in order to determine the area of research that has the greatest potential, we may need to take into account both the shares in DALYs, and the conditions for which the DALYs are expected to increase relatively rapidly; both of which can be summarized by future expected shares in DALYs. Chart 7B presents estimates similar to those in Chart 7A, but with the estimated 2030 DALY shares used as the reference, and, assuming even further forward-looking behavior, the 1990-2005 studies for the study shares. The percentages in Chart 7B differ from those in Chart 7A, but the general characterization is basically the same. Based on these criteria as well, the studies per DALY on HIV/AIDS (306% of the average) and on injuries (372%) are far above average, with the result that the share of CMPNC including HIV/AIDS also is above average (120%). And, again, in sharp contrast, the shares of NCD (20%) and CMPNC-HIV/AIDS (23%) are far below average. These percentages imply that there are over 15 (=306%/20%) studies per DALY due to HIV/AIDS for every one study per DALY due to NCD.

Charts 7C and 7D are parallel to Charts 7A and 7B, but refer to the percentage shares of PAA presentations relative to the percentage shares of DALYs. In most respects, the patterns are similar to those in Charts 7A and 7B. The one noteworthy exception is that the relative roles of injuries and CMPNC-HIV/AIDS are reversed between Charts 7B and 7D. The relatively greater emphasis on CMPNC-HIV/AIDS in PAA presentations than in the more general social science studies seems plausible given the centrality of fertility and related mortality in demography.

Thus, based on the two criteria of current shares in DALYs or estimated future shares in DALYs, we find that recent demographic and other social science research on health in developing countries has focused too much on HIV/AIDS and injuries, and too little on NCD and on the CMPNC category other than HIV/AIDS. Recent PAA presentations on health in developing countries have focused far too frequently on HIV/AIDS, while largely ignoring NCDs. Qualifications are necessary because of the crudeness of the data and the analysis, and the possibility that there are other important factors shaping socially desirable research efforts, as was discussed in Section 2. However, the magnitudes of the differences are so large that small refinements in data or analysis are not likely to change the bottom line: the large apparent imbalances between demographic and other social science research efforts and health/disease conditions in developing countries suggest that social science researchers who study

health in developing countries could make far greater social contributions if they refocused their efforts away from HIV/AIDS, and towards NCDs. They also indicate that it would be quite useful to study the mechanisms that influence the choices between health conditions in developing countries that social science researchers make when determining the composition of their research. Finally, future research that investigated whether and why current social science research levels on health conditions in developing countries are socially too low or too high, independent of the compositional question of focus of this paper, would also be quite valuable.

6. Acknowledgments

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Appendix

Table A: **All causes that are projected in some year to be at least 1% of total DALYs overall, or for females or males considered separately[11]**

	All developing countries			Low-inc. dev. countries		
	2005	2015	2030	2005	2015	2030
Population (millions)	5,495	6,121	6,890	2,699	3,154	3,772
All Causes	100%	100%	100%	100%	100%	100%
Communicable, maternal, perinatal, and nutritional conditions	41%	37%	32%	53%	48%	41%
A. Infectious and parasitic diseases	24%	23%	23%	31%	30%	28%
1. Tuberculosis	3%	3%	3%	3%	3%	3%
2. STDs excluding HIV	1%	1%	1%	1%	1%	1%
b. Chlamydia	0%	0%	0%	0%	0%	0%
3. HIV/AIDS	6%	8%	11%	7%	9%	12%
4. Diarrheal diseases	4%	3%	2%	6%	4%	3%
5. Childhood-cluster diseases	3%	2%	1%	4%	3%	2%
a. Pertussis	1%	1%	0%	1%	1%	1%
d. Measles	1%	1%	1%	2%	2%	1%
8. Malaria	2%	2%	2%	4%	3%	2%
9. Tropical-cluster diseases	1%	1%	1%	1%	1%	1%
e. lymphatic Filariasis	0%	0%	0%	1%	0%	0%
B. Respiratory infections	6%	5%	3%	8%	7%	4%
1. Lower respiratory infections	6%	5%	3%	8%	6%	4%
C. Maternal conditions	2%	2%	1%	3%	2%	2%
D. Perinatal conditions (c)	7%	6%	4%	8%	7%	5%
E. Nutritional deficiencies	2%	2%	1%	3%	2%	1%
1. Protein-energy malnutrition	1%	1%	1%	1%	1%	1%
4. Iron-deficiency anemia	1%	1%	0%	1%	1%	0%

Note: Those conditions that have 0% for all six entrees have at least one projected value for females that is 1%, with the exception of drug use disorder and poisonings, in which two cases there is at least one projected value that is 1% for males.

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[11] with row numbering identical to those in the source
http://www.who.int/healthinfo/statistics/bodprojections2030/en/
for which the current URL is http://www.who.int/healthinfo/global_burden_disease/en/index.html

Table A: (Continued)

	All developing countries			Low-inc. dev. countries		
	2005	2015	2030	2005	2015	2030
Non-communicable diseases	46%	50%	54%	35%	39%	45%
A. Malignant neoplasms	5%	5%	6%	3%	3%	4%
3. Stomach cancer	1%	1%	1%	0%	0%	0%
5. Liver cancer	0%	1%	1%	0%	0%	0%
7. Trachea, bronchus, lung cancers	1%	1%	1%	0%	0%	1%
9. Breast cancer	0%	0%	0%	0%	0%	0%
10. Cervix uteri cancer	0%	0%	0%	0%	0%	0%
B. Other neoplasms	0%	0%	0%	0%	0%	0%
C. Diabetes mellitus	1%	2%	2%	1%	1%	2%
D. Endocrine disorders	0%	0%	1%	0%	0%	0%
E. Neuropsychiatric conditions	12%	13%	13%	9%	10%	11%
1. Unipolar depressive disorders	4%	5%	5%	3%	4%	4%
2. Bipolar disorder	1%	1%	1%	1%	1%	1%
3. Schizophrenia	1%	1%	1%	1%	1%	1%
4. Epilepsy	1%	1%	1%	0%	1%	1%
5. Alcohol use disorders	1%	1%	1%	0%	0%	0%
6. Alzheimer and other dementias	0%	1%	1%	0%	0%	0%
9. Drug use disorders	0%	0%	0%	0%	0%	0%
12. Panic disorder	0%	0%	0%	0%	0%	0%
14. Migraine	0%	0%	0%	0%	0%	0%
F. Sense organ diseases	5%	6%	7%	4%	5%	6%
1. Glaucoma	0%	0%	0%	0%	0%	0%
2. Cataracts	2%	2%	3%	2%	2%	3%
3. Vision disorders, age-related	1%	1%	1%	0%	1%	1%
4. Hearing loss, adult onset	2%	2%	2%	1%	2%	2%
G. Cardiovascular diseases	10%	10%	11%	8%	9%	10%
2. Hypertensive heart disease	1%	1%	1%	0%	0%	0%
3. Ischemic heart disease	4%	4%	4%	4%	4%	4%
4. Cerebrovascular disease	3%	3%	4%	2%	2%	3%
H. Respiratory diseases	4%	5%	6%	3%	4%	5%
1. Chronic obstructive pulmonary disease	2%	3%	4%	1%	2%	3%
2. Asthma	1%	1%	1%	1%	1%	1%
I. Digestive diseases	3%	3%	2%	3%	2%	2%
2. Cirrhosis of the liver	1%	1%	1%	1%	1%	1%
J. Genitourinary diseases	1%	1%	1%	1%	1%	1%
1. Nephritis and nephrosis	1%	1%	1%	1%	1%	1%

Note: Those conditions that have 0% for all six entrees have at least one projected value for females that is 1%, with the exception of drug use disorder and poisonings, in which two cases there is at least one projected value that is 1% for males.

Table A: (Continued)

	All developing countries			Low-inc. dev. countries		
	2005	**2015**	**2030**	**2005**	**2015**	**2030**
L. Musculoskeletal diseases	2%	2%	2%	1%	1%	2%
1. Rheumatoid arthritis	0%	0%	0%	0%	0%	0%
2. Osteoarthritis	1%	1%	1%	1%	1%	1%
M. Congenital anomalies	2%	2%	1%	2%	2%	1%
N. Oral conditions	0%	1%	1%	0%	0%	0%
Injuries	13%	13%	14%	12%	13%	14%
A. Unintentional injuries	9%	10%	10%	9%	10%	10%
1. Road traffic accidents	3%	3%	4%	2%	3%	4%
2. Poisonings	0%	0%	0%	0%	0%	0%
3. Falls	1%	1%	1%	1%	1%	1%
4. Fires	1%	1%	1%	1%	1%	1%
5. Drownings	1%	1%	1%	1%	1%	1%
6. Other unintentional injuries	3%	3%	3%	3%	3%	4%
B. Intentional injuries	3%	4%	4%	3%	3%	4%
1. Self-inflicted injuries	1%	1%	1%	1%	1%	1%
2. Violence	2%	2%	2%	1%	1%	1%
3. War	0%	1%	1%	1%	1%	1%

Note: Those conditions that have 0% for all six entrees have at least one projected value for females that is 1%, with the exception of drug use disorder and poisonings, in which two cases there is at least one projected value that is 1% for males.

Chart 1A: **Studies on health in developing countries, 1990-2005**
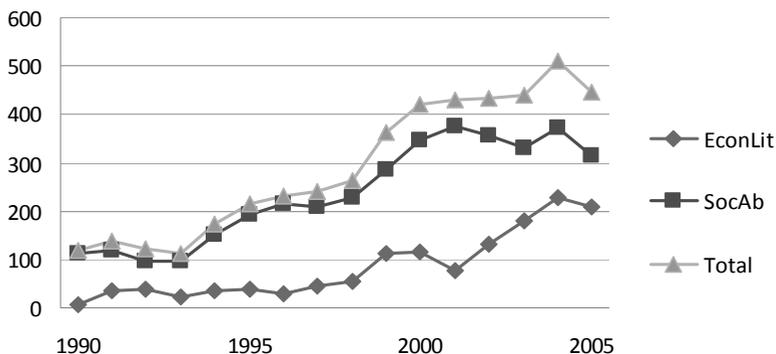
Chart 1B: **PAA presentations related to health in developing countries, 1990-2005**
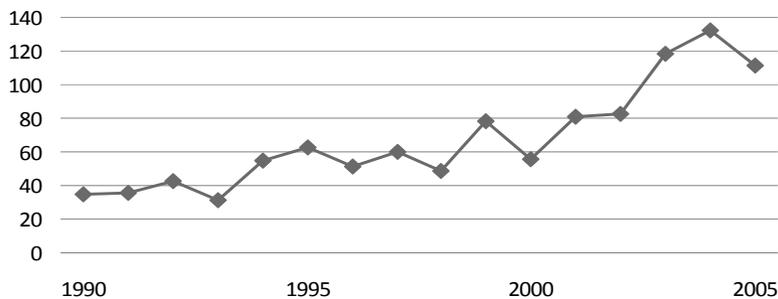
Chart 1C: **Average annual exponential growth rates between 1990-2 and 2003-5 in studies and PAA presentations related to health and development**
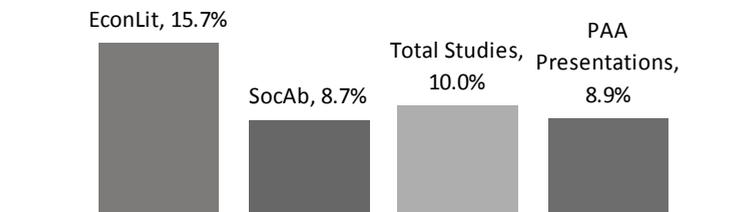
Chart 2A: **Average annual exponential growth rates for 1990-2 to 2003-5 in studies by three major GBD/WHO categories**

■ CMPNC ■ NCD ■ Injuries
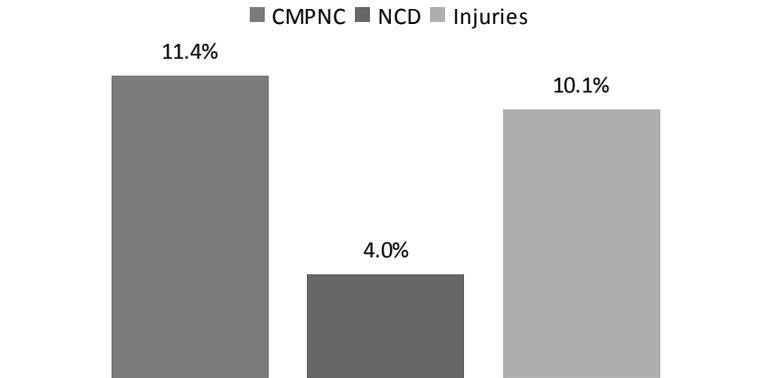
Chart 2B: **Average annual exponential growth rates from 1990-2 to 2003-5 in PAA presentations by three major GBD/WHO categories**

■ CMPNC ■ NCD ■ Injuries
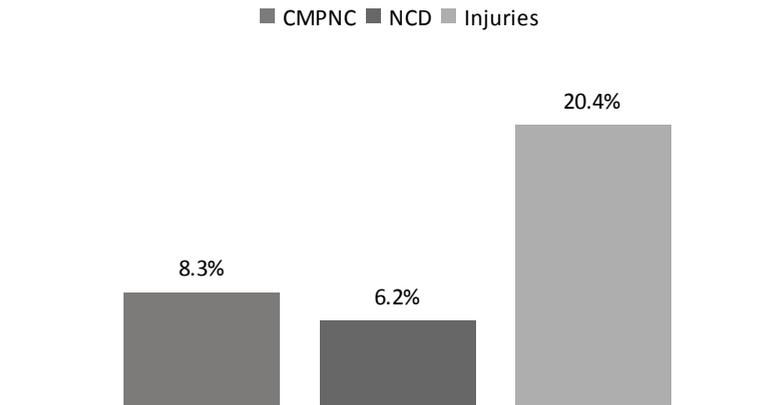
Chart 3A: Composition of studies for 1990-2005 by three major GBD/WHO categories
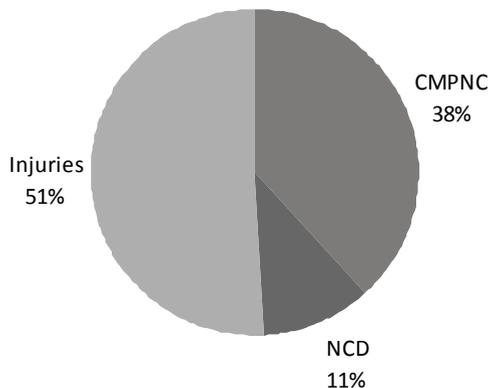
Chart 3B: Composition of studies for 2003-5 by three major GBD/WHO categories
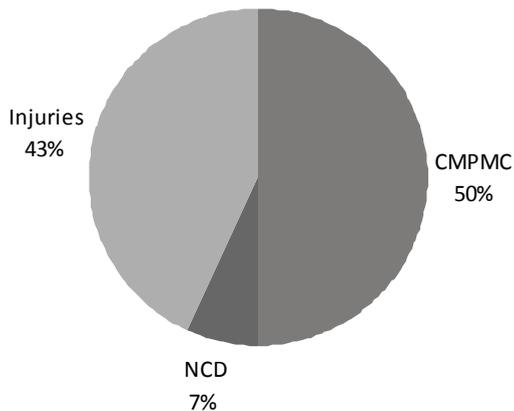
Chart 3C: **Composition of PAA presentations for 1990-2005 by three major GBD/WHO categories**
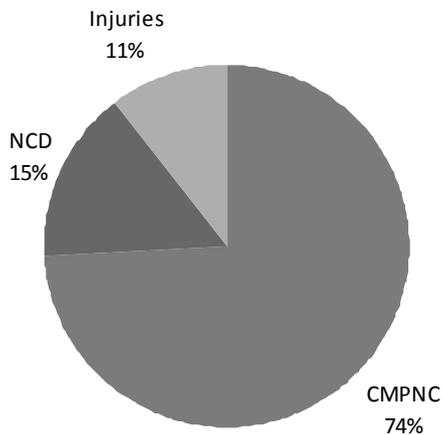
Chart 3D: **Composition of PAA presentations for 2003-5 by three major GBD/WHO categories**
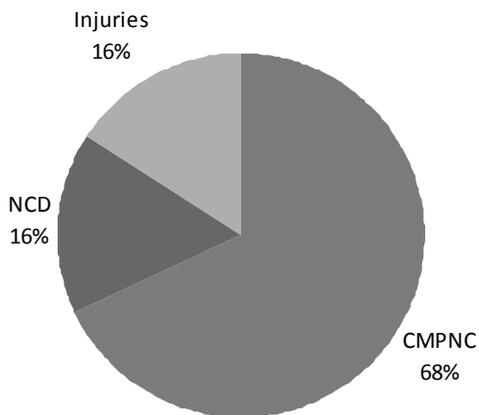
Chart 4A: **Average exponential growth rates in studies between 1990-2 and 2003-5 for three major GBD/WHO categories with HIV/AIDS separate**
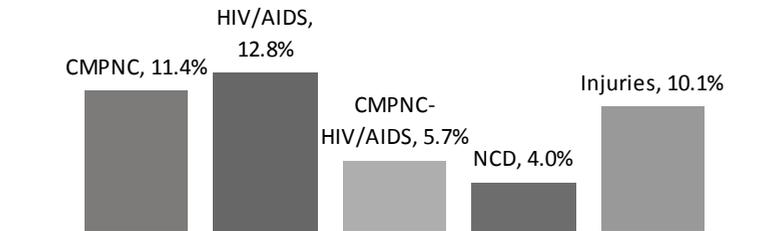
Chart 4B: **Average annual exponential growth rates in PAA presentations between 1990-2 and 2003-5 for three major GBD/WHO categories with HIV/AIDS separate**
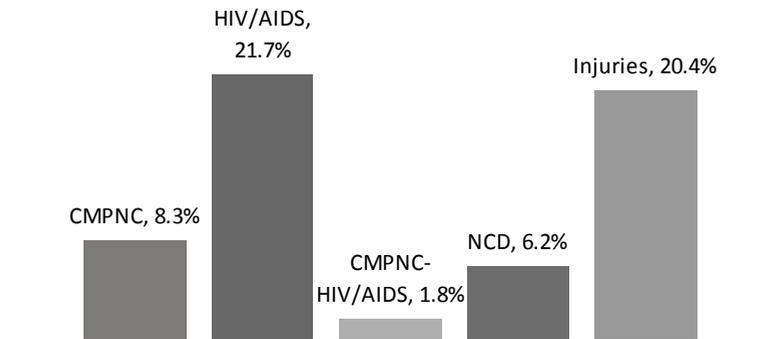
**Chart 5A:** **Distribution of studies in 1990-2005 for three major GBD/WHO categories, with HIV/AIDS separate**

HIV/AIDS
34%

Injuries
50%

CMPNC-
HIV/AIDS
5%

NCD
11%
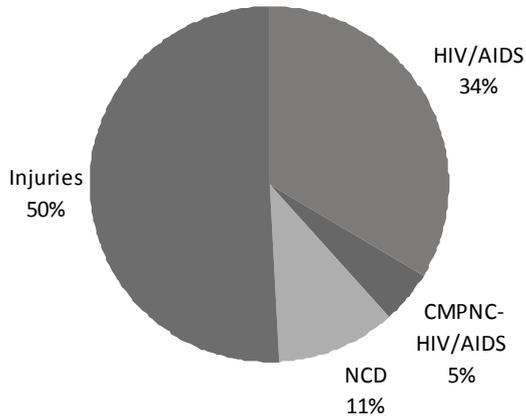
Chart 5B: **Distribution of studies in 2003-5 for three major GBD/WHO categories, with HIV/AIDS separate**

Injuries
43%

HIV/AIDS
43%

NCD
7%

CMPNC-
HIV/AIDS
7%
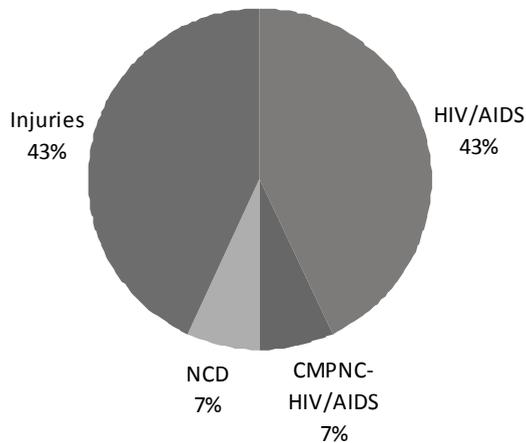
Chart 5C: **Distribution of PAA presentations in 1990-2005 for three major GBD/WHO categories with HIV/AIDS separate**

Injuries
11%

NCD
15%

HIV/AIDS
33%

CMPNC-
HIV/AIDS
41%
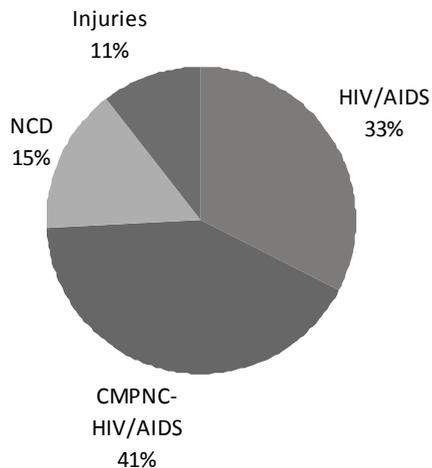
Chart 5D: **Distribution of PAA presentations in 2003-5 for three major GBD/WHO categories, with HIV/AIDS separate**

Injuries
16%

NCD
16%

HIV/AIDS
42%

CMPNC-
HIV/AIDS
26%
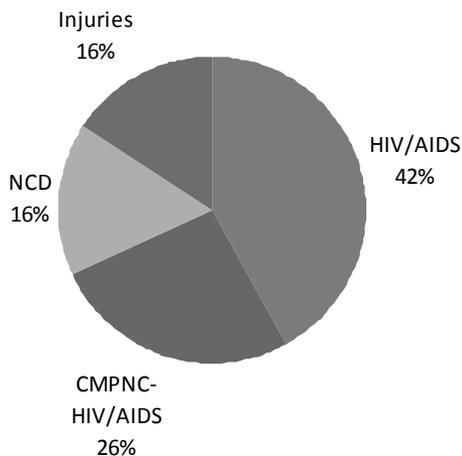
**Chart 6A: % composition of DALYs projected for three major GBD/WHO categories for all developing countries**

■ CMPNC ■ NCD ■ Injuries

2005 — 41%, 46%, 13%
2015 — 37%, 50%, 13%
2030 — 32%, 54%, 14%
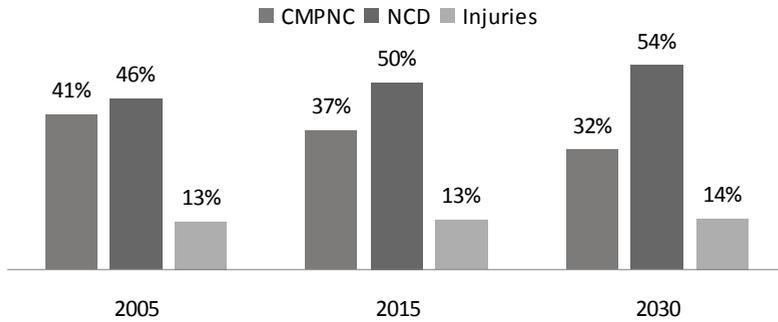
Chart 6B: % composition of DALYs projected for three major GBD/WHO categories for low-income developing countries

■ CMPNC ■ NCD ■ Injuries

2005 — 53%, 35%, 12%
2015 — 48%, 39%, 13%
2030 — 41%, 45%, 14%
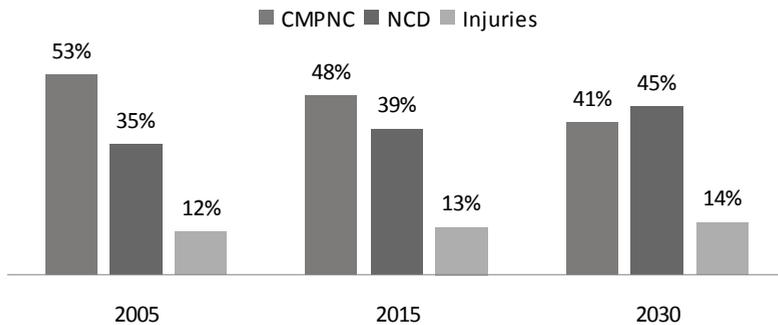
Chart 7A: **% ratio of share in studies in 2003-5 to share in DALYs for 2005 for three major GBD/WHO categories, with HIV/AIDS separate (100% = average)**
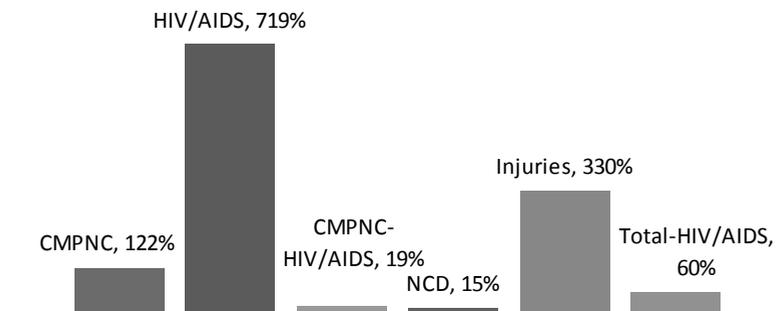

Chart 7B: **% ratio of share in studies in 1990-2005 to share in DALYs for 2030 for three major GBD/WHO categories, with HIV/AIDS separate (100% = average)**
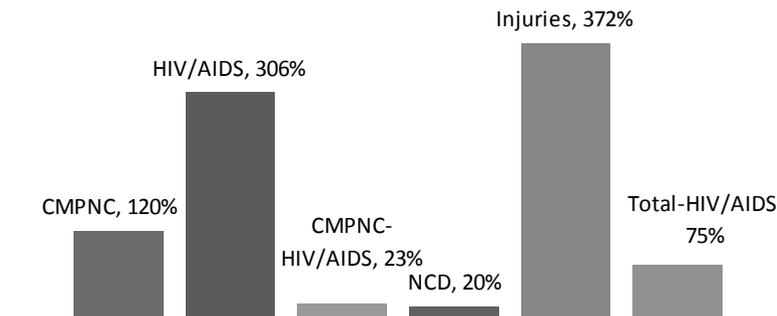
Chart 7C: **% ratio of share of PAA presentations in 2003-5 to share in DALYs for 2030 for three major GBD/WHO categories, with HIV/AIDS separate (100% = average)**

HIV/AIDS, 697%

CMPNC-
HIV/AIDS, 75%

CMPNC, 166%

Injuries, 121%

Total-HIV/AIDS, 62%

NCD, 35%
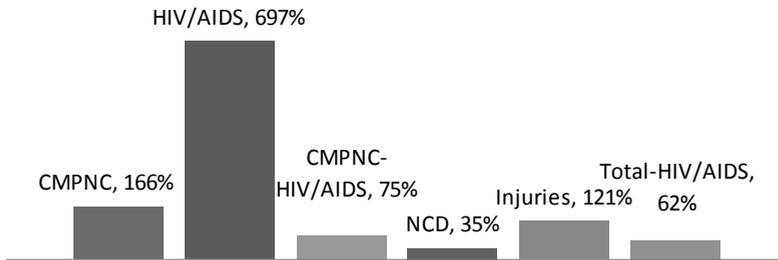
Chart 7D: **% ratio of share of PAA presentations in 1990-2005 to share in DALYs for 2030 for three major GBD/WHO categories, with HIV/AIDS separate (100% = average)**

HIV/AIDS, 296%

CMPNC, 231%

CMPNC-
HIV/AIDS, 198%

Total-HIV/AIDS, 76%

Injuries, 78%

NCD, 28%