# GLOBAL HEALTH =


# GLOBAL JUSTICE

Preface

This book aims to analyze the different understandings and usages of the term "Global Health", which is a dominant reference in international and also national health debates, policies and actions. It concludes that while there are many different interpretations, there is a common objective, which reflects WHO's constitutional goal: the **enjoyment by all peoples of the best standards of health**. However, this objective, now 67 years old, has **never been identified nor measured**. The book tries to define the best levels of health by analyzing international data of health[1] disparities and their distribution by the main influencing variables. It concludes on the predominant, direct and indirect, effect of income, and suggests the confidence interval of the health indicators of the world's top quintile national GDPs, as a target of "best heath". It then looks at how feasible those health standards could be for all and identifies efficient models that could allow a fair level of disparities (equity: fair distribution of inequality) and in a sustainable (ecological sustainability: intergenerational equity) way.

The book's second section explores **how the suggested best/feasible/sustainable (moving) targets have been met/unmet,** and measures, in a first approximation, the burden of health inequity in life years and healthy life years lost and in excess (avoidable) mortality. This analysis includes the distribution in time (historical trend and potential prospects) and space (with burden of inequity by countries and regions). It concludes that **one in three deaths, close to 20 million every year** in the last two decades, **are avoidable** if the world was to progress towards health equity. Only a third of countries (and many with only partial and not fully reliable data) report to WHO on national health equity indicators, which scope is in any case limited to estimate the burden of national health inequity. Even with the limited information it seems that a large share of health inequity is due to global disparities, yet the growing challenge of national health inequities in middle- and also high income countries also needs attention.

The final chapter reviews the complex universe of variables influencing health and its distribution. It proposes a pyramid of health needs which takes the classical "defensive" approach of public health, to a proactive approach to health by **maximizing the fulfillment of people's physical and psychosocial potential**. These two areas have a positive feedback on the root causes that condition the fulfillment of health needs, protection and fulfillment, that is, a healthy ecology and environment, and a fair socio-economic systems of rules (legal framework) and resources (economic frameworks including fiscal policies and health services), all of them linked with the generation, access and use of knowledge. We need to rescue and try to assess or even measure the **holistic concept of health**. The gaps of the present global health international architecture are identified and a **new global health framework** for the XXI century is proposed. It should aim at a renewed objective of the best health for all, which includes two new elements: **best holistic** (including the enjoyment of health) **feasible and sustainable health for all.**

"A dream you dream alone is only a dream. A dream you dream together is reality."
John Lennon

[1] All data use in this analysis are UN official data. The distribution maps have used statsilk database and imaging software.

TABLE OF CONTENTS

## List of figures

List of tables

## Section I: The concept and objective of Global Health

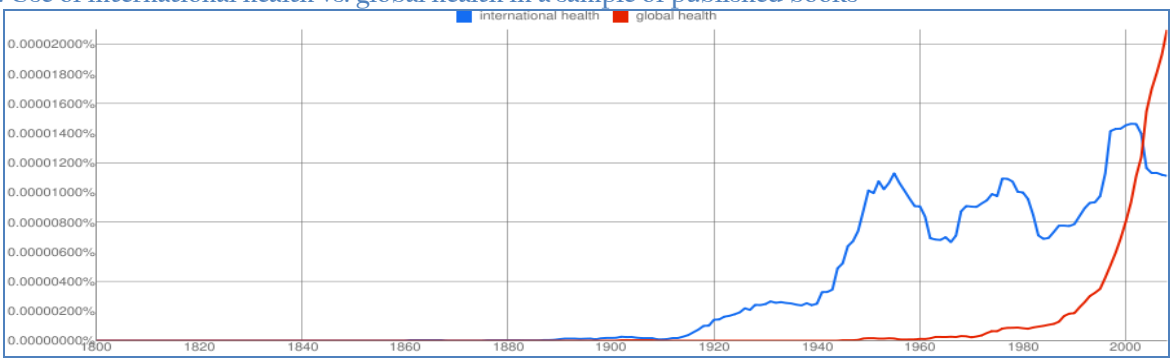
### Global health concept

This chapter explores the concept of global health in context of the rising frequency of the term's use. It reviews the definitions of global health from the academic community, international organizations and the countries and regions of the world that are together coining this term. Further it analyzes the different notions of Global Health between the proposed academic definitions and also between the implicit usage of the term by private and public actors. It then identifies the common grounds and principles that should apply to the collective action on Global Health but are not always consistently complied with. It aims at reflecting on the following questions: What do we understand by global health? How do the different and evolving understandings and use of the term contribute to improved global health?

### Trends in the use of the term "global health" and related concepts

**The use of the term "global health" has increased exponentially over the last decade.** Figure 1 compares the frequency of the terms global health and international health in published books, using Google Labs Ngram Viewer tool data.

Figure 1: Use of international health vs. global health in a sample of published books




While the Ngram tool's search is limited to published books, the large sample size allows for some assessment of the trends in use of words and phrases. The figure shows cycles of frequency in the use of the term international health, with peaks in the 1950s as the United Nations came into being, and the seventies and nineties. It also highlights the exponential use of global health, which overtook the use of international health during the last decade.

In French and Spanish, more than two translations of global and international health exist. For example, French uses three terms commonly: *Santé Internationale*, (international health) *Santé Globale*, (global health) and *Santé Mondiale* (health, pertaining to the world). The Spanish is analogous: *Salud Internacional*, *Salud Global*, *Salud Mundial*. Google Ngram shows similar and increasing frequency for *internationale/internacional* and *mondiale/mundial*, and far greater, exponential growth for the *globale/global*. Although this paper will not discuss the distinction between these terms in French and Spanish, and surely there are different

nuances between the terms in each language, it is interesting to note that this shift in terms is not only an Anglophone phenomenon.

Figure 2: Use of international health vs. global health in French

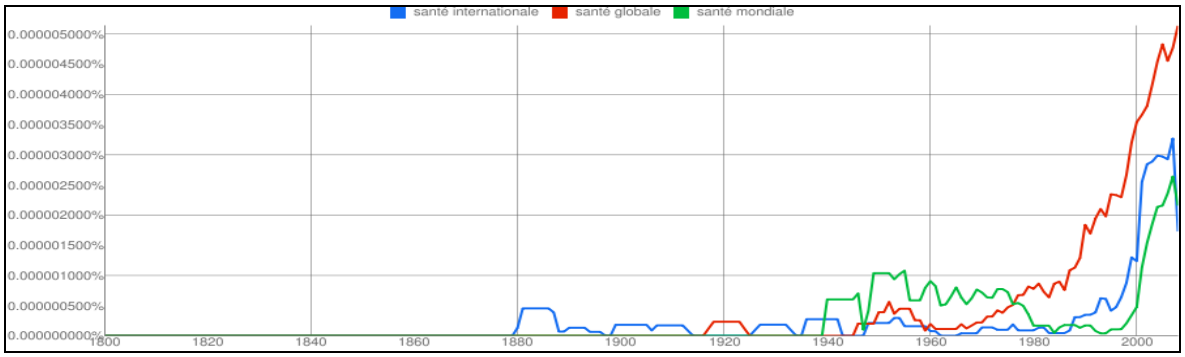
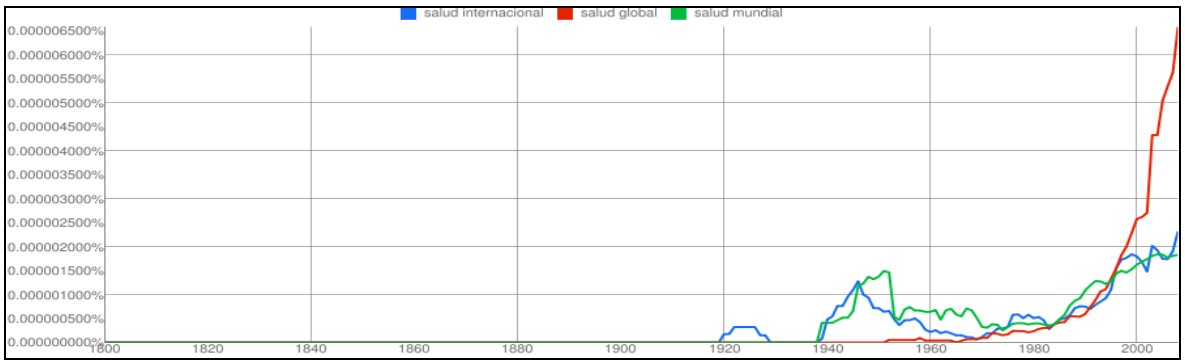



Figure 3: Use of international health vs. global health in Spanish




The term "global health" is not as common in other UN languages such as Chinese and Russian. Although there has been a slight increase in its usage over the last decade, it is not replacing "international health". Arabic, also a UN language is not cataloged by Google Books Ngram Viewer.

Figure 4: Use of international health vs. global health in Chinese

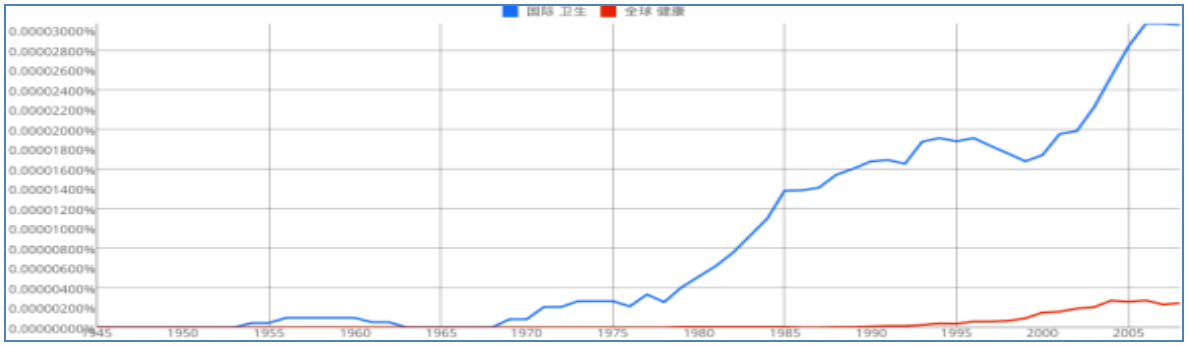
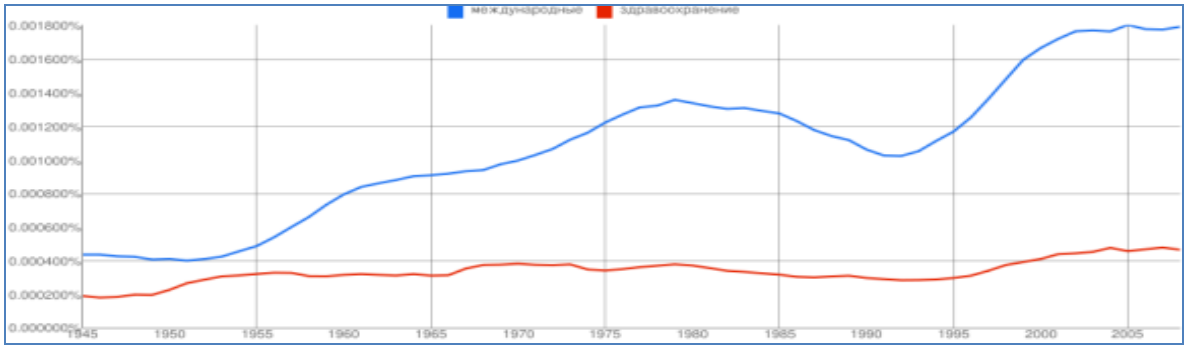


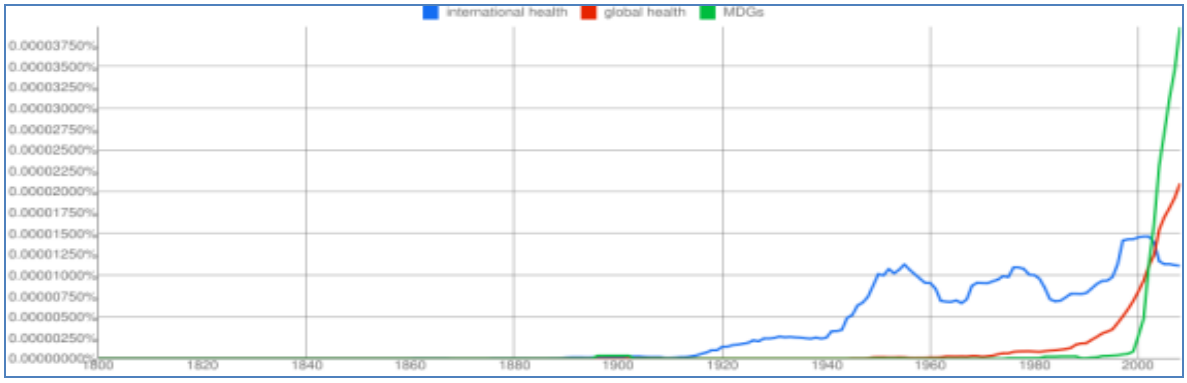
Figure 5: Use of international health vs. global health in Russian




## *Parallelisms in the use of related terms*

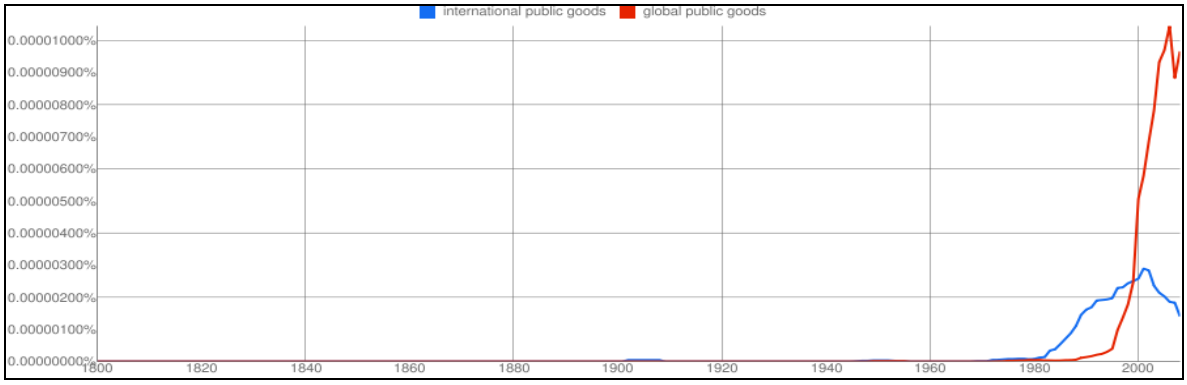
Analysis of the frequency of related terms shows that health is not the only world to 'go global', and reveals a supportive environment for the flourishing of the term global health. The use of the term MDG – Millennium Development Goal – has increased in parallel with that of global health during the last decade, consistent with the creation of the MDG agenda and its rise to prominence during this time period. Several MDGs focus on health and the conditions needed to create healthy populations worldwide, and the 8th MDG is global partnership.

Figure 6: Trend in the use of international health, global health, and MDG




Use of the term global public goods has far surpassed usage of international public goods, showing an emphasis on the supra-national nature of public goods.

Figure 7: Use of the terms international public goods vs. global public goods




Similarly, globalization has become more frequently used than international relations, and global knowledge more frequently used than international knowledge.

Figure 8: Use of the terms international relations vs. globalization

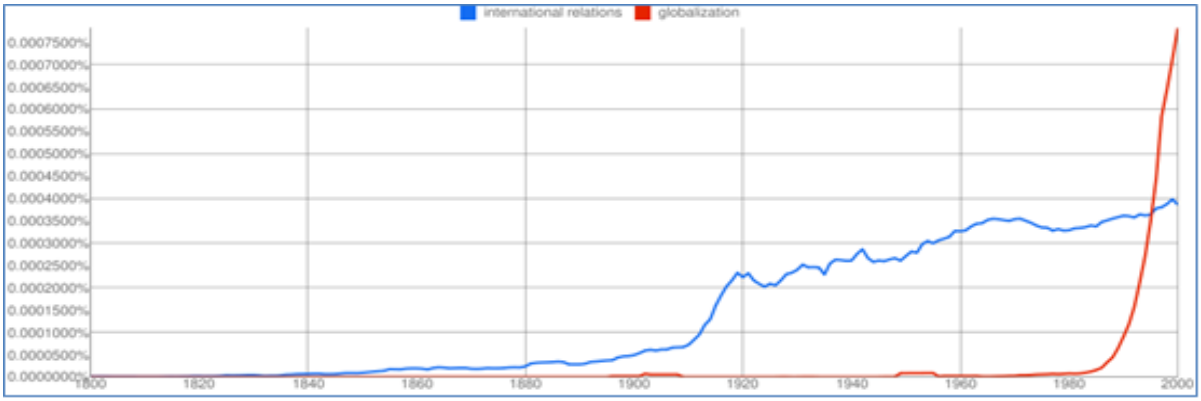
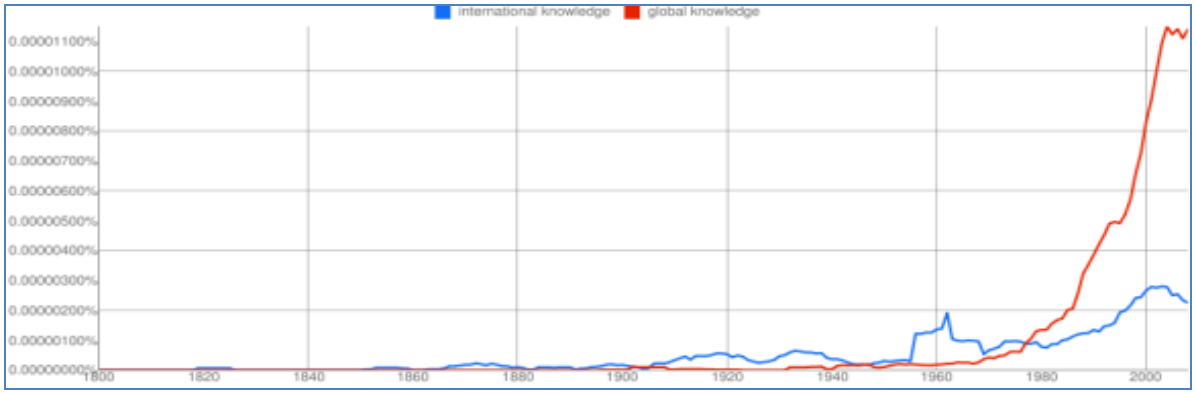



Figure 9: Use of the term international knowledge vs. global knowledge



These trends seem to reflect a far more interrelated and interdependent world, with a larger scope of actors and factors influencing the lives of people around the globe, beyond the previously dominating role of nations, their governments and the relations ("international") between these governments.

Taken from published books rather than conversation or articles, these trends also show an increase in explicit and formal discussion of this interconnectedness. For example, the analysis of the challenges of global health by the World Health Organization's (WHO) Commission on Social Determinants of Health concluded with recommendations that depend on profound changes in the functioning of the global economy[2].

## Landscape of definitions and understandings of Global Health

As the term global health has become more frequently used, experts have attempted to differentiate it from international health by clearly defining the specificities of each term. Far from an academic exercise, this process of definition and differentiation has profound implications for the prioritization of global health issues and funding, as well as the legitimation of and coordination among global health actors. Before turning to the definitions of these experts, it is useful to examine the layperson's definition of the word global. This everyday understanding provides a context that influences more technical, formal uses of the term global health.

### *Etymology*

The term global dates from the 1600s, stemming from the Latin *globus* "round mass, sphere, ball" and meaning spherical in form[3]. Over time, the adjective became associated with the earth, and emphasized connectivity. The term "global village" was first used in the 1960s to describe how the world was being metaphorically contracted into a village by electric technology and the instantaneous movement of information[4].
According to the Oxford dictionary, the adjective "global"[5] has two meanings: having to do with the "whole world," or "relating to or encompassing the whole of anything or any group of things, categories, etc.; comprehensive, universal, total, overall". International[6], in contrast, is defined as "existing, constituted, or carried on between different nations".

### *Proposed definitions*

In April 2005, the **North American-based** International Health Medical Education Consortium changed its name to Global Health Education Consortium (GHEC). The **GHEC** recently defined global health as "health issues and concerns that transcend national borders", and that "require a collective (partnership-based) action"[7]. It defines **international health** as "health practices, policies and systems in countries other than one's own" and as stressing the differences between countries more than the commonalities. The Consortium states that International Health is a concept more focused on bilateral foreign aid activities than on the collective action that the term global health implies.

[2] CSDH (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva, World Health Organization.
[3] Klein, Dr. Ernest, A Comprehensive Etymological Dictionary of the English Language, Amsterdam: Elsevier Scientific Publishing Co., 1971.
[4] Carpenter & McLuhan, "Explorations in Communication," 1960 Boston Beacon Press
[5] OED Online 2011, global, adj. [Homepage of Oxford University Press], [Online]. Available: http://www.oed.com/view/Entry/79019?redirectedFrom=global.
[6] OED Online 2011, international, adj. and n. [Homepage of Oxford University Press], [Online]. Available: http://www.oed.com/view/Entry/98072?redirectedFrom=international.
[7] Global Health Education Consortium 2011, Global Health vs. International Health: What is the Difference? Available: http://globalhealtheducation.org/Pages/GlobalvsInt.aspx [2011, 10/2].

In 2006, Brown et al analyzed the relation of the terms international and global health as reflecting a political and historical process[8]. They use WHO as a case example, arguing that the organization found its dominant role challenged in international health, and began to reposition itself within a shifting set of power alliances, from leader to coordinator, facilitator, technical adviser or even mere observer of more powerful global health initiatives between many partners. The term "global" is more inclusive of partners beyond nations and multi-national organizations.

Stuckler and McKee[9] emphasized the multidimensionality of global health. They argue that the global health can be understood through five metaphors, each with profoundly different implications for the field's way forward – global health as: foreign policy, security, charity, investment, and public health.

Koplan et al[10], representing the US Consortium of Universities on Global Health, differentiated the concepts attributed to global health: a notion - the current state of health in the world; an objective - a world of healthy people; and a mix of scholarship, research, and practice. They note that this mix will involve complex and evolving questions, issues, skills, and competencies, given the complex nature of relations between health and almost any global factor.

Bozorgmehr observed critically how the attempted definitions of global health were lacking enough differentiation from international health, and proposed a stronger link with its "trans-territorial" concept (understood as multi-sectoral and linked to social determinants and the right to health approach)[11].

Similar understandings are expressed by an increasing number of academic institutions within Europe, which aim at developing expertise in global health that extends beyond the traditional boundaries of tropical medicine and deal with global health governance, global health threats and the impacts on health of globalization[12].

These definitions of global health emphasize common themes that share elements with the dictionary definition of "global," yet they show variation and highlight the many dimensions and uses of the term.

## Usage of the term Global Health by global health actors

*Private initiatives*

Since the new millennium the adjective "global" has been used by private sector–related initiatives. Paradoxically, many of these private "global" initiatives have focused on only some health problems (*Global* Fund to Fight AIDS, Tuberculosis and Malaria since 2002), some interventions (*Global* Alliance on Vaccines and Immunization since 2000) or some population groups (*Global* strategy on Women and Children's Health since 2010). The term has also been used by the main philanthropists that have a progressive influence in global health aid, architecture and governance, such as the Bill and Melinda Gates Foundation, which has had a Global Health program since 2006.

[8] The World Health Organization and the Transition From "International" to "Global" Public Health. Brown et al., AJPH: Jan 2006, Vol 96, No 1.
[9] Stuckler, D. & McKee, M. 2008, "Five metaphors about global-health policy", Lancet, vol. 372, no. 9633, pp. 95-97.
[10] Koplan, J. P., Bond, T. C., Merson, M. H., Reddy, K. S., Rodriguez, M. H., Sewankambo, N. K., & Wasserheit, J. N. (2009). Towards a common definition of global health. The Lancet, 373(9679), 1993-1995. doi:10.1016/S0140-6736(09)60332-9
[11] Bozorgmehr, K. 2010, "Rethinking the 'global' in global health: a dialectic approach", Globalization and health, vol. 6, pp. 19.
[12] European academic institutions for global health, Andy Haines, Antoine Flahault, Richard Horton, The Lancet, Volume 377, Issue 9763, Pages 363 - 365, 29 January 2011

*International organizations*

ECOSOC addressed global public health in its 2009 Ministerial Declaration and outlined the main emerging factors influencing global public health[13] (notably the financial crisis, food security crises and climate change) but did not attempt to define it {{10 ECOSOC 2009;}}. Indeed, in most UN references to Global Health (including several resolutions of the World Health Assembly in the last years), the term remains undefined, and simply related to some of the factors influencing/improving "it". The term started to trigger more references after 2006, when the WHO 11th General Program of Work defined a "global health agenda" and described the "role of WHO in global health. The ongoing global health agenda focuses on investing in health to reduce poverty; building individual and global health security; promoting universal coverage, gender equality, and health-related human rights; tackling the determinants of health; strengthening health systems and equitable access; harnessing knowledge, science and technology; and strengthening governance, leadership and accountability. From that time, the terms "global health partners", "global health community" and "global health partnerships" have been mentioned throughout the annual resolutions of the World health Assembly.

Further, specific definitions of global health are often linked to initiatives stemming from its various dimensions, such as global health governance[14], global health security[15] or global health diplomacy[16] [17] and the UN resolution on global health and foreign policy[18]. This corresponds to Stuckler and McKee's discussion of metaphors describing global health.

National and regional organizations

The following countries and international entities have developed policies on Global Health: Switzerland, United Kingdom, the EU, the US and Japan. While they do not claim to define global health, the policies state common principles of the globalized and multi-sectoral influence on health, and are aimed at improving both the health of their citizens and of those in the wider world. They focus on the specific shaded areas summarized in the table below and clustered around three dimensions of global health later referred to in the discussion: equity and health for all, governance and health by all and coherence and health in all international relations. The table also highlights in *italics* the strategies' perceived added value or interest in cases where such a value has been specifically recognized, and in **bold** where a specific budget has been programmed.

[13] See: http://www.un.org/en/ecosoc/julyhls/pdf09/ministerial_declaration-2009.pdf
[14] See: http://www.who.int/trade/GHG/en/index.html
[15] See: http://www.ghsi.ca/english/background.asp
[16] See: http://www.who.int/trade/diplomacy/en/
[17] Kickbusch I, Global health diplomacy: how foreign policy can influence health, BMJ 2011; 342:d3154
[18] UN Resolution on "Global health and foreign policy" (A/RES/64/108).

Table 1: Main features of national and regional policies on Global Health

| | HEALTH FOR ALL | HEALTH BY ALL | HEALTH IN ALL | | | |
|---|---|---|---|---|---|---|
| | GH equity | GH governance | GH knowledge | GH and trade | GH in foreign policy and security | Other areas of coherence |
| **Swiss health Foreign Policy, 2006**[19] | Efficiency of development and humanitarian aid<br>Health systems.<br>AMT and NCDs. | WHO role.<br>*Geneva as world's health capital.* | GH research agenda. | *Swiss Pharma role in global health*,<br>IPR protection. | Pertinent bilateral and international agreements, mention of migration. Swiss citizens' health. | |
| **UK, Health is Global, 2008**[20] | Health systems,<br>IHP, A2M, HRH | UN reform, EU role in GH. | GH research agenda, *UK strength in research for health.* | IPR/A2M, *UK strength in health services.* | | Poverty reduction, climate change, pandemics, migration and conflicts. |
| **US Global Health Initiative 2009**[21]<br><br>**(63 Bn $ 2009-14)** | AMT, MNCH, NTDs, Family Planning, nutrition.<br>Health systems.<br>Focus on GHI+ countries.<br>*Each area has specific budgets and expected impacts.* | | New efficient and sustainable approaches on service delivery. | | | |
| **EU role in Global health, 2010**[22] | Health equity (priory countries), *health system strengthening*, IHP, multi-sectoral. (nutrition, education, gender, water and sanitation). | WHO increased core funding, inclusive leadership. | Pertinence and access to knowledge/ tools, capacity building. | *Coherence in BTAs*, respect and promote TRIPS provisions in public health. | Reference to IHRs. | Coherence in migration policies, food security/ agriculture, climate change |
| **Japan's Global Health policy, 2011**[23]<br>**(5 Bn $ 2011-15)** | Focus on mother and child health: EMBRACE - | | | | Support to global *public health emergencies*. | |

GH: Global Health, AMT: AIDS, malaria and tuberculosis, NCD: non communicable diseases, IPR: Intellectual Property Rights, IHP: International Health Partnership, A2M: access to medicines, HRH: human resources for health, R&I: research and innovation, MNCH: maternal, newborn and child health, NTDs: neglected tropical diseases, BTA: bilateral trade agreements, IHRs: International Health Regulations, GFATM: Global Fund to fight AIDS, tuberculosis and malaria. Please see the reference section for the citations of each of these policies. EMBRACE - Ensure Mothers and Babies Regular Access to Care.

[19] www.bag.admin.ch/themen/internationales/index.html?lang=en
[20] HM Government. Health is Global: UK Global Health Strategy 2008-2013. Available at http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_088702
[21] http://www.ghi.gov
[22] http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/EN/foraff/114352.pdf
[23] http://www.mofa.go.jp/policy/oda/mdg/pdfs/hea_pol_exe_en.pdf

## Globalization and health

The complex global landscape that influences the health of all is as rich as it is chaotic, and has strengths and weaknesses, opportunities and threats. The flow and speed of the factors and factors that influence health (communication, knowledge, biological and chemical health threats, health-related goods, patients and health workers, social determinants of health) translate into both potential risks to undermine our health and new capacities to enhance it.

The globalized economy influences the health of all more than the efforts of health systems. And the main actors in this dynamic and those more specifically influencing the "globalized health economy" have possibly already surpassed in most contexts the capacity of institutions and governments to influence the health of their citizens or of those of other countries through development cooperation policies and aid. In relation to the speed of financial transactions, income disparities in the world have grown during the last two decades and correlate with national health inequities, requiring a wider-than-health approach that targets social determinants[24].

Moreover, the fragile relations between human-kind and its natural environment pose additional collective challenges. In only a limited way has the concept or use of the term global health included the inter-connectedness of human health with our planet Earth's health and, hence, the sustainability of our desired improved health. The agenda of social determinants for health will need to embrace social and ecological determinants as targeted by the agenda XXI[25], under national and global renewed governance for health.

## The shift from international to global

Since the mid-nineties, the term "global health" has gradually entered debates and statements on health worldwide, together with an increase in use of the globalization and other related terms. Behind every shift in vocabulary, there is a shift in underlying concepts and connotations.

Although the term of "international health" is still sometimes interchangeably with "global health", it is progressively being more specifically related to the health matters that principally involve the dialogue, agreement and actions of national governments. One example of a more restricted, appropriate use for international health is "international health regulations" – a term that has increased in frequency since 1910 according to Google Ngram, while the term global health regulations is used so infrequently that it is not even registered among Ngrams.

Some understandings of the international health paradigm focused in the relations of rich countries helping poor countries[26]. The fact that 67% of the world's poor are in middle-income countries[27], and the powerful role of emerging economies in BRICS countries (Brazil, Russia, India, China and South Africa) show that the does not adequately address the complex determinants and dynamics of health in the world today.

In juxtaposition with international health, global health could be seen as health created and influenced by actors beyond the nation and relations between them – a more comprehensive group.

## Unclear boundaries and multiple usages

[24] CSDH (2008). Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva, World Health Organization
[25] See: http://www.un.org/esa/dsd/agenda21/res_agenda21_00.shtml
[26] Global Health Education Consortium 2011, Global Health vs. International Health: What is the Difference? Available: http://globalhealtheducation.org/Pages/GlobalvsInt.aspx [2011, 10/2].
[27] The Economist 2010, Crumbs from the BRICs-man's table: Emerging powers have helped poorer nations weather the global recession.

According to lay definitions, key actors, resolutions and policies, global health reflects the notions of the state of health in the world's human population, its complex and bidirectional relations with global factors whose influence extends beyond national boundaries and involves a growing scope of actors beyond the official institutions and governments traditionally dominating the dynamics of "international health". Different definitions emphasize different understandings of the term.

Global Health in practice reflects a variety of understandings of the needed strategies, scope of sectors, and the governance, financial and health policy dimensions of global health. This variation is particularly striking among global health policies in the countries or regions (European Union) that have adopted one. The US and Japan equate global health with the health of those most neglected in developing countries. They link it with their development aid, its financing and concrete health impacts attributed to their support. The UK, Switzerland and Europe focus on the wider range of policies and actors influencing the health of all: both their national citizens and the rest of the world. The term "global" has often been championed by private initiatives or private-public partnerships, which focus or restrict the attention to one specific health problem or intervention yet at a large scale and leveraging significant resources and actors towards global results.

Perhaps some of the popularity of the term global health is due to its wide applicability, so that many feel comfortable with its use and only accountable to their own interpretation. It does at times seem to be more of a "brand name" than a robust concept: a politically expedient term to denote any program dealing with health outside of one's own country. Yet despite this variation in – and perhaps even co-optation of – the term, strong themes emerge in understandings of global health.

## Common grounds yet neglected principles

The world's shared health objective was defined in 1945 during the constitution of WHO that now gathers all member states of the United Nations. It aims at *the attainment by all peoples of the highest possible level of health*[28].

According to WHO, health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity.

When applied to health, the term "global"(etymologically meaning whole of categories) could relate to the health of the world's population as a whole (health for all), to the involvement of the wide scope of actors related to health (health by all) and to the whole of the concept of health and –as a commonly agreed differentiation from international health as described earlier-(health in all).

These three "global "dimensions (health for all peoples, health by all its actors health in all its dimensions) relate to milestone global agreements on the goal and the principles or strategies required in health. They have recently been restated in the principles of the renewed Alma-Ata strategy of Primary Health Care by the World Health Report of 2009[29] and its related resolution at the World Health Assembly[30].

While these principles have been incorporated in many national policies and actions, many of the policies and initiatives championing the(ir) concept of Global Health, do not comply with them. While each global actor on its own cannot –and probably should not- aspire at all the global dimensions of health, the collective action, under strong leadership and governance, should progress towards them.

[28] World Health Organization. 1946. Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19–22 June 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.
[29] http://www.who.int/whr/2010/whr10_en.pdf
[30] http://unpanl.un.org/intradoc/groups/public/documents/un/unpan034097.pdf

At present, as detailed blow, the collective action is not clearly progressing in the mentioned principles and no clear targets or indicators have been agreed to mainstream efforts and progress towards the common goal - *attainment by all peoples of the highest possible level of health*-:

- Health for all: 1945 marked the creation of the World Health Organization's constitutional objective: the attainment by all peoples of the highest possible level of health. Few would object that this objective remains as relevant today as it was 65 years ago, if not more so. While the understandings of health may have cultural connotations and the measurements of the quality of health may be subject to interpretations, life expectancy is a horizon that most persons and communities wish to see extended as long as possible. What has been less measured is how that best (ideally healthy) life expectancy applies to all: how the gaps in the world are narrowed. That is, how we progress in improved global health equity. In developed countries some analysis seems to indicate that health gaps within countries have widened in correlation with growing income disparities[31]. At global level, between countries and income regions of the world, there has been little, if any, advancement on global health equity in the last 20 years[32]. The Commission on Social Determinants for Health[33] has recommended further research into ways to measure global inequity so as to enable regular monitoring of progress.

- Health by all: In 1978, the Declaration of Alma-Ata emphasized the crucial role of community participation towards improved health[34]. The dimension of health by all requires a democratic and empowered (informed and enabled) participation of the representativeness of the people, their most health-affected groups and the main actors involved in health policies and actions. It should include an open, inclusive and transparent process including situation analysis, priority setting, decision-making, budgeting, and implementation and monitoring of policies and actions. This principle has influenced many national policies to respect and promote an inclusive approach. However, health factors escape more and more the democratic (or potentially/theoretical) national and global governance frameworks, and are progressively influenced by the wide scope of the market-related and free-communication factors and private actors of the "globalized health economy" in their profit and/or philanthropic objectives, with a potential of harnessing greater energies but the risk of inequity on the one hand and arbitrary, restrictive choices on the other. The ongoing reform process of WHO is an example of this challenge. An index of the degree of inclusiveness (scope of stakeholders), representation (their democratic representation of society) and scope of participation (throughout the health policy/program/project cycle), would enable the measurement of this axis of global health.

- Health in all: The health of individuals and populations is dependent on a host of environmental, economic, social, and political factors. The dimension of health in all requires impact assessments for relevant policies as reflected in the Ottawa Charter for health promotion[35]. At national level, many health strategies have involved other relevant sector policies and introduced health impact assessments of relevant actions potentially influencing health conditions and/or outcomes. At global level, there is recognition by ECOSOC[36] and by many resolutions of the World Health Assembly, on the need to relate health actions and relations with other international and trans-territorial policies, agreements and dynamics. For example, the effects of health aid may, in some cases, be neutralized by trade or migration agreements, which limit the access to essential medicines[37] or the availability of health

[31] R Wilkinson, K Picket. Why greater equality makes societies stronger : the Spirit Level. Bollomsbury Press 2009.
[32] Global health equity: how the advancement of one in there continues to fail for one out of three. J Garay et al. In press.
[33] Closing the gap in a generation: health equity through action on the social determinants of health. Commission on Social Determinants of Health Final Report. Geneva, World Health Organization, 2008.
[34] Article IV : The people have the right and duty to participate individually and collectively in the planning and implementation of their health care. See: http://www.who.int/hpr/NPH/docs/declaration_almaata.pdf
[35] See: http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf
[36] See: http://www.un.org/en/ecosoc/julyhls/pdf09/ministerial_declaration-2009.pdf
[37] Westerhaus M, Castro A (2006) How Do Intellectual Property Law and International Trade Agreements Affect Access to Antiretroviral Therapy? PLoS Med 3(8): e332. doi:10.1371/journal.pmed.0030332

professionals[38]. As at national level, those potential effects require health impact assessments, seldom done in the current global relations. A composite index measuring the coherence across relevant international policies and agreements towards improved health, the most pertinent policies would facilitate the assessment of this dimension.

In order to galvanize efforts towards the shared goal of *attainment by all peoples of the highest possible level of health*, collective efforts should be better harmonized around the three principles of Global health hereby proposed: health for all, health by all and health in all. The Commission of social determinants for health has already recommended the definition of goals and indicators to measure and progress towards global health equity. Such need also applies to the dimensions of participation towards health by all and to coherence across global policies towards health in all.

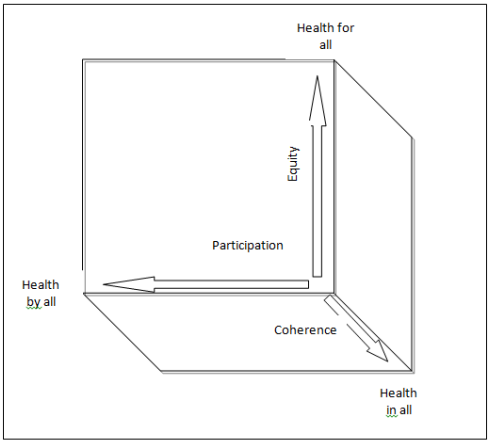



Figure 10: Vectors towards guiding principles of Global Health

Health dynamics in the world are growingly complex and pose increasing threats and opportunities. The term "Global Health "has replaced much of the space earlier referred to as International Health. While the definitions of Global Health relate to the widening scope of factor and actors influencing health, the usage of the term varies across private and public actors. There are common grounds, through international agreements, in the common objective of improved global health and in the principles that should inform policies and actions towards it. These can be summarized in health for all people, health by all actors and health in all policies. While these principles have inspired many national strategies, they are yet not progressing as required in the collective action towards improved global health. The vectors driving progress towards those principles (equity towards health for all, participation towards health by all and coherence towards health in all) require agreed targets and measurable indicators. Renewed and strong governance for global health is required to galvanize the potential and diversity of actors, towards the common goal.

While all approaches and efforts on Global Health are required, they need to collectively adhere to the principles of **health by all, health in all and health for all**, to effectively move towards the shared objective of improved global health. No actor alone, private or public can fully comply with the three principles but the collective action should aim at progressing in them.

Despite the different interpretations reviewed in the previous chapter on the concept and strategy on Global Health, there is one shared objective by all nations: this is captured in the constitutional objective of the World health Organization: the attainment by all peoples of the best attainable state of health: in short words: **best possible health for all**.

## Which is "the **best** state of health"

### The shared objective of global health

This chapter aims at identifying: which is the best state of health that can be feasible for all? It adds the inter-generational concept of equity by introducing in the analysis the concept of best-feasible and sustainable health for all. The identification of such target is essential to measure progress in the overall global health objective and not on partial objectives such as the MDGs or specific disease or health problems championed by some groups.

*Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*[39]. However, there is no agreement on a standardized indicator that can capture these three dimensions of health across countries, cultures and times. We will start with an analysis of "the best" physical state of health and come back in the later sections addressing the global health challenge with proposals to go beyond this limited scope.

### Defining the target of the shared global health objective

While the statistical approach to measure health inequality may screen for a trend, we need, as Braveman concludes, the operational definition, and hence its measure across variables systematically associated with health inequality. His analysis should include the weight of their relation with health inequality and also their reinforcing effect by multiple causality patterns. This approach will enable the cost-impact analysis and prioritization of actions.

Whichever is the social, political and moral complacency with inequity (translated in lower threshold levels of what is understood by "fair, it is important to measure it and demonstrate its consequences in the lives of those in the lower levels of health also in those apparently gaining but who often would do much better (and not just in relation to health), as Wilkinson and Picket conclude for developed countries.

WHO stated that "it is crucial to firmly document the extent of health inequities and demonstrate that they are avoidable, in that there are plausible interventions." One of the three main areas of recommendations of the Commission is "measuring and understanding the problem of health inequities and assessing the impact of governmental actions on health". Based on these conclusions, the World health Assembly of 2009 called upon all member states and the international community to tackle the health inequities within and across countries through political commitment. The Assembly requested also the WHO Director-General to include the reduction of health inequities as an objective of all areas of the Organization's work, especially priority public health programs and research on effective policies and interventions.

The Commission on SDH concluded in 8 recommendations, with a reference to the need to stratify health indicators and their determinants, by major variables known to systematically affect health outcomes. The work initiated by the Commission on Social Determinants of health has been integrated into WHO's Strategic Objective 7 of WHO's Medium-Term Strategic Plan for 2008-2013, namely, "to address the underlying social and economic determinants of health through policies and programs that enhance health equity and integrate pro-poor, gender-responsive, and human rights-based approaches ".

[39] Preamble to the Constitution of the World Health Organization as adopted by the International Health Conference, New York, 19-22 June, 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of the World Health Organization, no. 2, p. 100) and entered into force on 7 April 1948.The Definition has not been amended since 1948.

One problem is that he baseline of national health inequity was lacking in most countries and that the global trend was not measured and/or agreed upon. Therefore, outcome or impact cannot yet be measured. As a consequence, targets are purely activity (output) indicators of activities as having a strategy, developing a tool, exchanging experiences introducing rights and gender dimensions in norms and standards. Moreover, the WHO interim assessment of the progress of this objective and its targets, of May 2011, is based on subjective rating by member states. So the targets were only outputs and the analysis was subjective.

## Best country standards

Physical health can be measured by life expectancy and qualified by "healthy life expectancy", the result of deducting from the life expectancy (at birth or during different age periods) the burden of disease and disability that reduces the health. Healthy life expectancy (HALE) is defined as the "*average number of years that a person can expect to live in "full health" by taking into account years lived in less than full health due to disease and/or injury*"[40].

WHO analyses death registration data reported annually for calculation of life expectancy tables. For countries without such data (some 90 countries), available survey and census sources of information on child and adult mortality are analysed and used to estimate life tables with 95% uncertainty intervals (95% UIs)[41].

WHO partners with the World Bank to sponsor the initiative of "the Global Burden of Disease Study" (GBD). The latest GBD has been published in December 2012 and analyses data for 2010 (GBD 2010) [42] building on the earlier versions for 1990, 1999—2002, and 2004. In order to assess the loss of health (through premature mortality[43] –YLL- and through disability –YLD-) it uses a hierarchical (four levels) cause list for 291 diseases and injuries and a fifth level for 1160 sequelae so as to estimate the disability weights. It concludes on levels of healthy life expectancy and the causes of health loss (by risks and diseases). Data are disaggregated by 194 countries, 21 regions (on the basis of two criteria: epidemiological homogeneity and geographical contiguity), 20 age groups and three time periods (1990, 2005, and 2010)[44]. Data may be consulted and downloaded from the Institute of Health Metrics and Evaluation[45] (not from WHO webpage at the time of editing this book).

The best country level life expectancy at birth for women is Japan (85,85 years) and for men Iceland (79,79), with Japan's best average for both (82,6). The map below shows the distribution worldwide of average life expectancy at birth[46].

[40] http://www.who.int/healthinfo/statistics/indhale/en/
[41] Age-specific and sex-specific mortality in 187 countries, 1970–2010: a systematic analysis for the Global Burden of Disease Study 2010. Haidong Wang PhD,Laura Dwyer-Lindgren MPH,Katherine T Lofgren BA,Julie Knoll Rajaratnam PhD, Jacob R Marcus MPH,Alison Levin-Rector MPH,Carly E Levitz BA,Prof Alan D Lopez PhD, Prof Christopher JL Murray MD. The Lancet - 15 December 2012 (Vol. 380, Issue 9859, Pages 2071-2094 )
[42] GBD 2010 was implemented as a collaboration between seven institutions: the Institute for Health Metrics and Evaluation as the coordinating center, the University of Queensland School of Population Health, the Harvard School of Public Health, the Johns Hopkins Bloomberg School of Public Health, the University of Tokyo, Imperial College London, and WHO
[43] GBD 2010 sets a new normative standard life table for males and females to compute YLLs at each age by identifying the lowest observed death rate for any age group in countries of more than 5 million in population. The new reference life table has a life expectancy at birth of 86·0 years for males and females (Japan as best reference, as in previous GBD studies).
[44] GBD 2010: design, definitions, and metrics. Christopher JL Murray, Majid Ezzati, Abraham D Flaxman,Stephen Lim,Rafael Lozano,Catherine Michaud,Mohsen Naghavi,Joshua A Salomon,Kenji Shibuya,Theo Vos,Daniel Wikler,Alan D Lopez. The Lancet - 15 December 2012 (Vol. 380, Issue 9859, Pages 2063-2066 )
[45] http://www.healthmetricsandevaluation.org/ghdx/record/global-burden-disease-study-2010-gbd-2010-healthy-life-expectancy-1990-2010
[46] http://www.statsilk.com/maps/world-stats-open-data

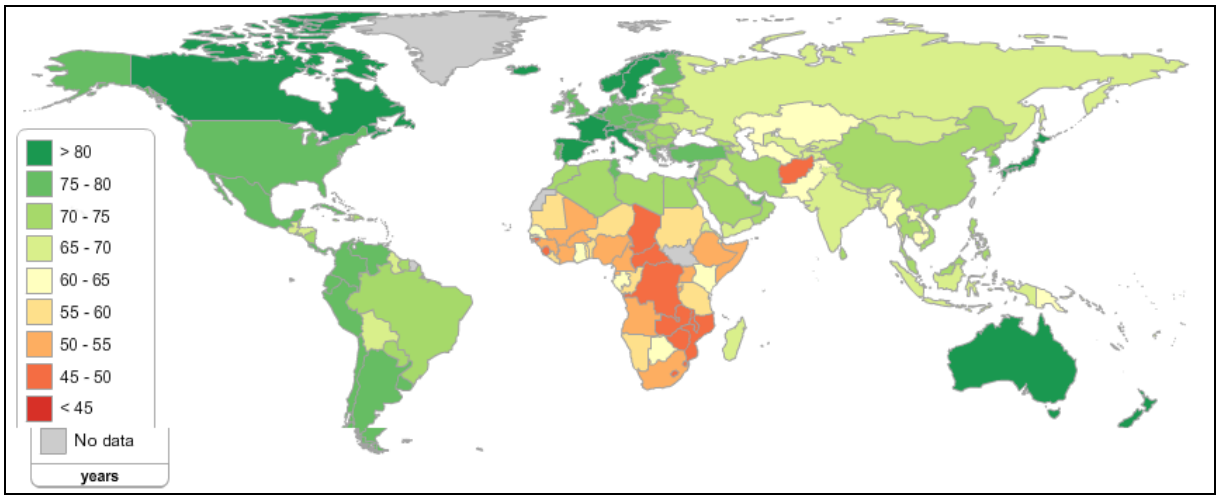



Figure 11: World-wide distribution of average life expectancy

As regards healthy life expectancy at birth Japan features best for both sexes, with 71, 7 years for women and 68,8 for men, at birth.

## Causes of global health disparities

A dry description of health disparities would only look at the dispersion of a comparable health indicator, such as healthy life expectancy, across the world's population. This is difficult to know as most countries do not register or report the disparities of health within their populations. If human health would follow the pattern of most distributions of variables in nature, we would expect a curve of "normal distribution", cantered around average values and with the width of the base measured by the standard deviation. Life expectancies across countries reflect a dispersion (standard deviation divided by the average) which increased during the nineties and returned to the levels of the 1990 levels during the last decade.

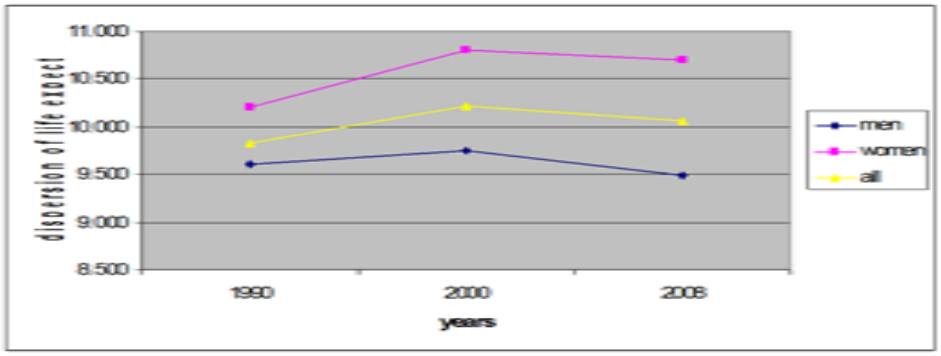



Figure 12: Dispersion rate of national average life expectancies 1990-2010.

Such dispersion analysis does not provide any information of the causes of such dispersion, and hence, is useless to address and reduce health disparities.

Almost any human, social or environmental factor influences health. As chapter 8 will describe, the dynamics of health and health disparities are very complex and can be understood in many hierarchical levels of causality. A disease (e.g. hearth failure) normally follows a pathogenic mechanism (e.g. high blood pressure), caused by risk factors related to lifestyles (e.g. low physical activity and high sodium and fat intake), often conditioned by a legal framework (e.g. regulating food products), a level of knowledge to take health-related decisions (e.g. knowledge of the effects of

certain food products), resources (e.g. to access healthy foods) and the ecological environment (e.g. allowing physical activity).

In order to screen the underlying causes of health disparities, some have suggested the screening of causes under the acronym of PROGRESS: place of residence, race, occupation, gender, religion, education, socio-economic status and social capital[47].

Some of these conditions cannot be changed (race, sex, genetics), various have to do with the country's features (latitude and altitude influencing climate and epidemiology), others are deeply rooted in the culture people grow with (religion, traditions) and certain causes are more amenable to change by international (climate change, macroeconomic conditions) and national political and policy frameworks (socioeconomic equity, occupational safety, household and ambient pollution, access to safe water, sanitation and health services) or by individual choices (diet, exercise, safe sex and other health-related lifestyles). The last level of personal freedom to maximise the enjoyment of our health potential, is subject, therefore to unchangeable determinants (genetics, race, and sex), country determinants (altitude, latitude) and socioeconomic conditions subject to international and national political and policy choices which can be clustered in four main areas: legal frameworks, knowledge, resources and environment.

### *Correlation of health with the main national health determinants*

For the following correlations we will use national life expectancy as a proxy of health life expectancy, due to the availability of data over time.

#### a. Legal frameworks:

Legal frameworks influence health conditions and access to health services. The following graph (using statsilk software[48]) shows the correlation between the country levels of Democracy Index, including levels of electoral process and pluralism, civil liberties, functioning of government, political participation and political culture [49] and Life Expectancy. It shows a high correlation when using country data but such correlation is greatly weakened if country data are weighed by population, given the effect of China, reflected by the fact of lower democracy index in China than India, yet with better health in the former.

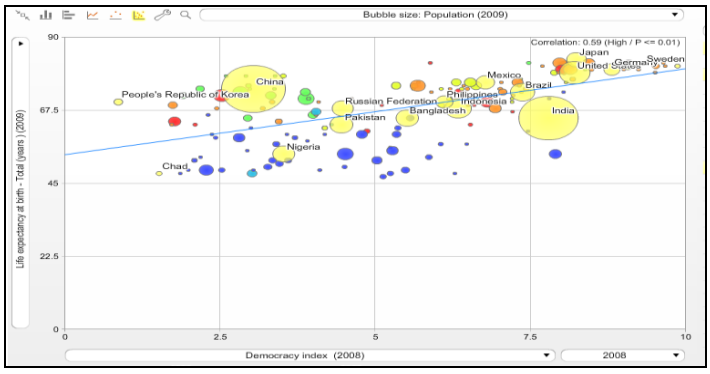



Figure 13: Correlation between democracy and health national indicators.

[47] Evans T, Brown H. 2002. Opportunities for action: applying an equity lens to global health initiatives. Presentation at the National Press Club, Washington DC; Evans T, Brown H. 2002. Applying an equity lens to the safe motherhood initiative. Presentation to the Safe Motherhood Interagency Group, London; Evans T, Brown H. 2003. Road traffic crashes: operationalizing equity in the context of health sector reform. Injury Control and Safety Promotion 10: 11–12.

[48] http://www.statsilk.com/maps/world-stats-open-data

[49] The Democracy Index is compiled by the Economist Intelligence Unit (a private business) that measures the state of democracy in 167 countries based on 60 indicators grouped in five different categories: electoral process and pluralism, civil liberties, functioning of government, political participation and political culture. The Index was first produced in 2006, with updated lists produced in 2008, 2010 and 2011 (the last year shows a decline in democracy index at global level).

### b. Knowledge

Once there are free conditions for individuals and societies to pursue health (and happiness), there needs to be a level of knowledge to make adequate use of that freedom and effectively protect and promote individual and public health. The following graph shows the correlation between the average years of education from primary to tertiary levels, and life expectancy. Although the information is not available for all countries, the available data show a very strong correlation, which is even stronger (Pearson correlation 0.84) when comparing female education years with life expectancy.

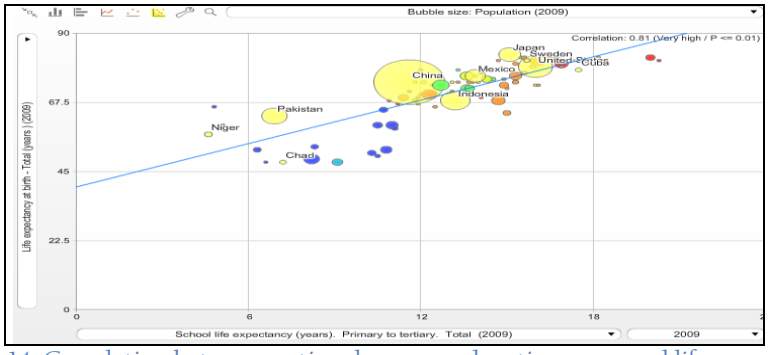



Figure 14: Correlation between national average education years and life expectancy

### c.

### d. Ecology

Countries use natural resources, own or imported, with both, negative and positive effects in health. On the negative side, carbon emissions have a negative effect in global health, estimated at some 140,000 excess deaths per year since 1970[50]. This is a source of "inter-generational inequity" which deserves in-depth analysis. Paradoxically, those countries contributing more to climate change are more protected from it and they experience better health outcomes (see figure 16). This correlation would be even stronger if ignoring the effect of Arab countries.

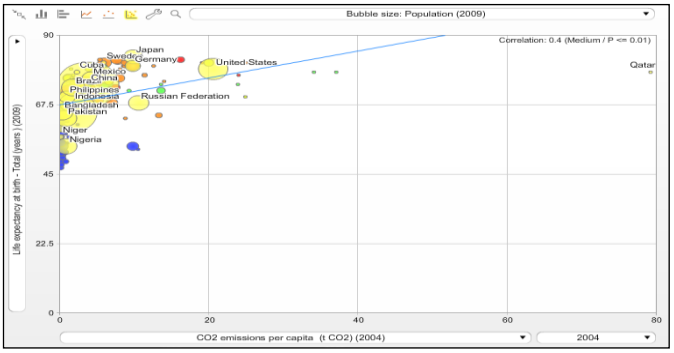



Figure 15: Correlation between electrification rate and life expectancy

[50] http://www.who.int/mediacentre/factsheets/fs266/en/

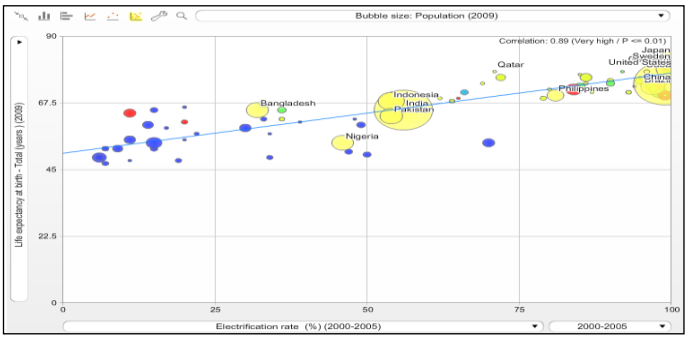



Figure 16: Correlation between carbon emissions per capita and life expectancy

On the other side, the use of natural resources for purposes as the electrification rate, which may be done in a sustainable way, is highly correlated with increased life expectancy.

### e. Economic resources

In a world where the individual economic capacity can empower the use of democratic and freedom rights, grant access to knowledge, secure from environmental risks and satisfy health needs and access to health services, it is not surprising to ascertain a strong correlation between economic resources, measured for instance by per capita GDP, and health.

After the advent of agriculture 5000 years ago, property of lands and means led in most culture to the concentration of power, rights, land and resources in a proportion of a society (feudalism). As socio-political structures grew in size up to the levels of nations and empires, so did the stratification of societies and inequities became wider and institutionalized. These inequities further increased with the industrial revolution and the access to a much wider variety of commodities. The French revolution and the American declaration of Independence re-balanced the equilibrium of power and rights and led to other processes of freedom and rights for women and for ethnic minorities. The communist process aimed at expanding the equity of resources though its wrong practice ended up undermining the dynamics of power and equal rights. During the XX century, capitalism and market rules dominate over social cohesion and equity processes. As a consequence, the world gradually increased its inequities within and between countries during the last century except for the war periods, where equity increased. In the last decade, the flow of communication and financial transactions has grown exponentially and so the opportunities for capital accumulation and inequities between and within countries.

Some schools of thought (often biased by political views) consider that some baseline levels of inequality favor higher economic growth, but this effect is diluted when excluding oil-producing economies. In recent decades, higher inequalities are associated to a lower economic growth. Inversely, some economies experiencing high growth rates, like China, increased their economic inequality, while others as Indonesia, Malaysia, the Republic of Korea, Taiwan and Thailand, managed to have both a significant economic growth with reduced inequalities. So, it seems as if inequalities are neither a precondition nor an unavoidable consequence of economic growth but they relate more to how policies condition the inclusiveness and fair distribution of growth.

#### *Between countries*

Across countries, the distribution of GDP reflects increased disparities, represented by a doubling effect of the standard deviation (statistical index of dispersion) of national GDPs from 7100 in the mid 80s to close to 15000 in 2005. There is a clear correlation between lower levels of GDP and worse health indicators. Figure 19 shows the confidence intervals ($p < 0,05$) of life expectancy in each income group of countries and subgroups. While there is a clear gradient, the only significant difference is between the low and the high-income countries.

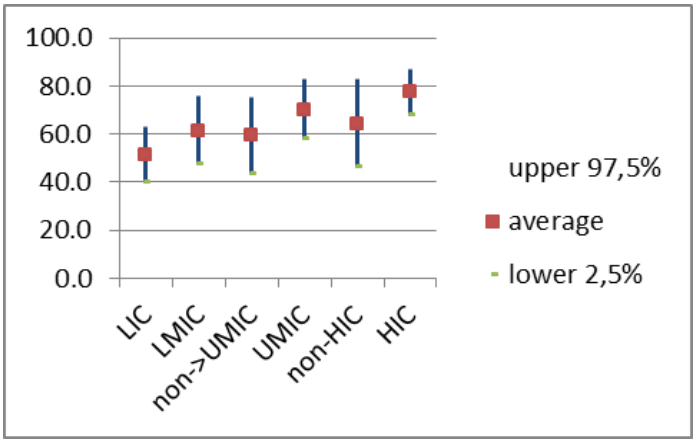



Figure 17: Confidence intervals of life expectancy by income groups of countries

The following figures show the best correlation type and figure between GDP and life expectancies. For all countries, the correlation is quite strong by logarithmic regression ($R^2$=0,7, meaning some 70% of the variation of life expectancy can be explained/predicted by GDP pc). The correlation improves slightly (to 0,73) when excluding countries with mortality rate due to HIV/AIDS › 250/100,000.

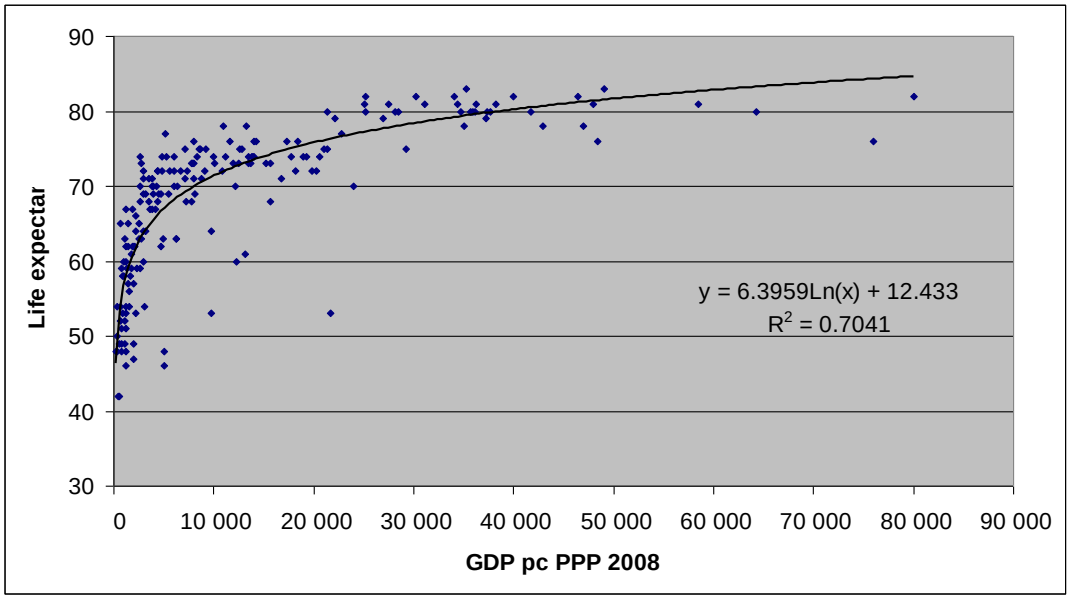



Figure 18: Correlation between GDP pc and life expectancy

Using data form the world health statistics report of 2011, the Pearson linear correlation strength shows the following levels between GDP per capita and the following health indicators:

Table 2: Pearson correlation factors between GDP per capita and different health indicators

| Health indicator | LE male | LE female | LE all | HALE male | HALE female | HALE all | U5MR male | U5MR female | U5MR all | AMR male | AMR female | AMR all |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pearson $R^2$ | 0,67 | 0,64 | 0,66 | 0,69 | 0,66 | 0,68 | 0,52 | 0,50 | 0,51 | 0,60 | 0,54 | 0,58 |

They reflect a consistent correlation yet weaker in women/girls than men/boys, and in under five mortality rates. Possibly women's health is more sensitive to legal frameworks, especially gender equality, while children's health is more sensitive to education, nutrition and water and sanitation, within the same GDP levels.

When we do the same correlation by income groups, there is great variation. For the high income countries, the best correlation is half the global one and only by polynomial (3rd order) regression and it shows a slight increase up to 20,000 GDP pc where after it flattens and even decreases slightly above 40,000. In the upper-middle income group, the correlation is even weaker (some 12% only) and after trying a polynomial regression of 5th order. For lower-middle income countries (half of the world's population), the best correlation is linear and it explains some 40% of variability. In low-income countries, again the correlation is weak (20%) and only through a polynomial regression of 3rd order, with a clear turning point at 700 GDP pc.

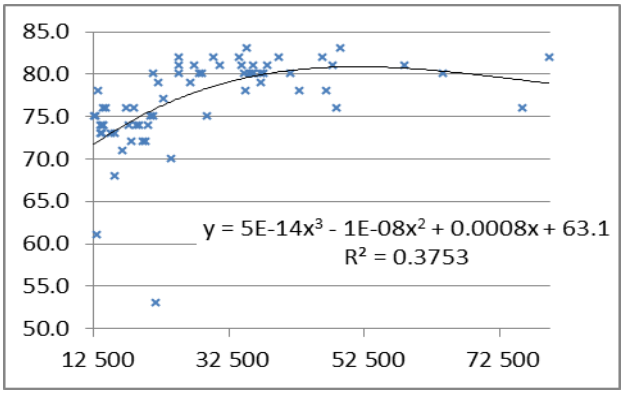



Figure 19: Correlation between GDP and life expectancy in High Income Countries

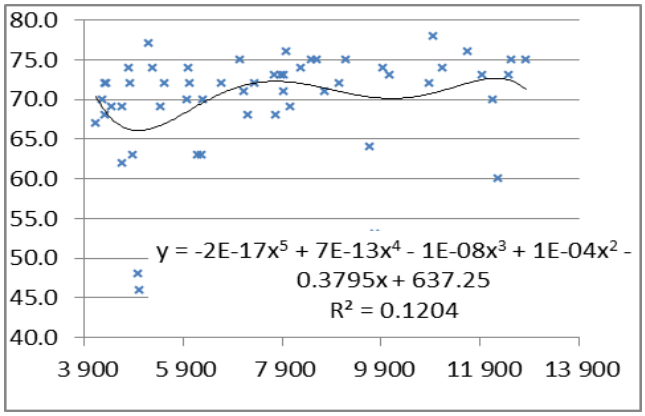



Figure 20: Correlation between GDP pc and life expectancy in Upper-Middle income countries

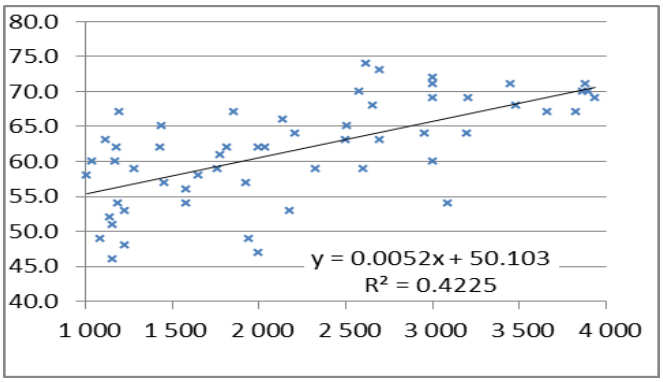



Figure 21: Correlation between GDP pc and life expectancy in Lowe-Middle income countries

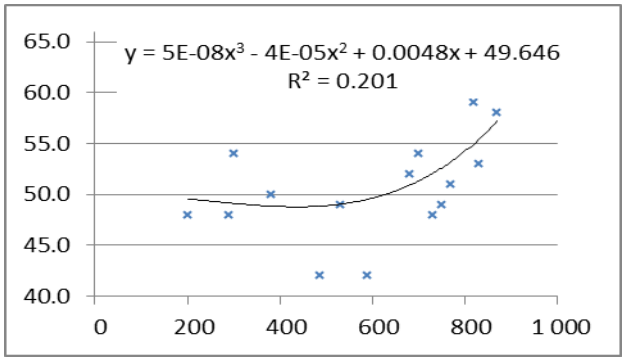



Figure 22: Correlation between GDP pc and life expectancy in low-income countries

In summary, the economic measure of national wealth (withstanding its limitations) is correlated with better health (measured in average quantity of life). This correlation fails above 20,000 –others have estimated 15,000[51]- GDP pc and below 700 GDP pc, signaling possible lower and upper thresholds.

### *Within countries*

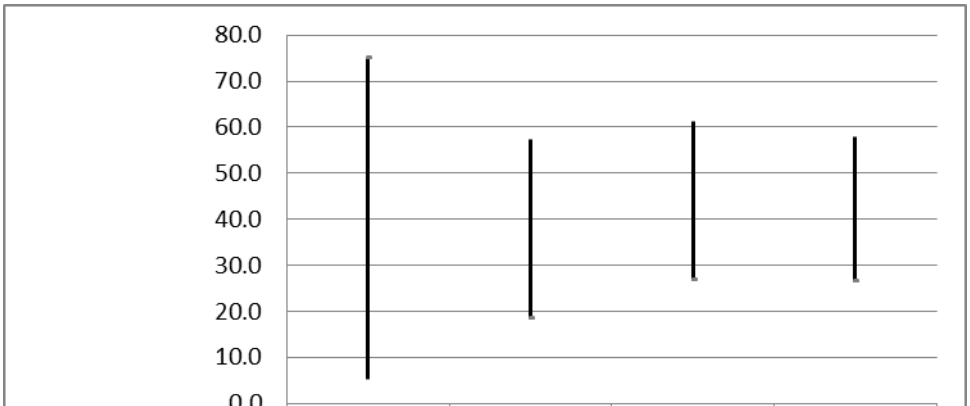
At country level, income inequity relations to health have even greater complexities. Income is closely related to socioeconomic Status (SES). For several decades, hundreds of studies and dozens of research networks in developed countries have looked into the relation of SES -most generally used education, income (net and relative deprivation), race and occupational status —and health. Even after the ample evidence of relations, there is yet no consensus on standard SES indicators. But the most difficult problem to unpack is that of the complex relations between SES related factors, their influence and feed back into social disadvantages, stratification and social mobility and their cumulative (and difference between acute, periodic and chronic effects ) effects throughout lifetime (especially during childhood ) , on others through spill-over effects , of different types ) and passed on between generations. The lead-researchers in this field identify five eras over the past two decades: the threshold of the association of poverty and health, the graded association between different elements of SES and health, the mechanisms linking SES and health, the multilevel influences, and the interactions among factors. Each of these "eras" still has many open questions. It leaves a feeling of entering a dense web of relations in many directions and in complex dynamics, including the effects of thresholds and feed-backs (similar to the neurological system), and where individual or even cluster analysis, can only give a partial and biased view of the problem.

### *The relation with the GINI index*

Data from developed countries show that the trend in the second half of the last century -as they economically grew-, depicts an increasing trend –especially in the central economic powers of the United Kingdom and then the United States-, some of them with a 'U-turn' pattern (declining then rising inequality), during the 1967–92 period. Data from OECD reflect that the average change of the GINI index, over the last two decades, has been of 3% annual increase. So, economic inequality has been increasing within and between countries in the world during the last five decades. What is its effect in health?

The distribution of income inequality measured by the GINI index does not seem to correlate with GDP pc. There are no statistically significant differences across income regions. The inequality of the distribution of the GINI index (inequality of the indexes of national inequality!), is higher in low income regions.

[51] Dow, W. H. and Rehkopf, D. H. (2010), Socio-economic gradients in health in international and historical context. Annals of the New York Academy of Sciences, 1186: 24–36.




| | LIC | LMIC | UMIC | HIC |
|---|---|---|---|---|
| upper limit p<0,05 | 5.3 | 57.3 | 61.1 | 57.8 |
| average GINI | 40.1 | 37.8 | 43.9 | 42.2 |
| - lower limit p<0,05 | 74.9 | 18.3 | 26.7 | 26.5 |

Figure 23: Confidence intervals of GINI index within income regions

Considerable attention has been given to the research into the consequences of social disadvantage, stratification and the dynamics of competition and its biological pathways triggered by chronic stress[52] (with over 150 articles looking at it as referred to "allostatic load" – AL- [53]), their impact on biological "stressors" (chronic high cortisol[54], low serotonin brain activity[55], smaller hippocampal brain volume[56] and diverse models of brain activity-especially the functionality of cerebral amygdala[57]-), their effects on major peripheral physiological regulatory systems (autonomic nervous system, cardiovascular, metabolic, and inflammatory processes) and on differential rates of diseases[58]. Obviously, as knowledge gets deeper (but often less clearer!) on the relations between socio-economic conditions, AL and biological effects, there are proposals to introduce neuro-psychiatric interventions (pharmaceutical or cognitive behavioral therapy[59], others), but we should not forget the real cause of these effects: social injustice and neglect of basic human rights, including social rights!.

While studies on SES have focused mainly in high-income countries and relate to the biological effects of social disadvantage, the dynamics in low-income countries may be very different as poverty means not just chronic stress but lack of the essential needs even to enable the high levels of cortisol.

In relation to health, the overall correlation between the GINI and average life expectancy for the 137 countries where there are available data for both in the last decade is very weak ($R^2$ of 0,09). The correlation of GINI and life expectancy within each income region is neither strong and gets weaker with higher GDP pc. Even when we exclude countries with HIV prevalence higher than 5%, the correlations in all regions remain weak, with the exception of the low-income countries, although the sample size of available data, after excluding high HIV prevalence countries is low (8 countries).

[52] Matthews, K. A., Gallo, L. C. and Taylor, S. E. (2010), Are psychosocial factors mediators of socioeconomic status and health connections? Annals of the New York Academy of Sciences, 1186: 146–173

[53] McEwen, B.S. & E. Stellar. 1993. Stress and the individual. Mechanisms leading to disease. Arch. Intern. Med. 153: 2093–2101.

[54] Impairment of the hippocampal role in regulating the hypothalamic-pituitary-adrenal (HPA) axis activity exacerbating the actions of steroids triggered by repeated stress. This is called the "glucocorticoid cascade hypothesis" of hippocampal aging

[55] Manuck, S. B., J.D. Flory, M.F. Muldoon & R.E. Ferrell. 2003. A neurobiology of intertemporal choice. *In Time and Decision: Economic and Psychological Perspectives on Intertemporal Choice*. Lowenstein, G., D.Read & R.Baumeister, *Eds.*: 139–174.

[56] Gianaros, P. J., J.A. Horenstein, S. Cohen, *et al* . 2008. Perigenual anterior cingulate morphology covaries with perceived social standing. Soc. Cog. Affect. Neurosci. 2: 161–173.

[57] McEwen, B. S. and Gianaros, P. J. (2010), Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. Annals of the New York Academy of Sciences, 1186: 190–222.

[58] Adler. N. E. and Stewart, J. (2010), Preface to *The Biology of Disadvantage: Socioeconomic Status and Health*. Annals of the New York Academy of Sciences, 1186: 1–4.

[59] McEwen, B. S. and Gianaros, P. J. (2010), Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. Annals of the New York Academy of Sciences, 1186: 190–222.

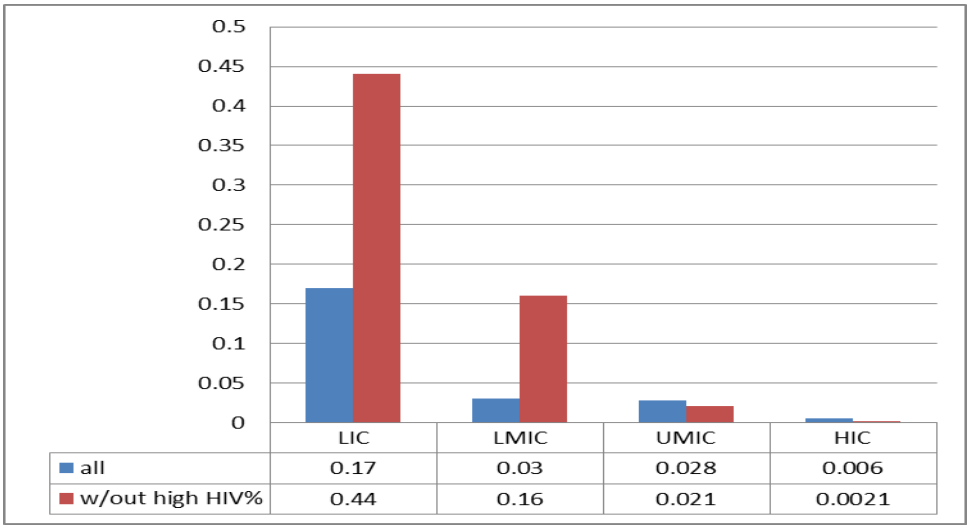



Figure 24: Correlation between GINI and life expectancy by income regions and HIV prevalence

There are other more specific studies that show how inequalities undermine the efficiency of the translation of wealth (income) into human development[60], including health, in OECD countries. Instead of using GINI, when comparing the wealth ratio of the upper and lower quintiles, Wilkinson and Picket have demonstrated these effects overwhelmingly in their book "The spirit level" in health, including unhealthy lifestyles [61], mental health (stress and anxiety mainly[62]) and perception of happiness[63] and its effects in unhealthy lifestyles but also in many other dimensions which interact with health such equal access to quality education[64] and unsustainable and environmentally-degrading patterns of production[65] and consumption[66]. All these consequences feed-back on greater stratification, inequality and reduced social mobility, with its cycle of inequality/social injustice and reduced wellbeing/health. Unfortunately such studies are lacking in non-high income countries.

Whether it's the validity of the data or the different dimensions of wealth inequality (GINI: throughout all the society, or the income ratio of richest to poorest) that influence the relation between economic disparities and the average health state of a society, remains to be seen. It may be that when the gradient of inequity is steeper and concentrates more wealthy in the upper quintile and more poverty in the lower one ("more unequal inequality"), social mobility is lower, stratification higher and the stress-related behavior and the strength of power dynamics, may have a stronger effect than if the inequality is spread out more evenly ("more equal inequality"). While the GINI index captures the overall inequity gap across all citizens with the average income levels, the ratio of upper to lower quintiles (as used by Wilkinson and Picket) as measured by the GINI index, may capture the steepness of inequity and be more sensitive to gradient, stratification and the stress-related mechanisms of poorer health for all. In any case, the dynamics of wealth inequality and their effect in health require further studies, especially in non-high income countries. Another explanation is that the static pictures (cross-prevalence) of income inequalities may fail to show clear differences across countries as there are many other factors influencing health, which blur that relation. When the dynamic of income inequalities are seen in time and their effects on health gains in motion, some

[60] Harry Jones 2009. Equity in development: Why it is important and how to achieve it. London: Overseas Development Institute
[61] SP Wamala, A Wolk, K Orth-Gomer, determinants of obesity in r4lation to socioeconomic status among middle-aged Swedish women, Preventive medicine (1997) 26: 734-44.
[62] R Sapolsky, Sick of poverty, Scientific American (2005) 293 (6):92-9.
[63] R Layard, Happiness. London: Allan Lane, 2005.
[64] J D Wilms, Literacy proficiency of youth: evidence of converging socioeconomic gradients, International Journal of educational Research (2003), 39:247-052.
[65] World Bank, World Development Indicators (WDI) September 2006. Economic and Social Data service International, Manchester : Mimas.
[66] A kalma, Hierarchisation and dominance assessment at first glance. European Journal of social psychology (1991) 21(2): 165-81.

studies –as the US and Canada comparison in the 1980s- has shown their specific effect on the health of the whole of society[67].

As regards the correlation between income disparities and health disparities, the scope of data across countries is very limited: only 44 countries from the 69 which reported health inequity ratios to the world health statistics in 2011 and 2012 also have some recent data on GINI index.

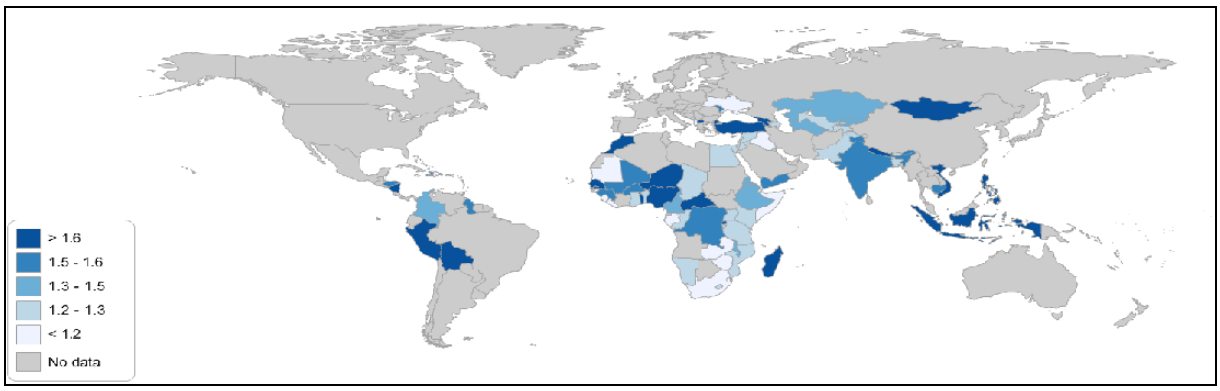



Figure 25: Map of the ratios of child mortality (lower vs. upper income quintiles)

The correlation of health inequities by income level, measured by the ratio of under-five mortality between the upper and lower income quintiles, seems unrelated to the degree of income inequities as measured by the GINI index.

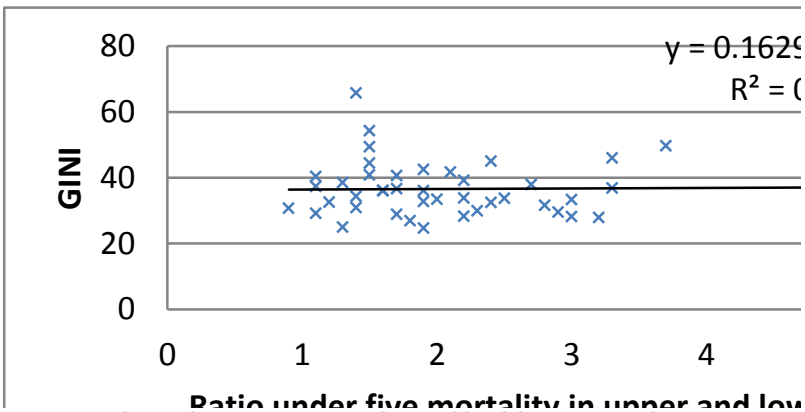



Figure 26: Correlation between GINI index and health inequities by income groups.

Again, whether the sensitivity of the GINI index to represent the gradient level of income inequities (vs. the ratio of upper/lower quintiles) or the validity of data, disable the logical evidence of higher health disparities with income inequities, is a matter which deserves research.

## The choice of variables and groups to define the global health objective of best health for all

The previous sections in this chapter describe the health disparities across countries, their dispersion rates and their association with the structural causes of ill health and health distribution, that is, legal frameworks, knowledge, environment and economic resources. Legal frameworks as measured by the democracy index have a moderate correlation strength that is even lower when the weighs of populations of countries is taken into account (especially by the effect of China). Both education and some use of natural resources such as electrification rates have a very strong correlation factor with

[67] Dow, W. H. and Rehkopf, D. H. (2010), Socioeconomic gradients in health in international and historical context. Annals of the New York Academy of Sciences, 1186: 24–36.

life expectancy, but when adjusted by income, their added correlation effect is weak. They seem, therefore, to reflect the indirect effects of income in health, by enabling improved access and quality of education, and energy sources. Income levels are strong predictors of national average health indicators such as life expectancy and healthy life expectancy, and influence other structural determinants.

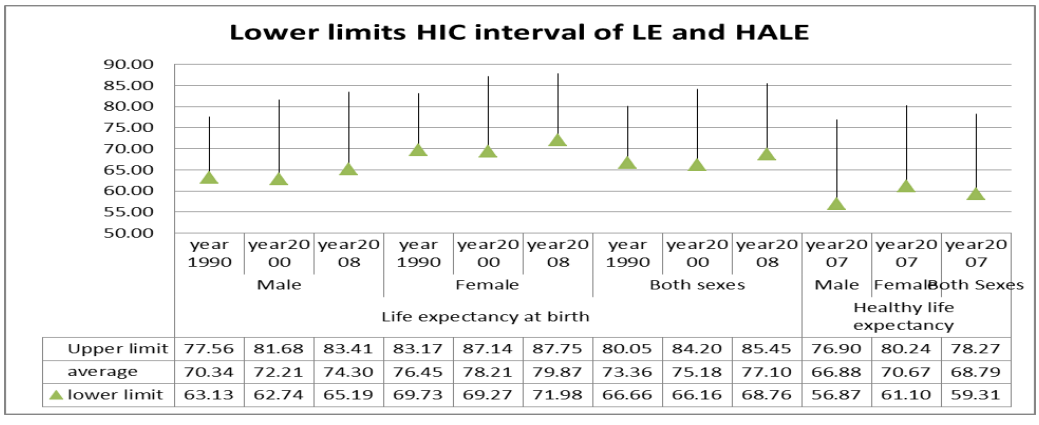
At global level, we therefore opt for selecting initially income levels to better understand health disparities, the best and feasible level, the gap and the alternative frameworks required to modify the inequity dynamics.

When the reference is a single country –as the best country in life and healthy life expectancy, Japan-, the scope of conditions that cannot (genetics, race, altitude, latitude) or are difficult (culture, religion) to change, is limited, and it does not represent the wide variety of unchangeable determinants of other countries. If we take the upper quarter of the world's population living in countries with higher per capita GDP, they represent the group of high-income countries as classified by the World Bank[68] (GDP per capita › US$12,276). This group represents 68 countries with an overall population of 1,55 billion, roughly one fourth of the world's population. It includes countries from all latitudes, altitudes, races, genetics, religions and traditions.

## The best health indicators represented by the high income group of countries

The group of high income countries are, as the previous section reviewed, a representative group of those health markers or determinants difficult to change, clustered by the main variable determining directly and indirectly global health disparities.

The following table lists the health indicators of this group of countries described here by their average and confidence interval (p ‹ 0, 05). For both sexes and according to the latest data from 2008, the threshold of the health indicators which could be considered (moving) *minimum global health objectives for all* would be 68,76 years of life expectancy, of which 59,31 would be healthy years, neonatal mortality rate of 18,9, under-five mortality rate of 21,69 and adult mortality rate of 9 per thousand.




| | Life expectancy at birth | | | | | | | | | Healthy life expectancy | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Male | | | Female | | | Both sexes | | | Male | Female | Both Sexes |
| | year 1990 | year 2000 | year 2008 | year 1990 | year 2000 | year 2008 | year 1990 | year 2000 | year 2008 | year 2007 | year 2007 | year 2007 |
| Upper limit | 77.56 | 81.68 | 83.41 | 83.17 | 87.14 | 87.75 | 80.05 | 84.20 | 85.45 | 76.90 | 80.24 | 78.27 |
| average | 70.34 | 72.21 | 74.30 | 76.45 | 78.21 | 79.87 | 73.36 | 75.18 | 77.10 | 66.88 | 70.67 | 68.79 |
| ▲ lower limit | 63.13 | 62.74 | 65.19 | 69.73 | 69.27 | 71.98 | 66.66 | 66.16 | 68.76 | 56.87 | 61.10 | 59.31 |

Figure 27: Confidence intervals of life expectancy in High Income Countries

[68] Low-income countries had GNI per capita of US$1,005 or less. Lower middle-income countries had GNI per capita between US$1,006 and US$3,975. Upper middle-income countries had GNI per capita between US$3,976 and US$12,275. High-income countries had GNI above US$12,276.

Table 3: Confidence intervals of health indicators in high-income countries

| Health indicator | Year | Sex | average | standard deviation | minimum threshold |
|---|---|---|---|---|---|
| Life expectancy at birth (years) | 1990 | Male | 70.34 | 3.61 | 63.13 |
| | 2000 | | 72.21 | 4.73 | 62.74 |
| | 2008 | | 74.30 | 4.56 | 65.19 |
| | 1990 | Female | 76.45 | 3.36 | 69.73 |
| | 2000 | | 78.21 | 4.47 | 69.27 |
| | 2008 | | 79.87 | 3.94 | 71.98 |
| | 1990 | Both sexes | 73.36 | 3.35 | 66.66 |
| | 2000 | | 75.18 | 4.51 | 66.16 |
| | 2008 | | 77.10 | 4.17 | **68.76** |
| Healthy life expectancy (HALE) at birth (years) | 2007 | Male | 66.88 | 5.01 | 56.87 |
| | 2007 | Female | 70.67 | 4.78 | 61.10 |
| | 2007 | Both Sexes | 68.79 | 4.74 | **59.31** |
| MDG 4 Under-five mortality rate (probability of dying by age 5 per 1000 live births | 1990 | Male | 19.22 | 13.98 | 47.18 |
| | 2000 | | 13.43 | 12.10 | 37.64 |
| | 2008 | | 9.42 | 6.91 | 23.24 |
| | 1990 | Female | 15.87 | 11.90 | 39.68 |
| | 2000 | | 11.24 | 10.86 | 32.96 |
| | 2008 | | 7.94 | 6.24 | 20.42 |
| | 1990 | Both sexes | 17.57 | 12.87 | 43.31 |
| | 2000 | | 12.34 | 11.45 | 35.25 |
| | 2008 | | 8.66 | 6.52 | **21.69** |
| Adult mortality rate (probability of dying between 15 and 60 years per 1000 population) | 1990 | Male | 183.25 | 62.59 | 308.43 |
| | 2000 | | 166.82 | 85.38 | 337.57 |
| | 2008 | | 144.66 | 74.32 | 293.29 |
| | 1990 | Female | 96.49 | 31.27 | 159.03 |
| | 2000 | | 89.57 | 61.63 | 212.83 |
| | 2008 | | 76.84 | 47.70 | 172.24 |
| | 1990 | Both sexes | 140.76 | 44.16 | 229.08 |
| | 2000 | | 129.21 | 70.32 | 269.85 |
| | 2008 | | 111.58 | 57.97 | **227.53** |

Global health disparities can be described by a scope of health indicators, across countries and featured by their dispersion rate. However, the analysis of health disparities requires the studies of correlation between health and the different hierarchical determinants influencing it. Clustered among four main pillars of structural causes (legal frameworks, knowledge, ecology and economic resources), income has a strong correlation with national average health indicators and influences the other main health determinants. This correlation is less clear within income groups of countries and within countries, although data are still scarce to draw conclusions.

The high-income group of countries (as defined by World Bank) represents one fourth of the population and the scope of health markers and determinants difficult to change. Their health indicators, weighted average and confidence intervals, enable the **setting of minimum (and moving with time) global health objectives for all**.

These are 68,76 years of life expectancy, of which 59,31 would be healthy years, under-five mortality rate of 21,69 and adult mortality rate of 227,53 per thousand.

## Could such best state of health be **feasible and sustainable** for all?

Estimating which may be the best feasible and sustainable health for all, this chapter asks the following questions: Can the best health standards identified in the previous chapter in high income countries be an objective for all? Could the development models of high-income countries apply to all countries? Which are the efficient country models that could be global references? Among them, which are ecologically sustainable? What makes those models different to others with less efficiency and sustainability? What is the mix of social determinants and health system features which could be a reference as equitable and sustainable health and development model? This analysis is quite essential to confirm or define the **best feasible health for all.**

## Could the high-income model apply to all?

The average per capita GDP of the high-income region in the word is 28,300 $, and has had an almost doubling effect since 1990. Clearly under that level of resources per capita, there would be no sufficient resources for all. On the other side, the access and use of resources comes at a price in ecology, and the level of production and consumption of high income countries is unsustainable with the surface and atmospheric recycling powers of the planet we live in. The average carbon emissions is 3.3 metric tonnes per capita, 60% higher than the recyclable threshold of the atmosphere (2.3), while the average ecological footprint is of 5,3 hectares per capita, over three times the threshold of nature's recycling capacity (1.6). At this rate, humanity would need more than two planets to keep up to its production and consumption rate, and climate change, among other consequences of carbon emissions, would lead to severe nature destruction and climate warning endangering many living species, including ours, during this century: The high income economic model for all is unsustainable.

The figures blow show, for the countries with high income, their rates of CO2 emissions and hectare sue per capita. They all have levels above the recyclable thresholds although the countries coloured in green are closer to the sustainability level and their cpom0pliance with the Kyoto commitments could bring them closer.

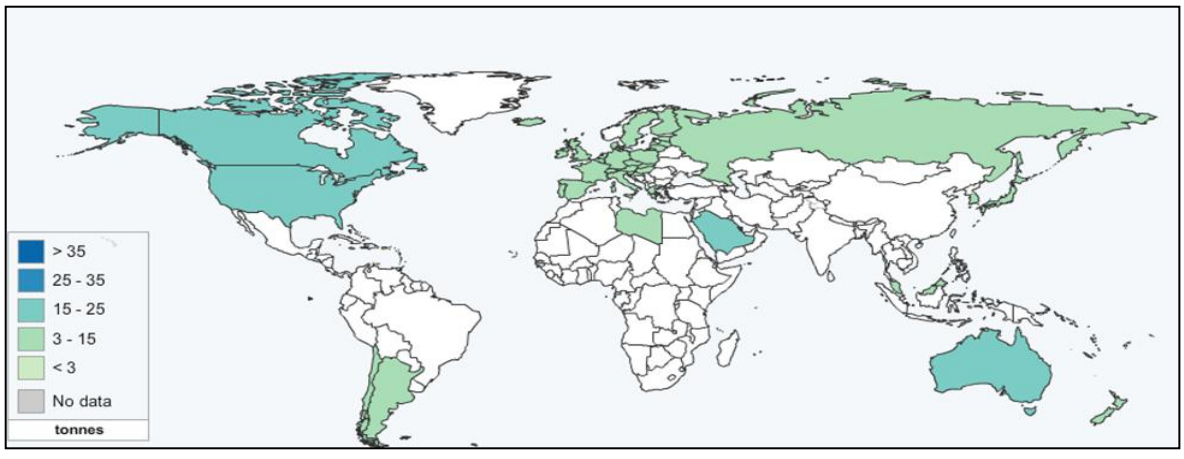



Figure 28: Carbon emissions per capita in HICs

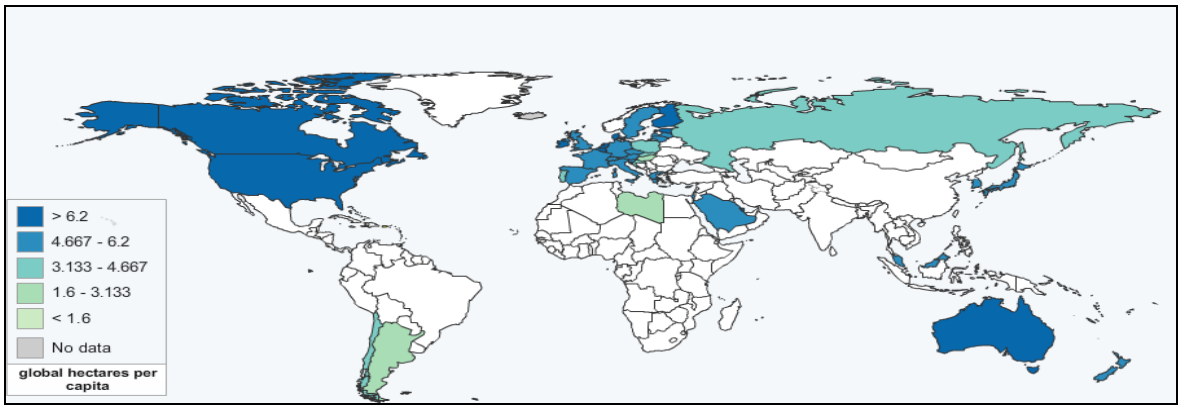



Figure 29: ecological footprint in Ha use per capita, in HICs

## Which are the most efficient country models that achieve (HI) best health standards?

The previous chapter concludes that the most influential variables determining health disparities is the level of income, and hence the representative sample (for pragmatic reasons as well) of the high income countries is a meaningful global health target for all. However, paradoxically, the socioeconomic and development model cannot be applied to all given the limitation of income worldwide. Even if those resources could reach all countries and people, they are based on levels of production and consumption which use natural resources and produce carbon emissions at levels beyond the recycling capacity of nature and the atmosphere.

There are 24 countries, representing one fourth of the world's population, which do enjoy levels within the confidence interval ($p < 0{,}05$) of the high income countries´ all main health indicators (life expectancy, healthy life expectancy, under five and adult mortality), yet at GDP levels (and public spending for health) lower than the high income group.

The following maps and table represent and list them. Their GDP per capita levels go as low as 2700 $, that is, four times lower (Vietnam) than the lower limit of the high income region., and public spending for health up to twenty times lower than the OECD average.

Ten countries- from all geographic regions except sub-Saharan Africa -enjoying these proposed global health standards have GDP pc lower than half of the world's average. These efficient health models prove the fact that the proposed global health standards could reach all as there would be sufficient resources for all but also in an unequal yet fair way (fair inequality1: equity), and not only in the utopian and often failed egalitarian model.

The maps indicate how among those countries with HIC standards of healthy life expectancy (most of Latin America, North Africa, Eastern Europe, Russia and South East Asia), the desirable levels of under-five mortality leave out some Latin America, North African and South East Asian countries and the standard adult mortality rates are out of the reach of Russia.

The scope of levels of GDP per capita among countries with HIC's levels of healthy life expectancy is very wide. Among them, most of the countries and of the population with lower GDP per capita levels are in China and South East Asia.

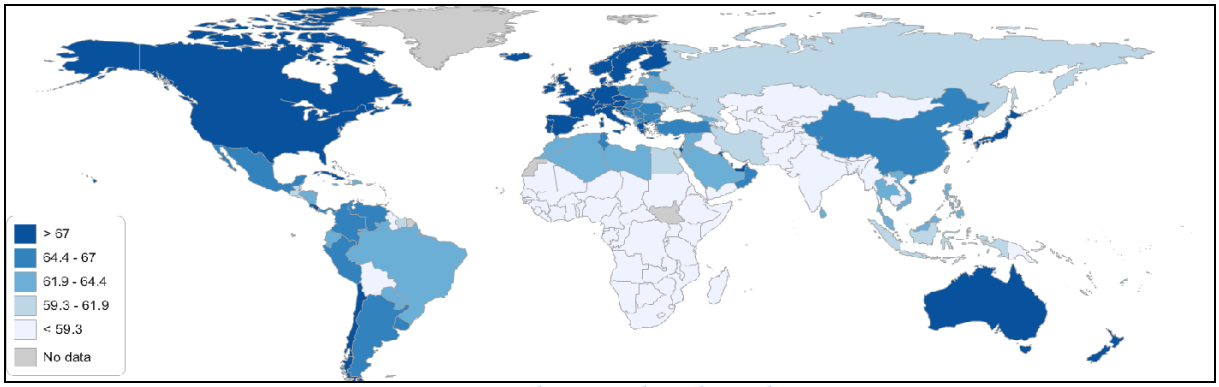



Figure 30: Countries with HALE above lower limit HIC region

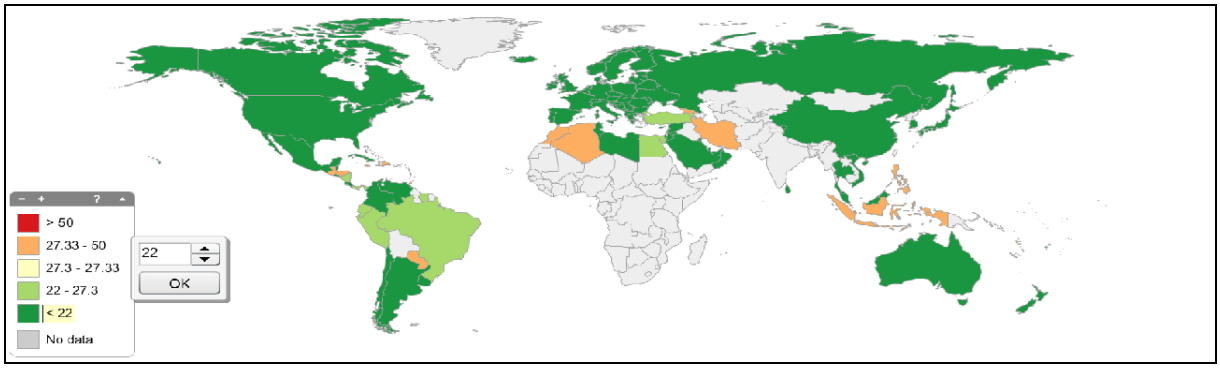



Figure 31: Countries with HALE › lower limit HIC and U5MR‹ upper limit HICs

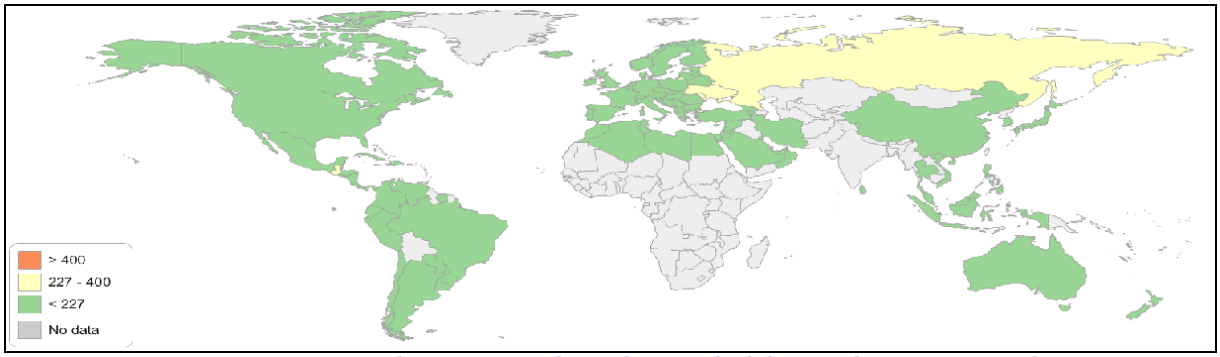



Figure 32: Countries with HALE › HIC lower limit and adult mortality ‹ HIC upper limit

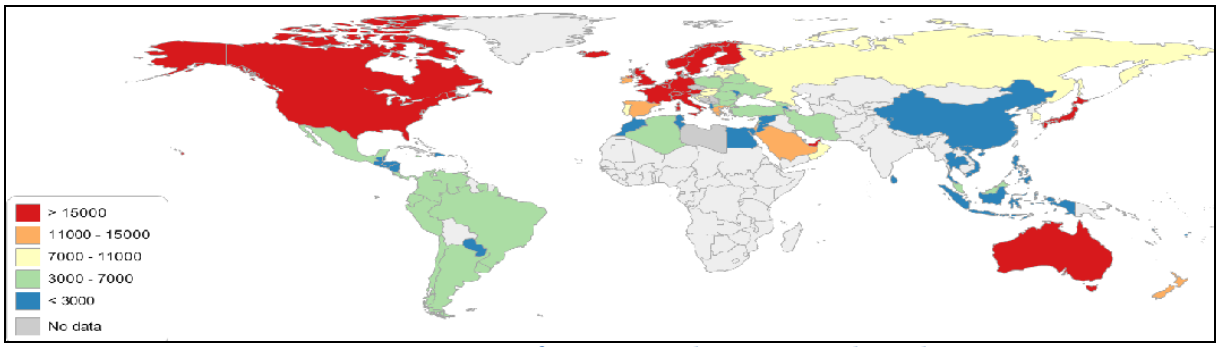



Figure 33: GNI per capita of countries with HALE › HIC lower limit

Table 4: GDP most health efficient countries

| | Life expectancy | | | healthy life expectancy | under 5 mortality rate | | | Adult mortality rate | | | Per capita GDP | Government health expenditure pc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 1990 | 2000 | 2008 | 2007 | 1990 | 2000 | 2008 | 1990 | 2000 | 2008 | 2008 | 2008 |
| Viet Nam | 66 | 70 | 73 | 64 | 56 | 30 | 14 | 200 | 167 | 150 | 2700 | 72 |
| Palau | 69 | 70 | 72 | 64 | 21 | 16 | 15 | 210 | 199 | 175 | 3000 | 637 |
| Moldova | 68 | 68 | 69 | 61 | 37 | 24 | 17 | 218 | 232 | 227 | 3210 | 142 |
| Tonga | 68 | 69 | 71 | 63 | 22 | 20 | 19 | 222 | 202 | 188 | 3880 | 117 |
| Fiji | 66 | 68 | 70 | 62 | 22 | 18 | 18 | 272 | 240 | 204 | 4270 | 118 |
| Syria | 67 | 71 | 72 | 63 | 37 | 22 | 16 | 218 | 162 | 150 | 4350 | 70 |
| Sri Lanka | 66 | 67 | 69 | 63 | 29 | 21 | 17 | 265 | 242 | 209 | 4460 | 85 |
| Cuba | 74 | 77 | 77 | 69 | 13 | 8 | 6 | 133 | 115 | 102 | 5200 | 875 |
| Jordan | 68 | 71 | 72 | 63 | 38 | 27 | 20 | 205 | 161 | 149 | 5530 | 263 |
| Thailand | 68 | 68 | 70 | 62 | 32 | 20 | 14 | 204 | 248 | 209 | 5990 | 209 |
| China | 68 | 71 | 74 | 66 | 46 | 36 | 21 | 172 | 135 | 113 | 6020 | 104 |
| Belize | 73 | 70 | 72 | 60 | 43 | 27 | 19 | 132 | 203 | 178 | 6040 | 182 |
| El Salvador | 64 | 70 | 72 | 61 | 62 | 33 | 18 | 270 | 203 | 214 | 6670 | 236 |
| Tunisia | 70 | 73 | 75 | 66 | 50 | 27 | 21 | 124 | 117 | 103 | 7070 | 234 |
| Albania | 69 | 71 | 73 | 64 | 46 | 24 | 14 | 133 | 130 | 116 | 7950 | 208 |
| Dominica | 73 | 74 | 74 | 66 | 18 | 17 | 10 | 169 | 152 | 164 | 8300 | 341 |
| Colombia | 69 | 72 | 75 | 66 | 35 | 26 | 20 | 197 | 163 | 118 | 8510 | 435 |
| Bosnia | 72 | 74 | 75 | 67 | 23 | 17 | 15 | 134 | 127 | 107 | 8620 | 436 |
| Saint Lucia | 71 | 74 | 75 | 66 | 21 | 16 | 15 | 175 | 161 | 144 | 9190 | 330 |
| Macedonia | 72 | 72 | 74 | 66 | 36 | 19 | 11 | 120 | 144 | 116 | 9950 | 439 |
| Lebanon | 66 | 70 | 72 | 62 | 40 | 24 | 13 | 241 | 174 | 160 | 10880 | 411 |
| Costa Rica | 76 | 77 | 78 | 69 | 22 | 13 | 11 | 108 | 100 | 97 | 10950 | 656 |
| Serbia | 72 | 72 | 74 | 65 | 26 | 13 | 8 | 139 | 158 | 138 | 11150 | 475 |
| Bulgaria | 71 | 72 | 73 | 66 | 18 | 16 | 11 | 158 | 160 | 153 | 11950 | 477 |
| Belarus | 71 | 69 | 70 | 62 | 24 | 17 | 13 | 194 | 242 | 221 | 12150 | 528 |

## Among the efficiency models, which are ecologically sustainable?

### *Ecological epidemiology –health-ecology*

The United Nations Conference on Environment and Development in Rio de Janeiro in 1992, agreed to the Rio Declaration[69] recognized the integral and interdependent nature of the Earth, "our home". In its operational framework, the so-called "Agenda 21", chapter 6 identifies – still under the overall strategy to achieve health for all by the year 2000-the links of health with environmental and socio-economic improvements and the need of efforts. It lists a number of areas that overlap with the priority areas identified by the CSDH.70A more in-depth analysis is ongoing under the WHO's health in the Green Economy series71.

#### f. Potential conflict between equity and ecology:

There are dimensions of health-ecology, which require complementary attention to the approaches proposed by social epidemiology and the recommendations and emerging plan of action of the agenda on social determinants for health. These are based on the premise that all ecological factors influencing health can be tackled by equitable social policies and that all policies tackling equity are eco-friendly. However, there are some social policies and/or actions that may lead to income and/or health equity in societies, but damage the ecosystem in which they live. For example, increased and equitable access to cars, transport, energy or heating, may have, under social equitable policies, positive effects on equity, but be based on means of production that are detrimental to the ecosystem. Specific regulation is required for these matters.

### *Concept of intra and inter-generational equity encompassing equity and ecology*

The UNDP development report of 2011[72] focused on the concepts of equity and sustainability, as key principles and requisites fro development. It can be brought down to equity across groups and countries and across generations. The abuse of resources for a group in relation to the rest (inequities) or for a generation, undermining the resources for future ones (un-sustainability = intergenerational inequity), are essential in all policies.

[69] The Conference reaffirmed the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972 and aimed at establishing a new and equitable global partnership to protect the integrity of the global environmental and developmental system. It

[70] the following key program areas (in italics where they overlap with the priority area of the agenda of SDH) : primary health care needs, particularly in rural areas; control of communicable diseases (including the eradication of guinea-worm and polio, and the control of onchocerciasis, measles, water-borne diseases, trematodes, diarrheal, respiratory infection, malaria, tuberculosis and the-then emerging AIDS epidemic); protecting vulnerable groups (especially children, youth , women and indigenous communities); meeting the urban health challenge and reducing health risks from environmental pollution and hazards (listed as urban and indoor air pollution, water pollution, pesticides, solid waste, human settlements, noise, radiations –including the then worrying UV radiations from thinned ozone layer-, energy and industry, and injuries)

[71] It reviews the evidence about expected health impacts of greenhouse gas mitigation strategies in light of mitigations options for key economic sectors71, in order to propose important health co-benefits for health and other sector policy-makers, and for consideration in the next round of IPCC mitigation reviews. So far, the analysis has included housing and household energy71, transport71 and health care facilities71. The potential effects of health and energy-friendly housing (insulation, ventilation, renewable or at least efficient energies for heating, cooking and light, adequate and efficient use/re-use of water and waste), transport (renewable or at least efficient energy-based vehicles, vehicle and alternative transport means) and health facilities (energy and waste considerations, use of ICTs) require new regulatory and financing strategies.

[72] http://hdr.undp.org/en/reports/global/hdr2010/chapters/en/

### *Main conditions and interventions for sustainable health equity (SHE): the link with agro ecology*

Following the Maslow's pyramid, the satisfaction of basic, safety and fulfillment should be planned in a way that is equitable across communities and countries and across generations. In terms of food and water, the evidence seems to show that agro-ecology is the most sustainable and often also efficient way to provide these basic needs[73]. This approach combines the sustainable use of natural resources, through a more equitable access to land and means, and by encouraging social cohesion strategies as cooperative frameworks. This approach decreases also the chemical risks and climate change effects of *food miles*[74]. There is also evidence on the low efficiency of the livestock industry vs. non-animal foods (15 times higher use of water per kilo, 40-200 larger use of land), besides the subjective ethical considerations of animal living and slaughtering conditions).

### *Indicators for sustainable health equity (SHE)*

An indicator could be developed that measures SHE by combining average and dispersion of healthy life expectancy with the sustainability of the economy, measured in carbon emissions or hectare use per capita. The UNDP has been developing indexes that incorporate those two dimensions. In 2010, the multidimensional index of poverty[75] introduces elements of sustainable development by looking at access to water, sanitation and clean energy, besides the previous human development dimensions of health and education. It also screens for the proportion of the population deprived from those basic needs and others such as land and assets. However, the disparities in the society were not looked into. In 2011, UNDP has looked deeper into equitable distributions of health, education and income, and developed the inequity-adjusted human development index. However, the element of sustainability of the overall economic context these factors live on, (as carbon emissions and hectare use per capita), is not included. When a composite index[76] is built introducing carbon emissions as an inverse proxy of sustainability, income inequality as an indicator of overall inequities in society and life expectancy as the average indicators of health, the best performing countries are listed in the following table:

[73] Agro-ecology and the Right to Food", Report presented at the 16th Session of the United Nations Human Rights Council [A/HRC/16/49], 8 March 2011

[74] http://www.adbi.org/files/2008.10.wp118.limitations.food.miles.pdf

[75] The Multidimensional Poverty Index (MPI) identifies multiple deprivations at the individual level in health, education and standard of living. It uses micro data from household surveys, and—unlike the Inequality-adjusted Human Development Index—all the indicators needed to construct the measure must come from the same survey. Each person in a given household is classified as poor or non-poor depending on the number of deprivations his or her household experiences. These data are then aggregated into the national measure of poverty.

[76] http://hdr.undp.org/en/data/build/

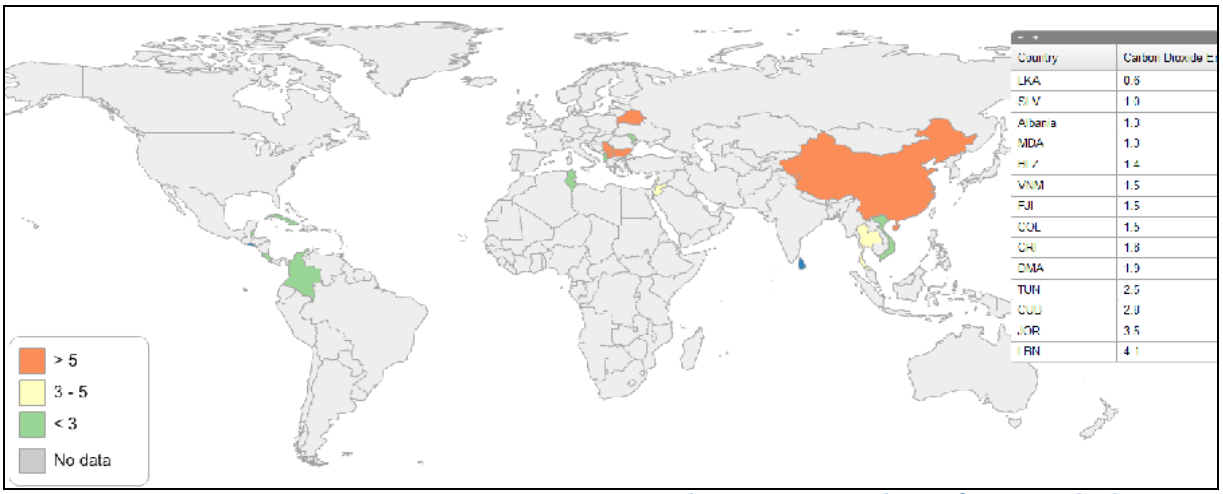



Figure 34 : CO2 emissions per capita in non HIC with HALE, U5M and AM of HIC standards

The result is ten non-HIC countries with HIC regional health standards and sustainable economies in terms of carbon emissions per capita. In order of the efficiency of their sustainable and health economies they are: Vietnam, Moldova, Fiji, Sri Lanka, Cuba, Belize, Salvador, Tunisia, Albania, Colombia and Costa Rica. (in red in table 4)

## What makes the efficient and sustainable models of best health different to others?

None of the 248 indicators reported by WHO shows significant differences between the group of HI countries and the group of efficient/sustainable countries (with similar health indicators but much lower GDP and public health expenditure per capita) concluded above. The same applies to the comparative analysis of the confidence intervals of the 248 WHO indicators between the efficient/sustainable countries and the other countries within the same GDP range (1500 to 11000 GDP) but with health indicators outside the range of the HI countries.
The limited sample and great variation among countries mean high dispersion rates and avoid the detection of statistically significant differences.

There is, however, a correlation among these ten efficient-sustainable healthy countries, between the public spending for health and the level of perceived happiness (higher than average in the ten mentioned countries) and the levels of healthy life expectancy. (See figures 35 and 36).

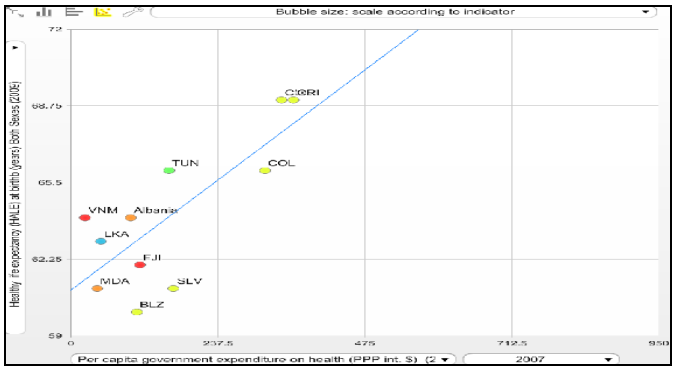



Figure 35 : Healthy life expectancy vs. government expenditure on health

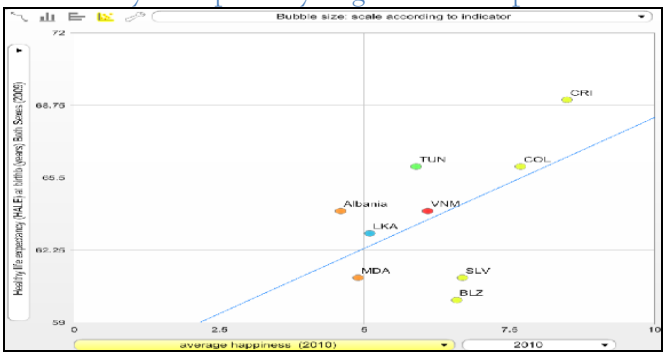



Figure 36: Healthy life expectancy vs. perceived level of happiness

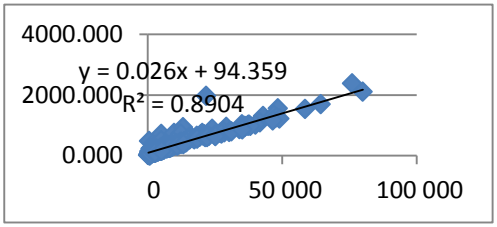



Figure 37: Correlation GDP with GDP cost/HALE gain

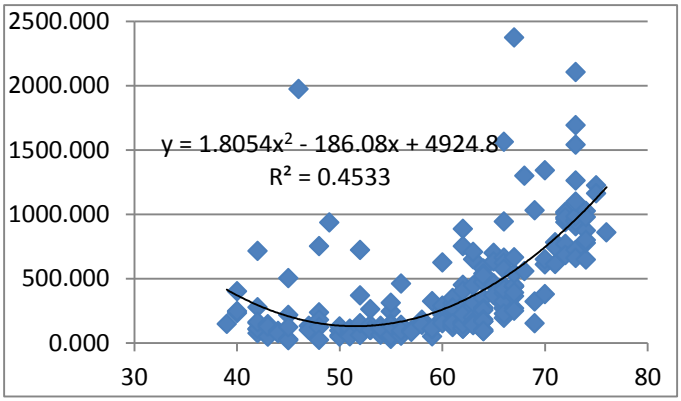



Figure 38: Correlation between HALE and GDP efficiency on HALE gain

Figure 37 shows a strong linear positive correlation between the levels of GDP per capita with the levels of GDP cost per gain on healthy life expectancy. The higher the level of GDP per capita, the higher the cost per incremental year of healthy life expectancy. This relation reflects the fact that at high levels of GDP a progressively higher level of resources for health, and possibly for other dimensions of human wellbeing.

The correlation between the level of GDP cost per gain of healthy life expectancy and the level of healthy life expectancy itself reflects a decreasing trend towards greatest efficiency (lower cost) at the level of 50-60 years of healthy life expectancy and increasing cost per HALE thereafter.

In both correlations, the countries with higher cost per healthy life expectancy gain are those with high HIV prevalence (Swaziland, South Africa, Botswana), oil producing countries (Equatorial Guinee, Khazajstan, Turkmenistan, Russia, Saudi Arabia, Bahrain, Brunei, Arab Emirates, Norway, Angola, Gabon) and those with the highest levels of GDP per capita (Monaco, Luxembourg).

One of the features determining greater health efficiency is the level of public expenditure for health and its efficiency on the gain of healthy life expectancy. Such efficiency of the public expenditure for health is very strongly correlated with the level of public expenditure for health itself: the higher the public expenditure per capita, the higher the incremental cost per extra healthy life expectancy, as figure 39 shows. The same applies to countries with the level of public expenditure for health as those efficient and sustainable models listed in table 4.

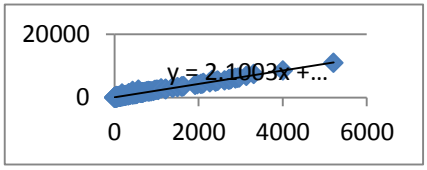



Figure 39: Public health expenditure efficiency (on HALE) vs. levels of PHE

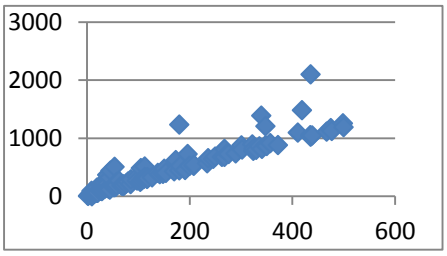



Figure 40: PHE efficiency vs. levels of PHE when < 500 $ pc

## Section II: The burden of Global health inequity

### The concept of equity and health equity

Equality comes from Latin *aequalitatem* (nom. *aequalitas*, from *aequal*, equal), meaning "equality, similarity, likeness". Equity also comes from Latin, in this case from *aequitatem* (nom. Aequitas, from *aequus* "even, just, equal" and relates to "equality" but also to symmetry, fairness". While equality is a mathematical and abstract (but measurable) concept which does not apply to nature where all variables hour their name (with distributions in the populations: variability), equity is a reality check of how fair is the approximation or distance from the impossible equality. Historically, it relates as well to legal, economic and social sciences, whose interpretations of equity are important to keep in mind:

In 1590, equity was used to name a system of law from the 1590s -Roman *naturalis aequitas*- with general principles of justice, which corrected or supplemented the legal codes. Still today *in legal terms*, it relates to the "set of legal principles in jurisdictions that supplement strict rules of law where their application would operate harshly"[77]. Charles Dickens' satirized in the Bleak House of the excessive time and expense associated with suits in equity in 19th-century England.

It was later gradually used in *economics*, where some relate equity to equal life chances regardless of identity to provide all citizens with a basic minimum of income/goods/services. It also refers to ways to increase funds and commitment for redistribution[78]. Economic inequity has often replaced the mathematical concept of inequality and has been measured by various econometric tools such as the Lorenz curve and the GINI index[79], which estimates the cumulative differences across all individuals in a group.

*In education*, equity has been associated with the right to basic functioning literacy and numeracy fairness for all individuals, and in fairness (achievement based upon ability and application)[80].

The dynamics of equity have been seen from many different angles as well. The so-called *equity theory* dates from the early 60s[81] explains the personal satisfaction and that in inter-personal and work-relations through the perception of fair/unfair distributions of resources, relating their inputs in work and the outputs they get.

So, from other disciplines, there are dimensions of equity related to basic –often undefined- minimum and *fair* distribution, which would relate, in the equity theory, to the relations of inputs and outputs.

### What do we understand by health inequity?

In 1992, Whitehead defined health inequity as 'differences in health that are not only unnecessary and *avoidable* but, in addition, *are considered unfair and unjust*'[82]. Whitehead also outlined what may be considered 'unfair' or 'unjust' in terms of restricted choice of healthy lifestyles (e.g. education or information on health hazards), exposure to unhealthy living and working conditions; inadequate access to essential health and other public services and lack of protection –from impoverishment- of sick people.

[77] Glendon MA et al. (2008). Comparative Legal Traditions In a Nutshell, 3rd edition, pp. 142–143. Thomson-West/
[78] Kate Bird 2009. Building a fair future: why equity matters. London: Overseas Development Institute
[79] Joseph L. Gastwirth The Estimation of the Lorenz Curve and Gini Index
*The Review of Economics and Statistics* Vol. 54, No. 3 (Aug., 1972), pp. 306-316
[80] Simon Field ,OECD 2007. No More Failures: Ten Steps to Equity in Education.. Paris: OECD Publishing.
[81] Adams, J.S. 1965. Inequity in social exchange. *Adv. Exp. Soc. Psychol.* 62:335-343.
[82] Whitehead M. 1992. The concepts and principles of equity in health. International Journal of Health Services 22(3): 429–45.

## How can we measure health inequity?

In the 80s, LeGrand[83] and others compared the average population mortality and concluded that health inequality was decreasing worldwide. However, this approach did not take into account the overall increase in life expectancy, which doesn't necessarily lead to a narrower distribution[84]. Several authors have proposed frameworks for measuring health inequity, either across groups[85], through the distribution of healthy lifespan[86] or a combination so as to compare national inequalities across countries[87]. In year 2000, Gakidou et al proposed a way to measure health inequity assessing health life expectancy across individuals[88] [89]. This served as the basis for the World Health Report which analyzed the performance of health systems, including their effect on health equity measured in the above mentioned approach and through a complex statistical formula combining dispersion measures from the mean and among individuals[90].

During the last decade many statistical methods have been proposed. The measurements are based on econometrics related to the Lorenz curve and the inequity space it leaves measured by the GINI index, such as the proportion of total income that would need to be reallocated across the population to achieve perfect equality in income, known as the Pietra index[91]. This has led to various proposals of health inequity cross-sectional or longitudinal measurements known as the "JLN" index[92] and its further adaptations[93].

Several researchers posed some concerns on the methodology which based the assessment of health inequity WHO report of 2000. There are concerns on the validity of the indicators used (DALE or DALY[94]) and on the extrapolation of a very high rate of unavailability of reliable data . Another very important concern is that the pure statistical methods of addressing ("aseptic ") dispersion does not take into account the comparisons between social groups[95] and the effect of variables which systematically may affect the health status..

Moreover, the methods proposed are hard to understand by non-statisticians, and a figure which results from an unintelligible method for most, runs the risk of not raisin the awareness among the society and the policy makers, that inequity and its consequences deserve.

In this context, Braveman and Gruskin[96] have defined equity in health as an *ethical value* grounded in the ethical principle of distributive justice and consonant with human rights principles. In fact, Whitehead's dimensions of unfairness in health are listed in article 25 of the Universal declaration of Human Rights in 1948[97] and further elaborated in the International Covenant of Economic, Social and Cultural Rights in 1966[98] and its specific general comment on health in year 2000[99].

---

[83] LeGrand J. Inequalities in health and health care: a research agenda. In: Wilkinson RG, ed. *Class and health: research and longitudinal data*. London, Tavistock Publications, 1986.

[84] Murray CJL et al. Measuring health inequality: challenges and new directions. In: Leon D, Walt, G, eds. *Poverty, inequality and health*. London, Oxford University Press, 1999 [

[85] Asada Y.A framework for measuring health inequity.J Epidemiol Community Health. 2005 Aug; 59(8):700-5.

[86] Gakidou EE, Murray CJ, Frenk J. Defining and measuring health inequality: an approach based on the distribution of health expectancy. Bull World Health Organ. 2000;78(1):42-54.

[87] Gakidou E, King G.Measuring total health inequality: adding individual variation to group-level differences.Int J Equity Health. 2002 Aug 12;1 (1):3.

[88] E.E. Gakidou; C.J.L. Murray; J. Frenk Defining and measuring health inequality: an approach based on the distribution of health expectancyBull World Health Organ vol.78 no.1 Geneva Jan. 2000

[89] Statistical annex. WHO. The World Health Report 2000. Geneva: WHO, 2000.

[90] World Health Organization The World Health Report 2000: Health Systems: Improving Performance. Geneva. 2000.

[91] Duclos J.-Y.,Arar A (2006): Poverty and Equity: Measurement, Policy and Estimationwith DAD. Springer, Newy-York.

[92]Jones and López Nicolás, 2004 A.M. Jones and A. López Nicolás, Measurement and explanation of socioeconomic inequality in health with longitudinal data, Health Economics 13 (2004), pp. 1015–1030.

[93]Paul Allanson, Ulf-G. Gerdtham, Dennis Petrie Longitudinal analysis of income-related health inequality Journal of Health Economics, Volume 29, Issue 1, January 2010, Pages 78-86e

[94] DALE: Disability Adjusted Life Expectancy, DALY : Disability Adjusted Life Years.

[95] C Almeida, P Braveman, MR Gold, CL Szwarcwald Methodological concerns and recommendations on policy consequences of the World Health Report 2000. The Lancet Vol 357 May 26, 2001

[96] P Braveman, S Gruskin Defining equity in health. J Epidemiol Community Health 2003;57:254–258

[97] See : http://www.un.org/en/documents/udhr/index.shtml#a25

[98] International Covenant on Economic, Social and Cultural Rights . New York, 16 December 1966

[99] CESCR General Comment No. 14: The Right to the Highest Attainable Standard of Health (Art. 12) Adopted at the Twenty-second Session of the Committee on Economic, Social and Cultural Rights, on 11 August 2000

However, values cannot be measured and the specificities of the rights and the definitions and responsibilities of duty-bearers have often not been defined in detail so as to be objectively assessed.
Braveman proposes an *operational definition of equity in health* based on meaningful and measurable criteria: *absence of disparities in health* –health inequalities- (and in its key social determinants) *that are systematically associated with social advantage* (wealth, power, and/or prestige) /disadvantage. This proposed definition would imply addressing/abolishing (towards absence) the associated social disadvantages.
The International Society for Equity in Health somehow moderates that statement defining equity in health as the absence of systematic and *potentially remediable differences* in one or more aspects of health across socially, demographically, or geographically defined populations or population subgroups'[100].
At global level, there have been different approaches to measure the levels and trends of global health inequity. They have been based on the above mentioned "aseptic "statistical analysis of dispersion: they have looked into mortality (1995-2000) dispersion[101] (DMM : dispersion measure of mortality), cluster comparative analysis of regions according to under-5 and adult mortality rates (1960-2000)[102] (identifying variables associated with the differences[103] and the slope index[104] by continents (1950-2005) to show the differences in life-expectancy and their trend in time.
All these analysis and debates nurtured the design and work of the Commission on Social Determinants for Health (SDH). Based on its final report, ("closing the gap in a generation"[105]). The Commission defines health inequity in the following context: "Where systematic differences in health are judged to be *avoidable by reasonable action* they are, quite simply, unfair[106]. So, for WHO, through the mentioned commission, health inequities are those systematic health disparities/inequalities which are *avoidable by reasonable action.*
The questions, therefore, are:

## Which are the systematic disparities that are avoidable or at least reduced?

These considerations are subject to different interpretations and have ideological connotations.
While the statistical approach to measure health inequality may screen for a trend, we need, as Braveman concludes, the operational definition, and hence its measure across variables systematically associated with health inequality. His analysis should include the weight of their relation with health inequality and also their reinforcing effect by multiple causality patterns. This approach will enable the cost-impact analysis and prioritization of actions.
Whichever is the social, political and moral complacency with inequity (translated in lower threshold levels of what is understood by "fair, it is important to measure it and demonstrate its consequences in the lives of those in the lower levels of health also in those apparently gaining but who often would do much better (and not just in relation to health), as Wilkinson and Picket conclude for developed countries.[107].
WHO stated that "it is crucial to firmly document the extent of health inequities and demonstrate that they are *avoidable*, in that there are *plausible* interventions?"[108] One of the three main areas of

[100] Starfield B. 2006. State of the art in research on equity in health. Journal of Health Politics, Policy and Law 31(1): 11–32.
[101] Kath Moser; Vladimir Shkolnikov; David A. Leon World mortality 1950—2000: divergence replaces convergence from the late 1980s, Bulletin of the World Health Organizationvol.83 no.3 Geneva Mar. 2005
[102] J P RugerI, H-J Kim, Global health inequalities: an international comparison *J Epidemiol Community Health 2006;60:928-936 doi:10.1136/jech.2005.041954*
[103] For under-five mortality : levels of extreme poverty, populations living in rural areas, female illiteracy, per capita expenditure on healthcare, use of services, access to safe water, sanitation, and immunisations. For adult mortality: higher prevalence of HIV infection.
[104] The slope index of inequality is the slope coefficient in a simple regression analysis of life expectancy in years against the ranking of the continents
[105] Closing the gap in a generation: health equity through action on the social determinants of health. Commission on Social Determinants of Health Final Report. Geneva, World Health Organization, 2008.
[106] Closing the gap in a generation: health equity through action on the social determinants of health. Commission on Social Determinants of Health Final Report. Geneva, World Health Organization, 2008.
[107] R Wilkinsom, K Pickett The Spirit Level . Why greater equqlity makes societies stronger. Bollombury Press, 2009.
[108] World Health Organization. Equity Social Determinants and Public Health Programmes.Albany, NY, USA: WHO, 2010. p 5

recommendations of the Commission is "measuring and understanding the problem of health inequities and assessing the impact of governmental actions on health"[109].Based on these conclusions, the World Health Assembly of 2009 called upon all member states and the international community to tackle the health inequities within and across countries through political commitment. The Assembly requested also the WHO Director-General to include the reduction of health inequities as an objective of all areas of the Organization's work, especially priority public health programs and research on effective policies and interventions[110].

So what has happened since then?

The Commission on SDH concluded in 8 recommendations[111] , with a reference to the need to stratify health indicators and their determinants, by major variables known to systematically affect health outcomes. The work initiated by the Commission on Social Determinants of Health has been integrated into WHO's Strategic Objective 7 of WHO's Medium-Term Strategic Plan for 2008-2013, namely, "*to address the underlying social and economic determinants of health through policies and programs that enhance health equity and integrate pro-poor, gender-responsive, and human rights-based approaches* ".

One problem is that he baseline of national health inequity was lacking in most countries and that the global trend was not measured and/or agreed upon. Therefore, outcome or impact cannot yet be measured. As a consequence, targets are purely activity (output) indicators of activities as having a strategy, developing a tool, exchanging experiences introducing rights and gender dimensions in norms and standards[112]. Moreover, the WHO interim assessment of the progress of this objective and its targets, of May 2011, is based on subjective rating by member states. So the targets were only outputs and the analysis was subjective.

While we know the baseline data,

## Which would be the target?

Neither the Commission on SDH nor the WHO report, strategic plan or the related resolutions of the World Health Assembly, has dared to propose a target on health equity either at national or at global level. Again, what is "fair equality"?

The Commission on SDH recognizes the weakness on the available proposed indicators and the data available to measure their progress.

As regards the global picture, it states (p 184, recommendation 3): "*further research into ways to measure global inequity and its determinants is needed. It is important to develop targets globally for reduction of health inequities between and within countries, with regular monitoring of progress*".

The analysis hereby presented, tries to contribute to this request.

The comparison of the proposed best health standards (as per CI of the representative sample of the upper upper group's by the stronger variable determining health disparities, i.e. income) with the present situation world-wide, would indicate the global health equity gap.

[109] Closing the gap in a generation: health equity through action on the social determinants of health. Commission on Social Determinants of Health Final Report. Geneva, World Health Organization, 2008.

[110] World Health Assembly of the World Health Organization. Reducing health inequities through action on the social determinants of health. Resolution WHA62.14. Geneva, World Health Organization, 2009:21– 25 (http:// apps.who.int/gb/ebwha/pdf_files/WHA62-REC1/ WHA62_REC1-en-P2.pdf, accessed 20 October 2009).

[111] These recommendations (chapter 16, final report) relate to 1.- improving birth and death registrations, 2.- establishing national health equity surveillance systems (main health outcomes and determinants stratified by relevant variables (gender, income/wealth, education, occupation, ethnicity, residence), 3.- global health equity surveillance system led by WHO, 4.- prioritization of the analysis of SDH in the research 5 health proffesionals' trainning and 6 wider education agendas , 7.- build caoacity in equity-health impact assessments and WHO stewardship role.

[112] See : http://apps.who.int/gb/ebwha/pdf_files/MTSP-08-13-PPB-10-11/mtsp-3en.pdf

## GHE trend and prospects in time

The constitutional objective of WHO aims at the highest attainable standard of health for all.
This objective can be broken down in its two main dimensions: the highest attainable standard of health (world's health advancement), and how does it apply for all (world's health equity).

### Life expectancy

The common feature of better health may be the measure of life expectancy. Figure 1 shows the trend of the estimated life expectancy in the world during the last 50 years. It includes the trend of the highest national health expectancies, the lowest, and the average. It shows how the highest national life expectancy has increased some 10 years in the last 50 years, while the average life expectancy has increased over 15 years of age in the same period, at a quite constant rate of close to 4 months longer lives on average, every year over the last lustrum (or **every three days, Humanity lives on average one day longer**). Over the last 50 years, with some cyclical variations until the 80s, most likely due to data inconsistency, there are not noticeable peaks or lows associated with any social, scientific or environmental event. The lowest national life expectancies have more clear relations with wars or the AIDS epidemic.

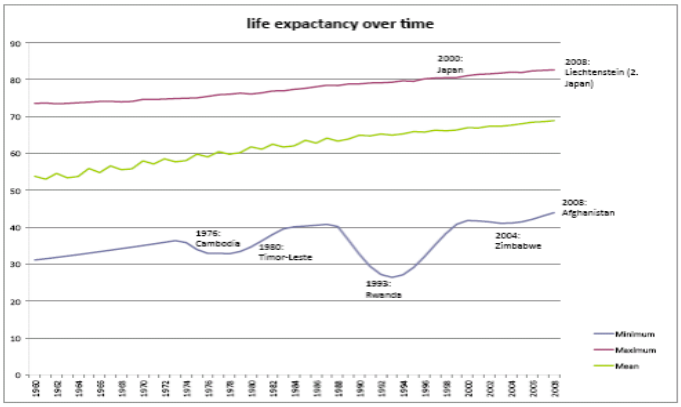



Figure 31: Trend of highest, average and lowest national life expectancies 1960-2010

## Mortality rates

If we want to breakdown this measure of health advancement, into its major components, we may look at the major components which influence life expectancy by early mortality (or survival) and from which there are also historical records across countries: under five and adult (15-60) mortality rates.

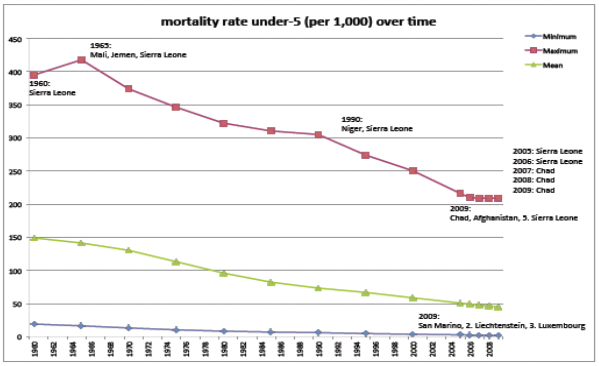



Figure 32: Trend of highest, average and lowest national under-five mortality rates 1960-2010

Figure 2 shows a downtrend in the highest, the average and the lowest national mortality rates under the 5th year of age. Again, the highest (worst) national mortality rates reflect extreme contexts of poverty, in Central and West Africa, with the effects as well of countries in conflicts as Afghanistan. The lowest (best) rates are also correlated with highest wealth measured in GDP pc, although the lowest levels (around 5 per 1000) seem to hit a natural barrier which does not allow much greater reductions in the last decades. The average national under-five mortality rate shows a down-trend but with variations of a greater reduction rate up to the mid-80s, a reduced reduction rate in the last two decades of the last century, and a slightly higher reduction rate after the turn of the century. These fluctuations may correlate with the effects of key primary health care interventions in the 70s, notably the use of Oral rehydration salts and the reduction of mortality due to diarrhoea, the crisis of social spending in many developing countries during the structural adjustment period in the 80s and 90s and its effect on child health, and the boost in lowering under-5 mortality rates in the context of the MDGs and the effect of certain public health interventions as the progress of vaccination coverage or the use of bed nets.

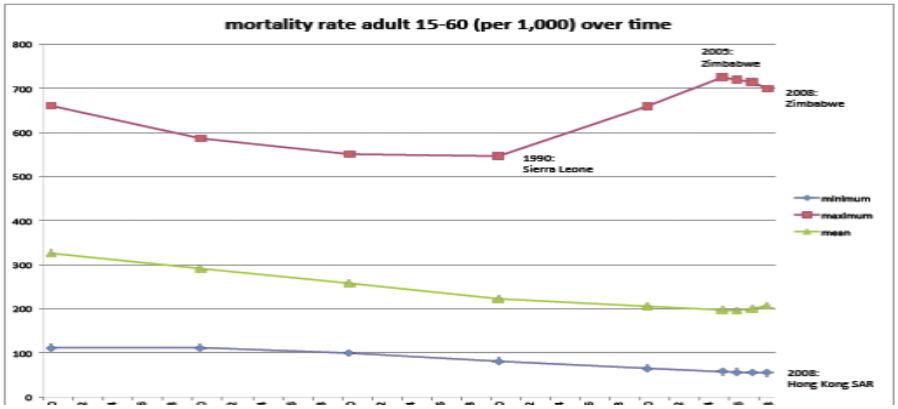


Figure 33: Trend of the highest, average and lowest national adult mortality rates 1960-2010

Figure 3 represents the highest, average and lowest national adult mortality rates in the last fifty years. While highest mortality rates before the nineties were, much in parallel, related to highest under-five mortality rates and poverty, the highest rates since the nineties have taken place in those countries with highest HIV prevalence, with the worst effect of high prevalence, poverty and weakening health systems, in Zimbabwe. The average national adult mortality rate has gradually declined until the nineties and the last decade, where it has increased slightly, due to the impact of AIDS and, as we will later see, the effects of adult male mortality rates rise in ex-soviet republics. The lowest ones experience a slow but constant decrease, which in contrast with under-five mortality rates, seems to still have space for improvement.
One could argue that the highest standards for health have been improving in the last fifty years, reflected in the constant increase of life expectancy and its breakdown reduction of under five mortality and adult mortality in the best performing countries. How have improved living and working conditions, and the advancement of knowledge, translated in that best health "for all"? It seems as if the average of national life expectancy has also shown the gradual improvement, so one could conclude that the "best" health standards have had a "pull effect" for all. When we see in some detail some of the main components of life expectancy, that is, the main age-related premature mortality rates, we see that the average national adult mortality rates have not followed the mentioned "pull effect", and in fact have worsened in the last

two decades. This fact is however "compensated for", by the improvement at a higher rate than the best (lowest) rates, of the under-five mortality rates.
We may need to accept that there are differences in almost any population (human and non-human) variable and those differences cannot be eliminated by a concept of homogeneity. Health, in fact, is the result of hundreds of variables, which also show the natural/statistical dispersion among the population. But the question is: have these unavoidable differences been narrowed? The next section will try to answer that question.

## Inequalities in life expectancy

When looking at the differences by groups of countries, we may see the trend of groups in time and how *the differences* between them are widening or narrowing:

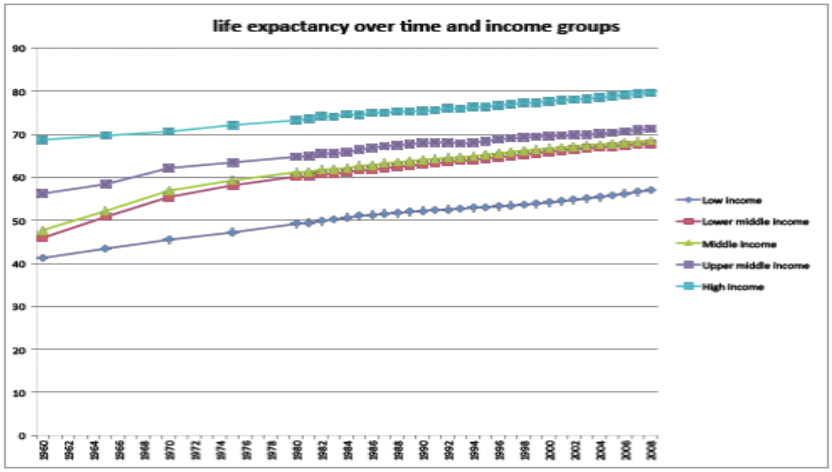



Figure 37: Average life expectancy trend 1960-2008, by income groups

Figure 8 shows how the life expectancy among the five income groups as defined by the World Bank, have progressively increased their average life expectancy. It also shows that during the sixties there was a narrowing of difference between middle and low-middle income with upper-middle income countries, and that thereafter the trend of all regions have run quite parallel with the gaps between them, quite constant.
The graph below shows in more details how those differences have remained quite constant in the last two decades.

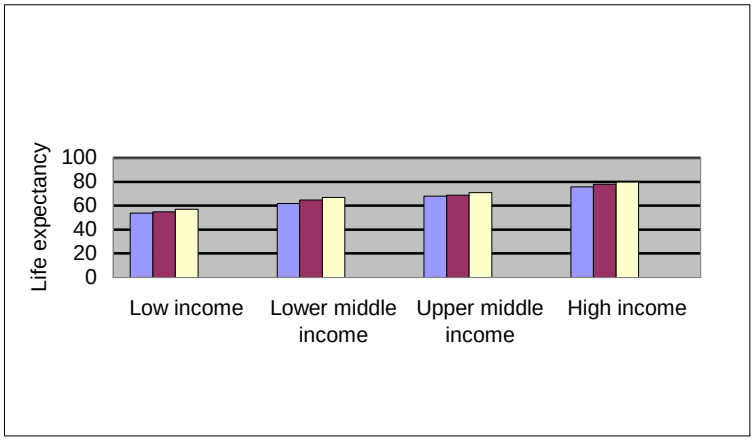



Figure 38: trend in life expectancy across income regions, 1990-2008

By looking at the major elements, analysed in section 1, of life expectancy, that is, under-five mortality and adult mortality, we may unfold their contribution to the gap in life expectancy and their trend in time. **Figure 9 shows the historic trend of under-five mortality by income groups.**

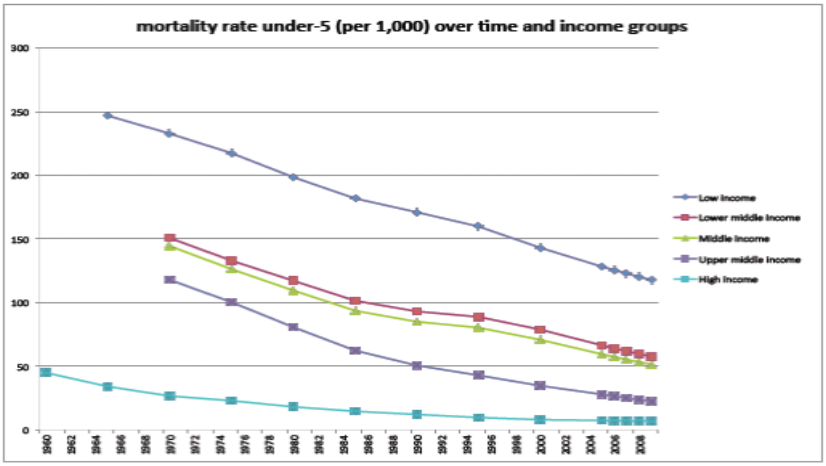



Figure 39: Average under-five mortality by income groups 1960-2008

Under-five mortality rates have gradually decreased across all regions. In the high-income region, as section one showed when looking at the "best attainable standards of health" in the national lowest rates in time, there is a flattening at around 10/1000 with very slow improvements beyond those low levels. The trend in the other lower other regions has continued a higher reduction rate. As a result, there has been a narrowing of the gaps in under-five mortality, especially in the last 30 years.

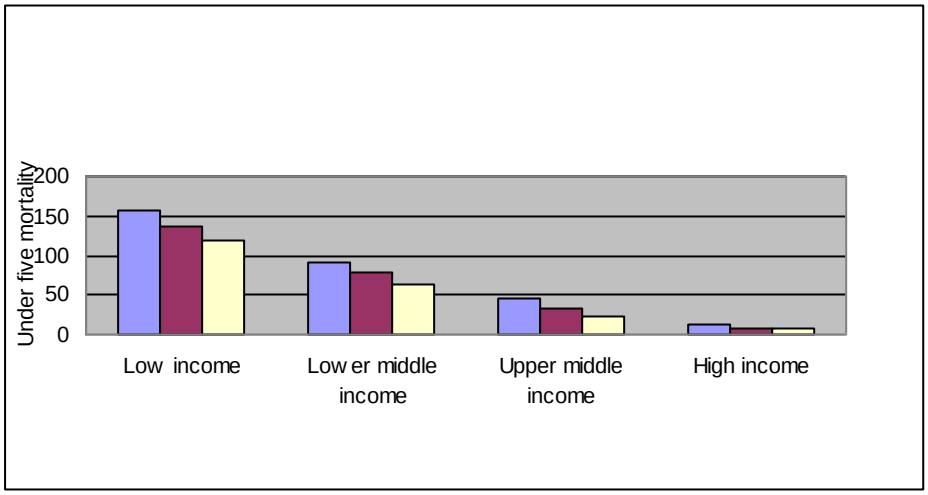



Figure 40: Trend of average under-five mortality rates by income regions, 1990-2008

Figure 10 shows in greater detail that reduction and narrowing effect in the last 20 years. It shows how the gap in under-five mortality has continued to narrow in the last two decades. When comparing the

extremes, the gap between high and low income countries in 1990, the baseline date for MDGs, were 146. In 2008, latest data on under-five mortality in the world health statistics, that gap has been reduced to 111 (a 23% reduction). This reduction in low income countries, however, is far from the MDG target's expected progress by that time.

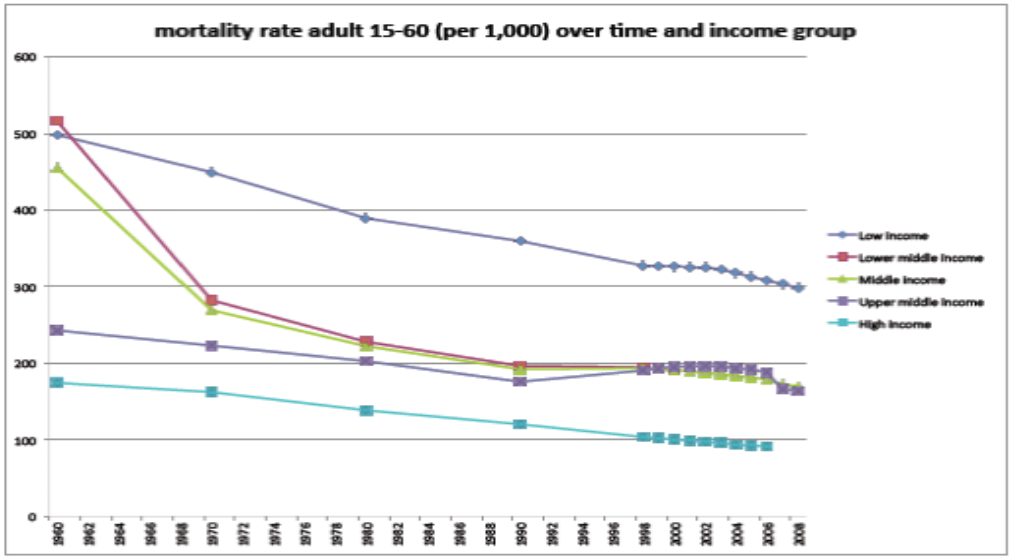



Figure 41: Trend of average adult mortality rates by income regions, 1960-2008

The same analysis for adult mortality is shown in figure 11. The story here is different: the reduction rate of adult mortality in high income countries has not decreased or reached a plateau, as it seems in under-five mortality. The reductions reported in middle and low-middle income countries in the 1960s, were very steep but there are some questions on the consistency of data at that time. After the 1970s, the reductions in all regions were similar and the trends quite parallel.

However, in the 1990s, all middle income countries' groups show a flattening curve, wit stagnant rates or even increasing rates in upper-middle income countries, which in fact, during the first half of the last decade, showed higher adult mortality rates then the rest of middle-income countries.

The detailed analysis of this effect shows that it is due to high increases in adult mortality rates of men in the ex-soviet republics during the last two decades. This effect seems to be reversed after 2005with upper-middle income countries catching up on their expected (in correlation with income) lower mortality rates.

Since the mid-1990s, low income countries experienced also an increase in their average adult mortality rates and this increase begun to be reversed as well in the second half of the last decade. When looking in detail at the main drivers of this "hump" in adult mortality rates in low income countries in the last 15 years, it mainly relates to the increase in countries with HIV sero-prevalence, mainly those in sub-Saharan Africa (although some of them belong to the middle-income regions).

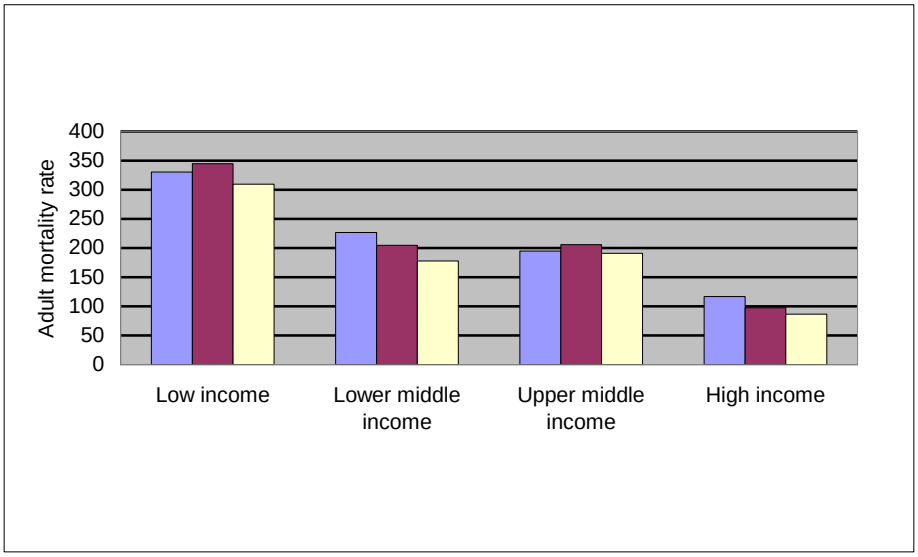



Figure 42: Trend of adult mortality rates by income regions, 1990-2008

Figure 12 shows in greater detail how the gaps between the average adult mortality rates have evolved between income regions. It shows that the average adult mortality rates increased in year 2000 in low income (due to the effects of the HIV/AIDS pandemic) and upper-middle income region (mainly due to the effects of increased male adult mortality rates in ex-soviet republics). The gaps have been therefore shifting and have varied between regions. Even ignoring the –tragic in millions of premature deaths- of the 1990s in low and upper-middle income regions, the gap between high income regions and low income regions has moderately increased from 224 to 233 (4% increase) and in upper-middle income countries from 79 to 104 (31% increase). Low-middle income countries have shown a moderate narrowing of this gap with high income countries (from 110 to 91, 10% reduction).
As figure 13 shows, the comparison between the extremes high and low income regions' average under-five and adult mortality rates, shows a lowering (narrowing) gap in under-five mortality and an increasing (widening) gap (although at a lower rate in the last decade) in adult-mortality rates.

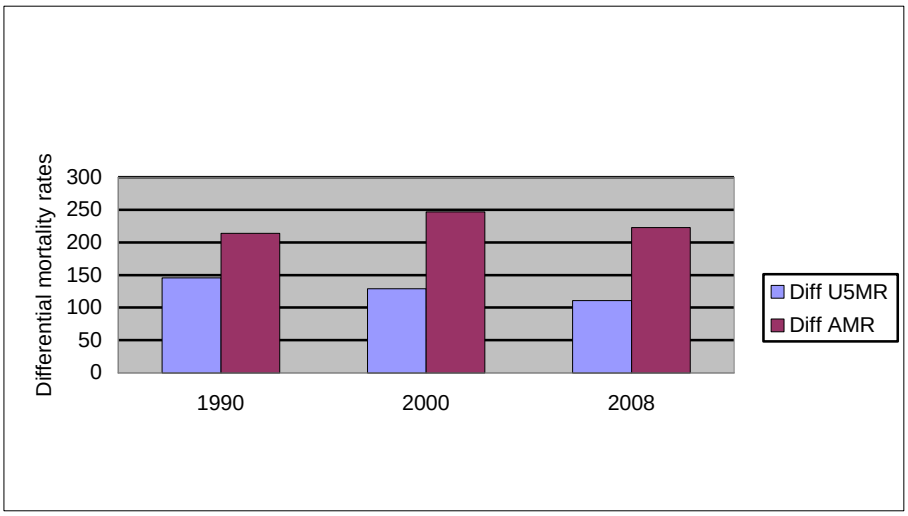



Figure 43: Differential rates in under-five and adult mortality rates between high and low income regions, 1990-2008

The analysis of this section shows that the parallel trends of life expectancy across regions, with a constant gap between them, results from a combination of a narrowing gap in under-five mortality (with reduced rates in middle and low income regions while a reduced reduction rate of the already low rates in high income countries) and a widening gap in adult mortality rates (where the reduction continues in high income countries while low and upper-middle income countries have had increasing rates).

## The mortality burden of global health inequity

What does the stagnant gap between people, countries, and regions in the world mean? Is it unavoidable? Is the balance and/or compromise between advancement and gap required for progress? How would alternative models as today's affect that balance in favor of equity? At what price? What is the opportunity cost of continuing business as usual?

Back to the WHO's constitutional objective of best health for all, what would that be like and how does that compare with the gap analyzed in section 2?

"Best health" can be measured in many ways: we may want to refer to best physical (healthy life years at highest capacity), psychological (subjective feeling of wellbeing) and social (with the very complex dimensions and interpretations of inclusion, cohesion, belonging, desired company and support..). In sections 1 and 2 we have only reviewed data on the physical dimension and only in its quantitative dimension of length of life. The correlation seems strong with resources but at the best in a logarithmic function and with major outliers and disruption factors (as seen with AIDS and with the social breakdown in the post-soviet transition). The psychological and social dimensions of health are probably far less correlated with resources. Indirect signs of that are that the higher rates of suicides in affluent countries and amongst them, higher national income inequalities are correlated with a perception of lower degrees of happiness[113]. Another dimension not included in the WHO definition of health is the sustainability of our lifestyle, and how the price of our health today may be undermining that of future generations. In other words, what is, for instance, the ratio between our health and wellbeing and our carbon footprint? Some studies have shown that only one country in the world (Cuba) has a Human Development Index above 0,8 (80%) and a rate of carbon foot print which would be sustainable at global level[114].

Another group of questions emerge from the standard to be compared with. Would it be the person living a longer, happier and more socially productive life? Or would it be the population group or the country with best indicators? Or should we use just the best regional average?

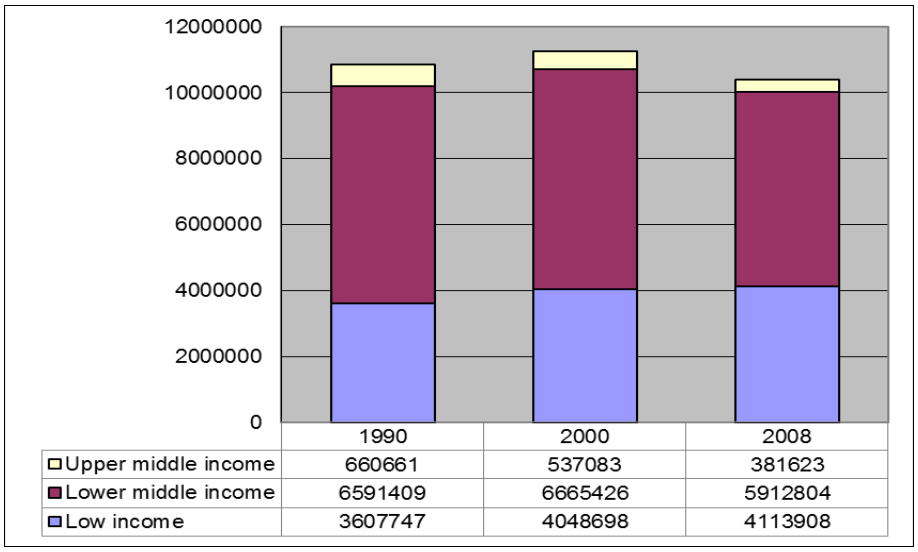
Obviously, the more limited is the dimension of best health we look (or can look) at, end the wider is the reference group we take as best standard, the higher the underestimate of the theoretical gap and its measure in ill-health.

The following analysis is an attempt to measure the burden of the health gap in the world (failure to comply with the world's health objective "for all"). Given the availability of data in time, and in order to allow for geographic, genetic and epidemiological variability, it compares the present situation with the best regional (by income regions) indicators. The indicators used are the under-five and adult mortality rates. The deaths in these two population groups amount to 93% of all deaths under 60, which is the approximately the age below the confidence interval ($p < 0,05$) of the life expectancy in the reference high income region (average 70, standard deviation 5,77).

By applying the under-five mortality rates and the adult mortality rates of the (best) reference regional average (high income region), to the rest of the total world's population, we would get the number of at deaths in under 5s and in 15-60 years of age, that would take place if these best regional rates would

[113] R Layard, Happiness. London : Allan lane, 2005.
[114] World Wide Fund, Living Planet report 2006. Gland, Switzerland: WWF International, 2007.

apply "for all". By comparing that figure with the present world statistics, we estimate the excess number of deaths due to the health gap (under) estimated only from mortality and from these two age groups[115]. Given that the assessed differences relate to the income (resources), we call the results of this analysis "inequity death toll", reflecting the fact that the uneven distribution of resources (income) related to needs (greater health risks and higher burden of disease) –that is inequity-, is the cause underlying the results hereby presented.




| | 1990 | 2000 | 2008 |
|---|---|---|---|
| Upper middle income | 660661 | 537083 | 381623 |
| Lower middle income | 6591409 | 6665426 | 5912804 |
| Low income | 3607747 | 4048698 | 4113908 |

Figure 45: Inequity deaths in under-fives by other-than-high income regions, 1990-2008

Figure 45 shows the results of the inequity death toll (IDT hereafter) in under-fives by other-than-high (reference) income regions and from 1990 to 2008. The graph reflects an IDT for children under-five of 10,86 million 1990, 11,25 in 2000 and 10,4 in 2008 who would have not died, had the best regional under-five mortality rates applied "for all". This total number differs from the trend in differential rates shown in figure 13, and is due to the combination of the effect of differential rates and the shifting demographics of the populations.
Figure 15 shows that the IDT for adults of 15 to 60 years of age is of 7,2 million in 1990, 8,91 in year 2000 and 8,92 in year 2008. As in under-fives, these figures are not in full correlation with the differential rates in figure 11, due to the evolving demographic dynamics also in this age group.

[115] Adjusting to the remaining groups of excess deaths would imply increasing 6,12 % of that figure for the deaths in the 5-15 period and the differences in the distribution of deaths in the over-60 population (data not available for all countries and regions).

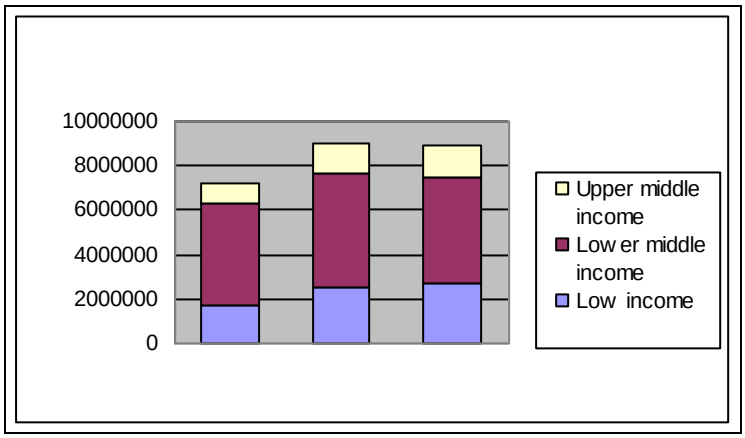



Figure 46: Inequity death toll in adults 15-60 years of age by income groups, 1990-2010

Figures 47 and 48 show the aggregate IDT for under-fives and for adults 15-60 years of age and their breakdown by age-groups and by income regions, in the period 1990-2008. They reflect the fact that the total IDT has remained quite constant in the last two decades, between 18,11 million in 1990, an increase (12%) to 19,32 million in year 2000 and slight (5%) decrease in 2008 to 18,96 million. These figures also reflect an increase in the share of IDT by adult deaths (from 39 to 46%) and in the weight of the IDT from low-income countries (from 29 to 35%, despite being only 17% of the population of non-high income regions).

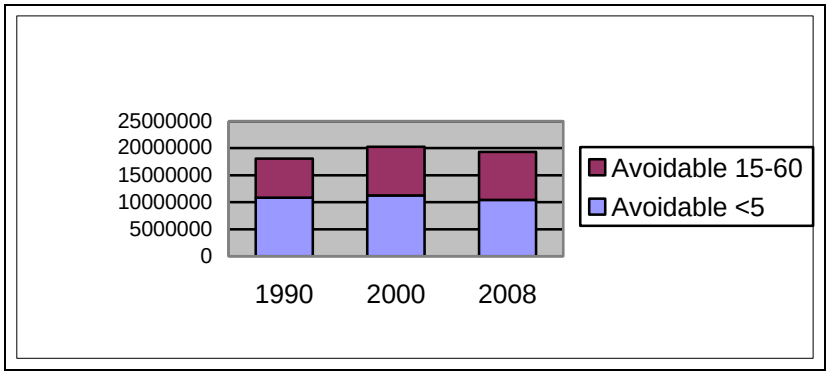



Figure 47 : IDT by age groups (under-five and adults), 1990-2008

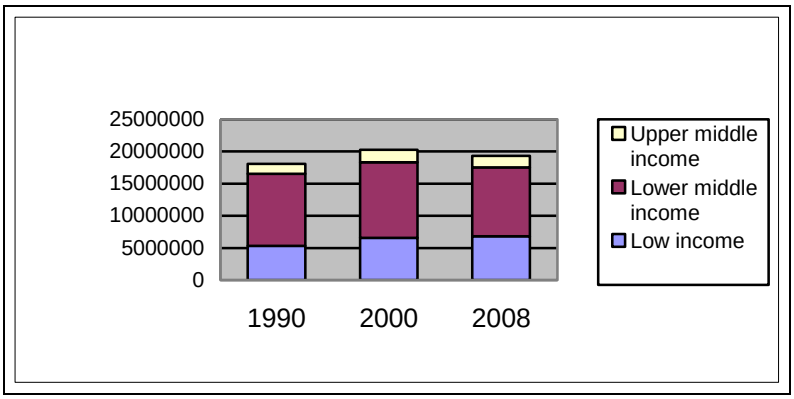



Figure 48: IDT by income regions, 1990-2008

The figure of , at least, some **20 million people dying every year (over 54,000 per day) due to global health inequity** is what we should have in mind when moving towards the "for all" (equity) dimension of the shared objective in global health. This means that **one in three of all annual deaths in the world** (world deaths in 2008, 58 million), **would be avoidable** if there was health equity across income regions.
This figure may be questioned as it is not related to the population, and demographic growth could mean that while the net figure is quite stable, the relative value in relation to a growing population is on the decrease. While the world's population has increased from 5,1 Billion in 1990 to 6,7 Billion in 2008, the total number of deaths has not evolved in the same way due to a growing share of the population under-18, due to the effect of population growth in low and middle income countries (with significant exceptions like China). Figure 18 represents the proportion of inequity deaths from the total of deaths in the world, as reported by the Population division of the UN department of Economic and Social affairs[116] :

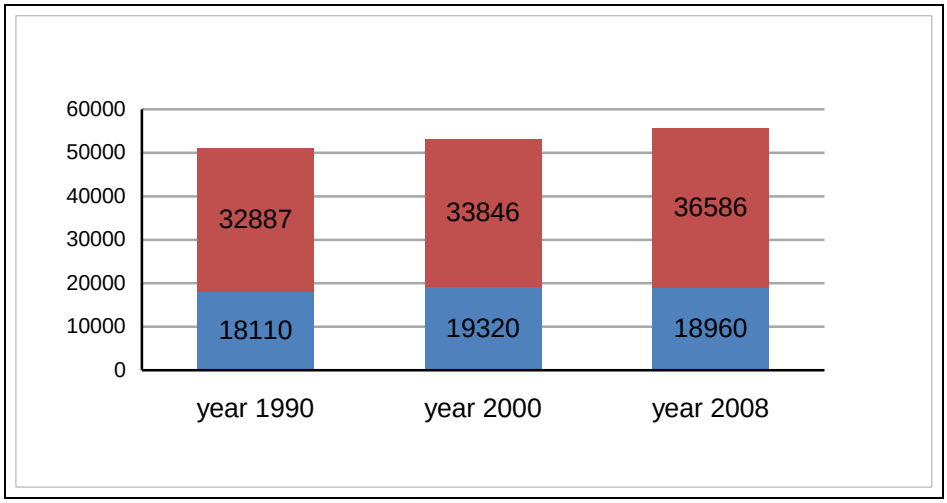



Figure 49: Share of IDT in the world, 1990-2008

The analysis shows that worldwide, there was an increase in the share of deaths due to inequity during the 90s and that there has been a slight reduction of that share during the last decade. Still, more than one in three deaths are due, according to the analysis hereby made, due to global health inequity.
Figure 19 represents the proportion of total deaths in specifically in the groups of under-fives and in adults 15-60 years, which are due to the burden of the IDT, in the breakdown of non-high income regions. It reveals that the proportion is above 80% in low income countries, over 60% in low-middle income countries and over 50% in upper-middle income countries, with a trend that shows increase in this share from 1990 to year 2000 and stagnant or moderate decrease during the last decade. This IDT share in premature deaths, is more significant measure of the effect of global inequity in the ill health and burden of mortality of a given country or region.

[116] http://esa.un.org/unpd/wpp/Excel-Data/mortality.htm

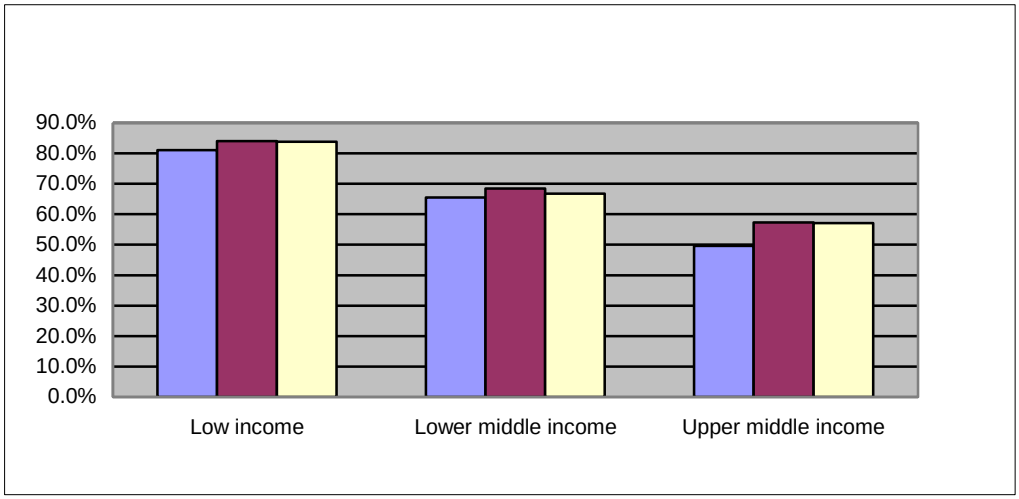



Figure 50: % of under-five and adult deaths, due to global health inequity, by income regions. 1990-2008

## Inequalities in burden of disease

### *Distribution of diseases and their burden of ill health by income regions*

The relative burden and combination of unmet health needs (their main categories and specific needs) varies across income regions. This is reflected in the spectrum of health problems, as shown in the following table:

Table 5 : Figure 41: Distribution of diseases by income regions

| Cause | WORLD | LICs | LMICs | UMICs | HICs |
|---|---|---|---|---|---|
| Maternal conditions | 0.32% | 0.61% | 0.16% | 0.11% | 0.04% |
| Peri-natal conditions | 1.46% | 2.79% | 0.73% | 0.43% | 0.12% |
| Nutritional deficiencies | 0.36% | 0.62% | 0.22% | 0.22% | 0.06% |
| Infectious diseases | 3.89% | 7.53% | 1.40% | 3.10% | 0.38% |
| NCDs -MH/Injuries | 8.09% | 7.96% | 8.33% | 9.06% | 7.30% |
| Neuropsychiatric disorders + self injuries | 3.26% | 3.23% | 3.16% | 3.49% | 3.47% |
| Injuries | 2.31% | 2.96% | 2.22% | 2.13% | 0.76% |
| Total | 19.69% | 25.69% | 16.21% | 18.55% | 12.14% |

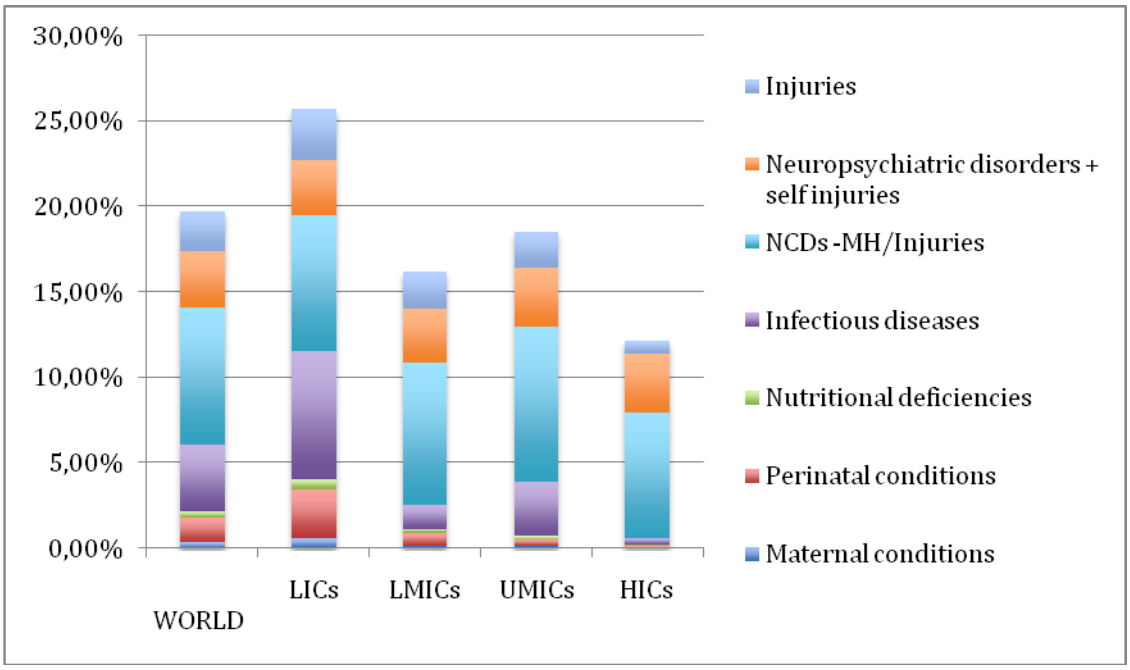


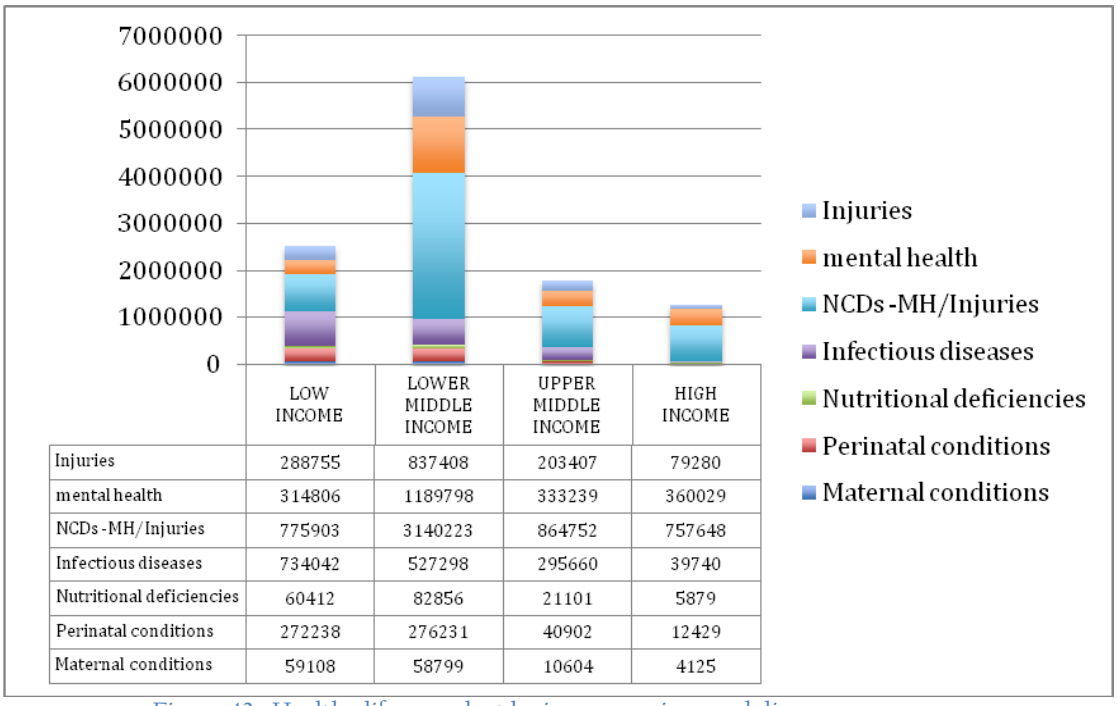

Figure 42 : Graphic representation of disease groups by income regions

If (as developed below in the section of global health equity), we compare the best regional health standards, those of the high-income region, with the rest of the world, the following table shows the excess burden of disease by no-HIC region and disease group:

Table 6 : Percentage of life years lost by income region and disease group

| | Maternal conditions | Perinatal conditions | Nutritional deficiencies | Infectious diseases | NCDs - MH/Injuries | mental health | Injuries |
|---|---|---|---|---|---|---|---|
| LICs | 0.57% | 2.67% | 0.56% | 7.14% | 0.65% | -0.24% | 2.20% |
| LMICs | 0.12% | 0.61% | 0.16% | 1.02% | 1.02% | -0.32% | 1.46% |
| UMICs | 0.07% | 0.31% | 0.16% | 2.72% | 1.76% | 0.02% | 1.37% |

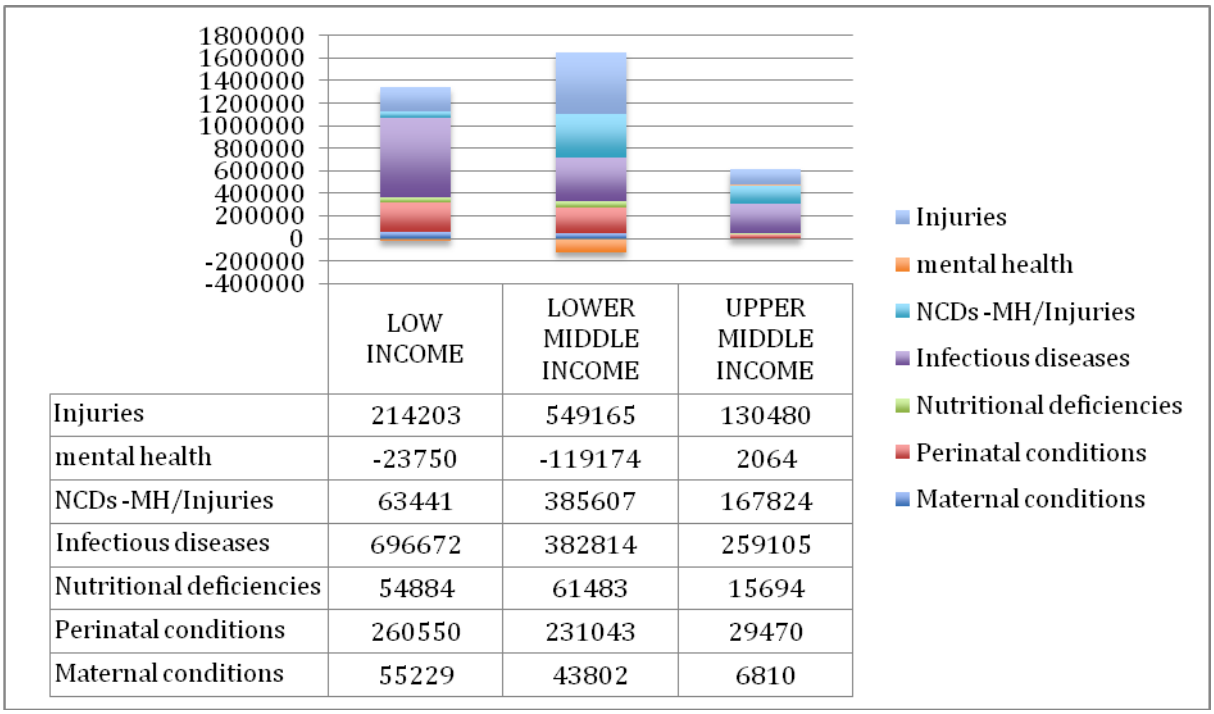
The following figure shows those relative levels of burden of disease, in absolute terms given the different population weights of the income regions:




| | LOW INCOME | LOWER MIDDLE INCOME | UPPER MIDDLE INCOME | HIGH INCOME |
|---|---|---|---|---|
| Injuries | 288755 | 837408 | 203407 | 79280 |
| mental health | 314806 | 1189798 | 333239 | 360029 |
| NCDs -MH/Injuries | 775903 | 3140223 | 864752 | 757648 |
| Infectious diseases | 734042 | 527298 | 295660 | 39740 |
| Nutritional deficiencies | 60412 | 82856 | 21101 | 5879 |
| Perinatal conditions | 272238 | 276231 | 40902 | 12429 |
| Maternal conditions | 59108 | 58799 | 10604 | 4125 |

Figure 43 : Healthy life years lost by income regions and disease groups

When we apply the same population weights to the excess burden of disease when compared with best (HIC) regional health standards, the following graphs show the share of excess burden of disease by regions and disease groups:




| | LOW INCOME | LOWER MIDDLE INCOME | UPPER MIDDLE INCOME |
|---|---|---|---|
| Injuries | 214203 | 549165 | 130480 |
| mental health | -23750 | -119174 | 2064 |
| NCDs -MH/Injuries | 63441 | 385607 | 167824 |
| Infectious diseases | 696672 | 382814 | 259105 |
| Nutritional deficiencies | 54884 | 61483 | 15694 |
| Perinatal conditions | 260550 | 231043 | 29470 |
| Maternal conditions | 55229 | 43802 | 6810 |

Figure 44 Excess burden of disease (compared to HICs) by income regions and disease groups

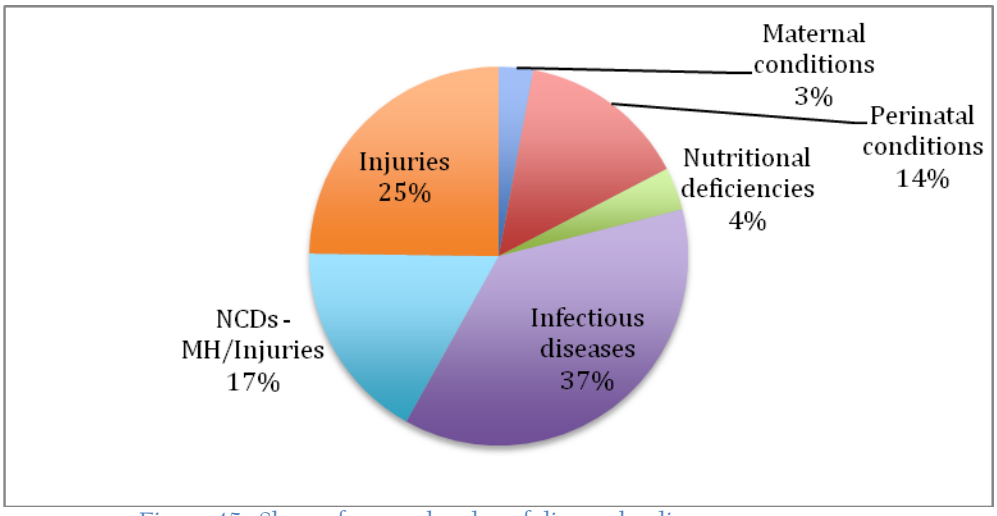
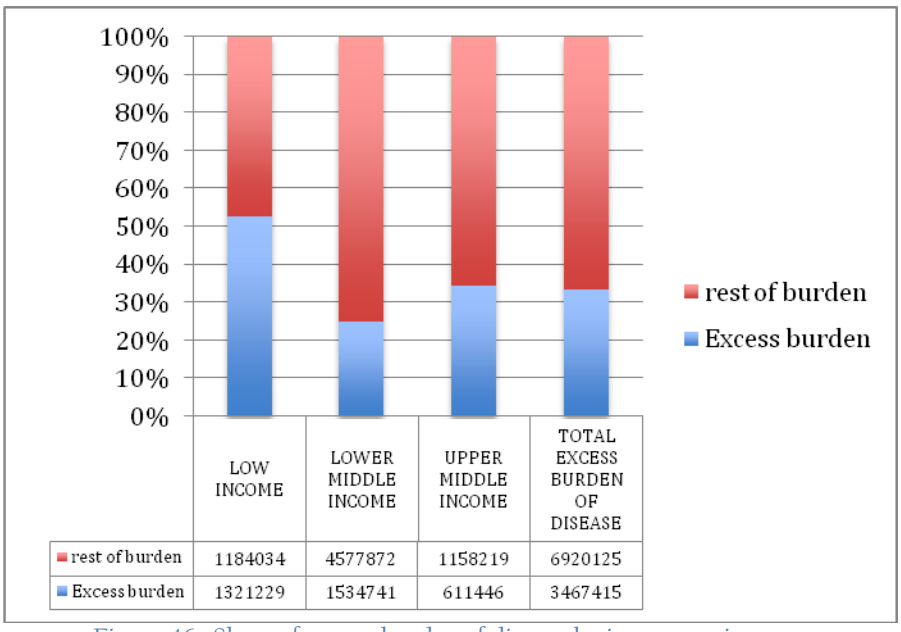



Figure 45 : Share of excess burden of disease by disease groups

And the last graph shows the absolute figures and share of excess burden of disease from the overall burden of disease when compared with the high-income region:




| | LOW INCOME | LOWER MIDDLE INCOME | UPPER MIDDLE INCOME | TOTAL EXCESS BURDEN OF DISEASE |
|---|---|---|---|---|
| rest of burden | 1184034 | 4577872 | 1158219 | 6920125 |
| Excess burden | 1321229 | 1534741 | 611446 | 3467415 |

Figure 46 : Share of excess burden of disease by income region

The results above show that one third of the burden of disease in non-high income countries is due to excess ill-health when compared with the health status of the high income region. This is over half of the burden of disease, in low-income countries.

As regards of the burden of disease, including premature deaths (as compared with best standard, Japan) and the disability caused by non-lethal conditions, the availability of data is more limited. Besides, the limitations (see last section in this chapter) are, many fold. However, with the available data, the burden of disease shows a reduction of some 0,7% annually, higher in low income countries (0,9), lower in low

middle income and high income (0,3) and negative (increased burden) in upper middle income countries. This might be explained by the reduction of under five mortality in LICs, with greater weight in burden of disease through life years lost and by the increased adult morbidity and mortality (especially male) in ex-soviet republics in UMICs.

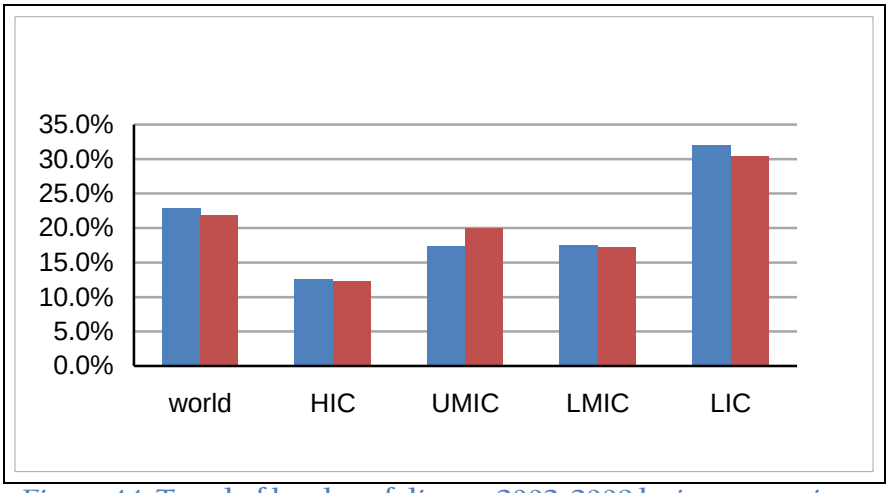



Figure 44: Trend of burden of disease 2002-2008 by income regions

## GHE Lag time

The lag time for each non-high income group between the baseline levels and the time they reach the baseline levels of the high-income group, represents the delay of equity that translates in excess mortality and avoidable deaths. From the baseline levels of 1990 and at the present trend, the lag time would only lead to the 1990 baseline levels of HICs under five mortality rates by 2020 for upper middle income countries, 2050 for low middle income countries and by 2065 for low income countries. In the case of adult mortality, those delays would reach 2035 for middle income countries (here the trend for upper middle income countries, given the "hub effect" in 2000 from the soviet collapse, is difficult to assess) and up to year 2200 for low income countries.

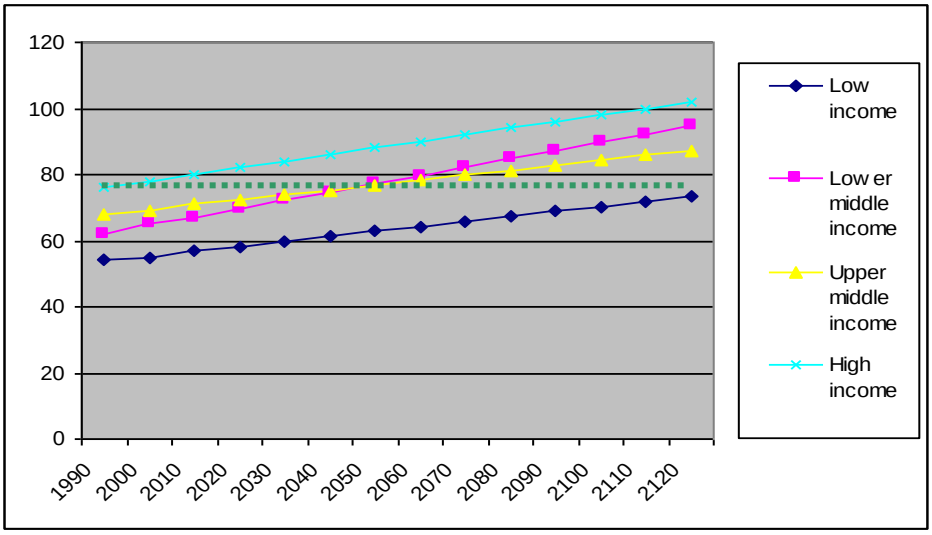



Figure 47 : Lag time of life expectancy by non-high income regions.

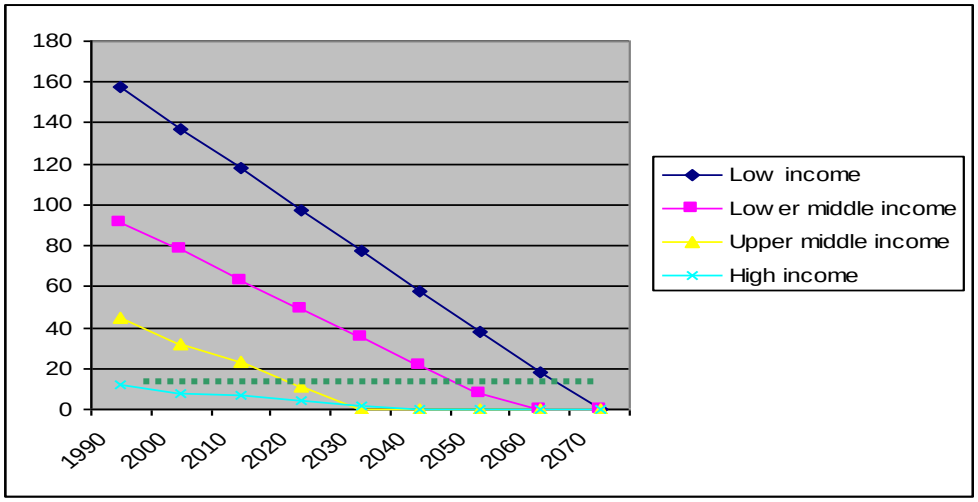



Figure 48: lag time by non-high income region for under five mortality.

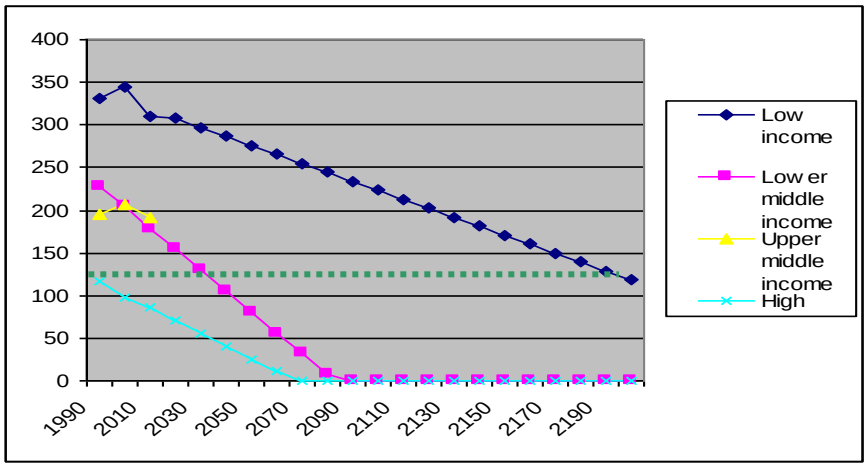



Figure 49: lag time by non-high income region for adult mortality

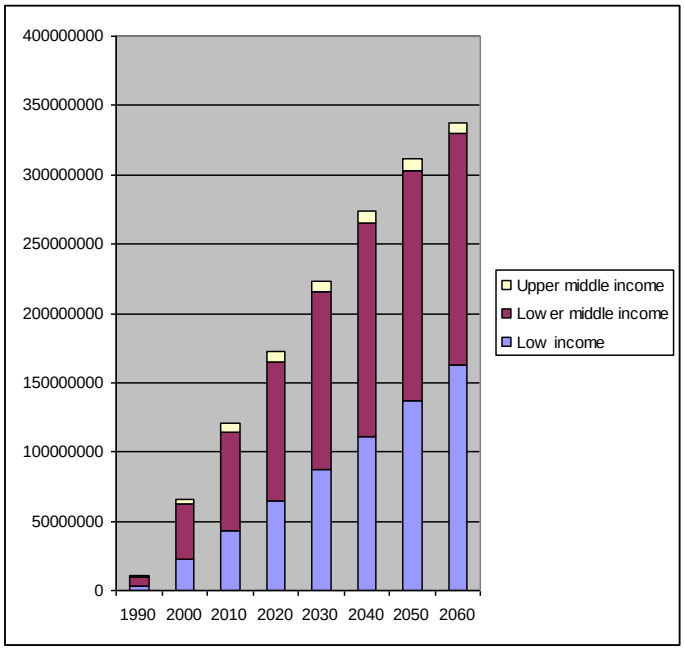



Figure 50 : cumulative avoidable child deaths by current framework of health inequity

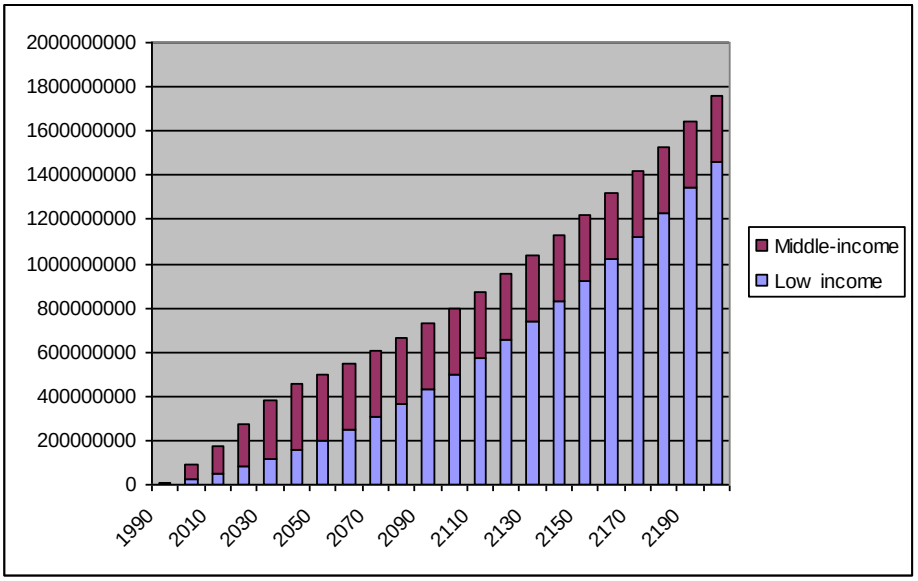



Figure 51 : Cumulative excess adult deaths by present framework of health inequity

At the level of –yet decreasing- excess mortality rates and during the lag time described above (up to 2065 for child deaths and 2200 for adult deaths), the cumulative deaths for children under five is close to 350 million Euros and the cumulative deaths for adults close to 1800 million (given the much longer lag times, especially for low income countries. Such fact leads to a growing share of adults deaths of the overall excess mortality due to global health inequity.

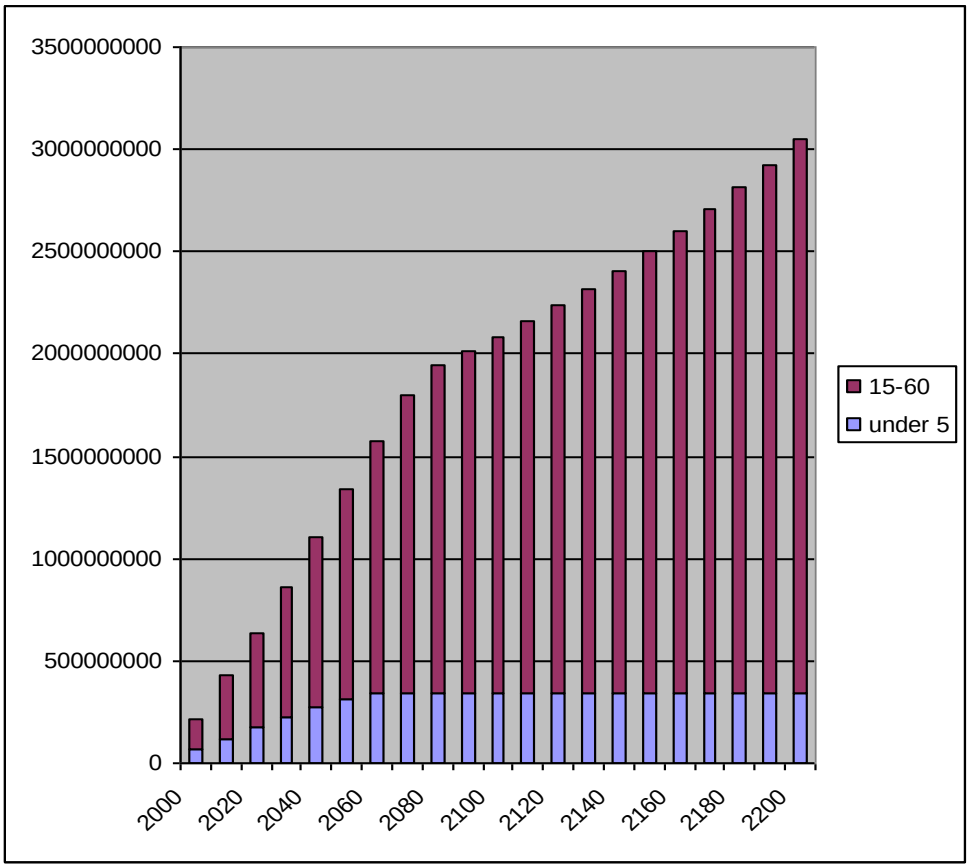



Figure 52 : Excess cumulative deaths due to global health inequity, by age groups

## The dilemma of progress vs./and Equity

In comparison with the above-mentioned trends and estimates of cumulative excess mortality due to global health inequity, the effect of progress in reducing –yet in parallel, maintaining inequity gaps- mortality rates and increasing life expectancy, can be estimated and projected in time, in deaths avoided by the effect of progress. At the present trend, progress would gradually eradicate adult mortality (under the age of 60) in high income countries by 2055, in middle income countries by 2085 and in low income countries by 2130 (see figure 53). Such eradication would be reached earlier for under-five mortality: 2020 in high income countries, 2050 in middle income countries and 2070 in low income countries (see figure 54). The cumulative number of deaths avoided by progress would increase to reach a plateau of some 40 million at the end of the century. The breakdown of lives saved by income regions reflects a large share in middle income countries and by age groups in adult mortality.

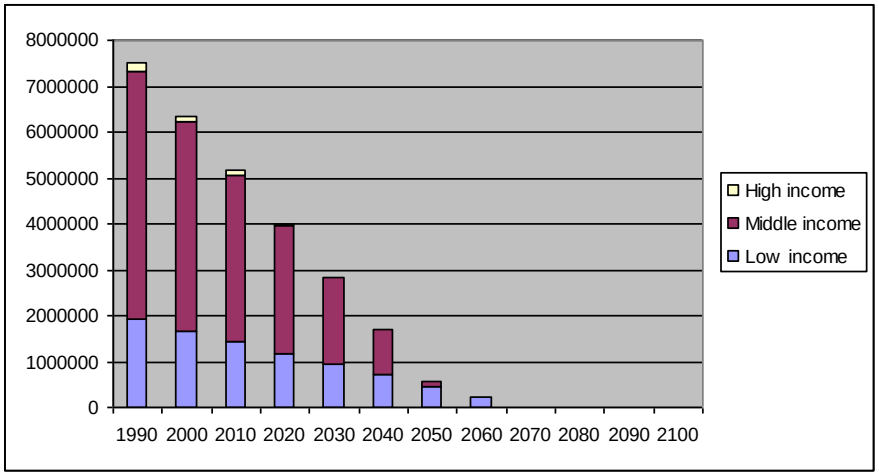



Figure 53: Prospects of impact of progress at present rate, in reducing children deaths

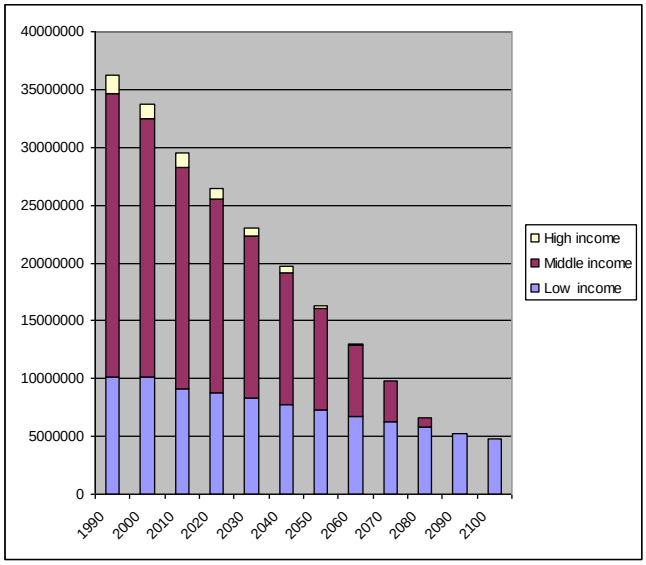



Figure 54: Prospects of progress (with inequity) at present rate, of impact in reducing adult deaths

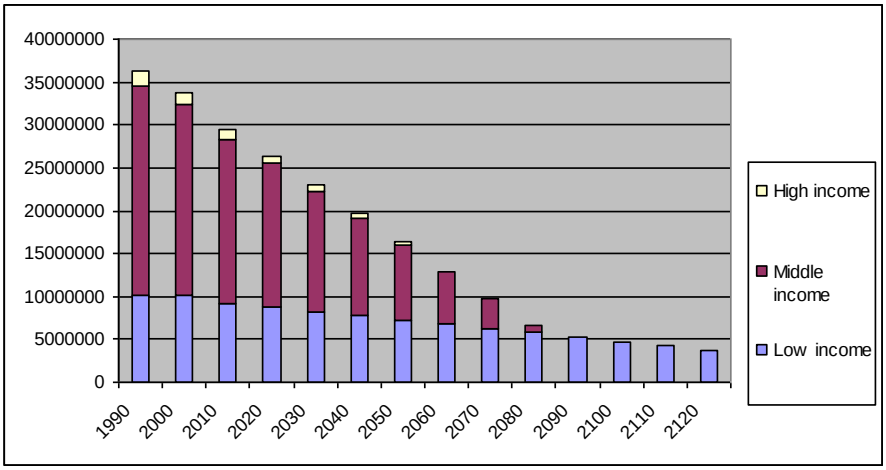



Figure 55: Prospects of progress (with inequity) in reducing premature (<60) mortality

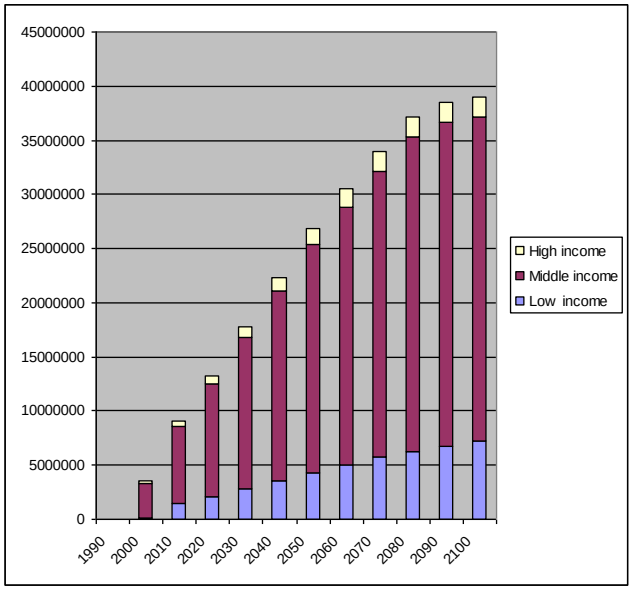



Figure 56: Overall prospects of annual number of lives saved by progress, by income region.

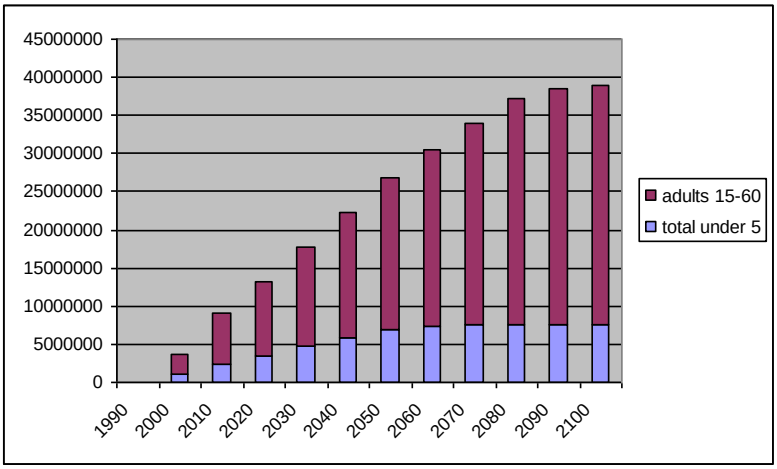



Figure 57 : Overall annual number of lives saved by progress, by age group.

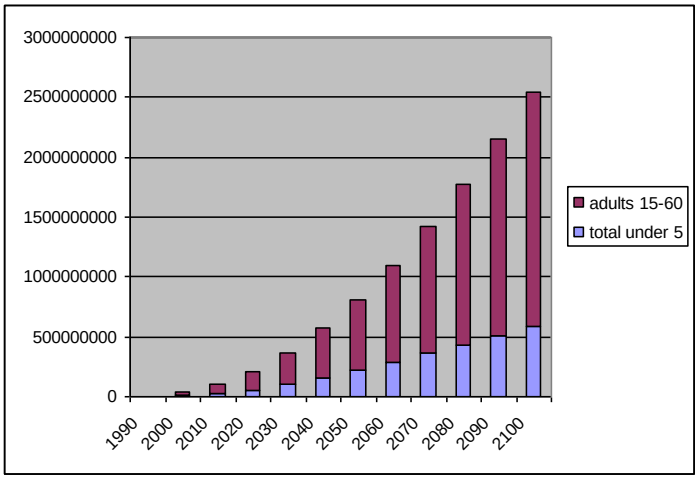



Figure 58 : Overall cumulative number of lives saved by progress, by age group.

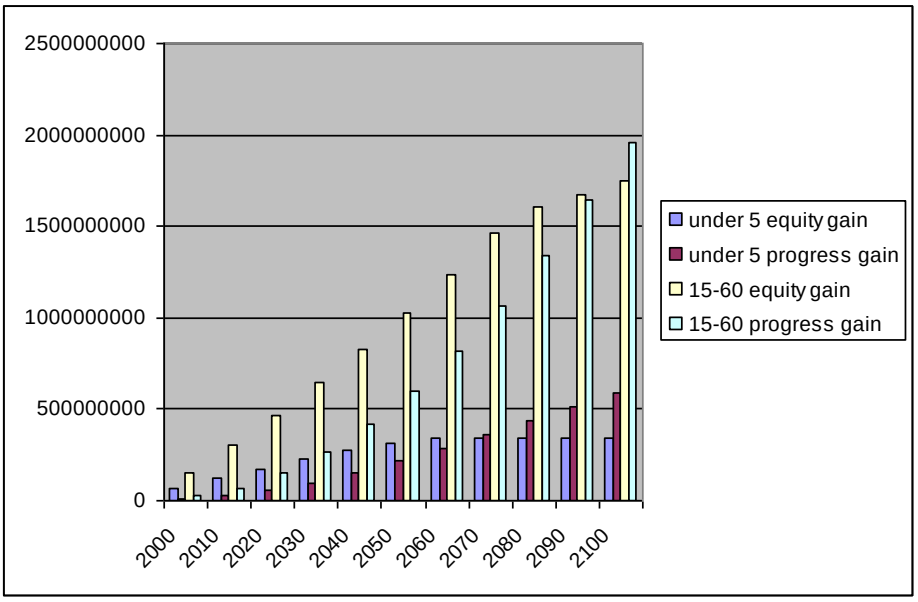



Figure 59: Estimated impact of equity vs. progress on lives saved in XXIst century.

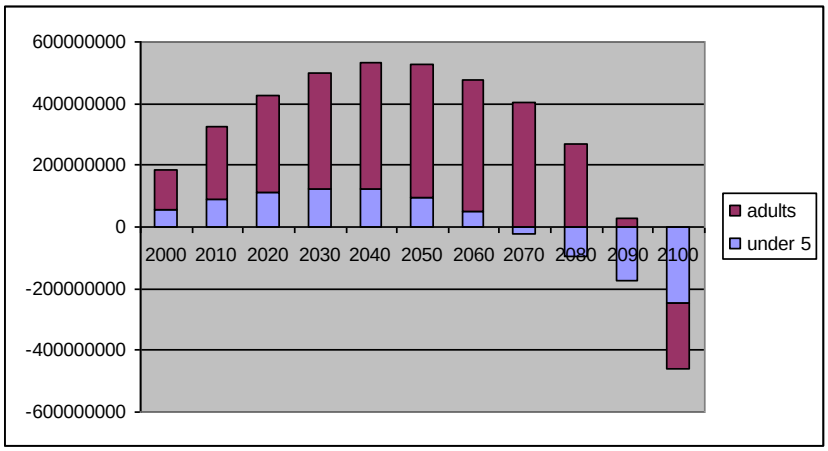



Figure 60: Balance of equity impact over progress impact, on lives saved

The comparison between the effects of preventing avoidable deaths by the present model of progress with no equity, with the theoretical alternative of equity with no progress can be modeled, as figure 59 shows. The estimates of the lives (children and adult) which would be saved by either model, reflects that the effect of progress (which would remain in time) would overcome the potential effect of equity (which is neutralized by time when baseline standard levels are met) after 2070 in child deaths and in 2100 in adult deaths.

## The geographical distribution of global health inequity

The distribution of life years lost due to global health inequity reflects, as figures 61-63 show, a reduction over the last 20 years in most of Latin America, while a worsening effect in Southern Africa (due to AIDS) and in Russia (due to the collapse of the Soviet Union).

In terms of healthy life years, (see figures 64-66) the distribution by sexes in 2007 points at worse health in men in Brazil and Russia, and an overall major loss of healthy life expectancy in sub-Saharan Africa.

## Life years lost

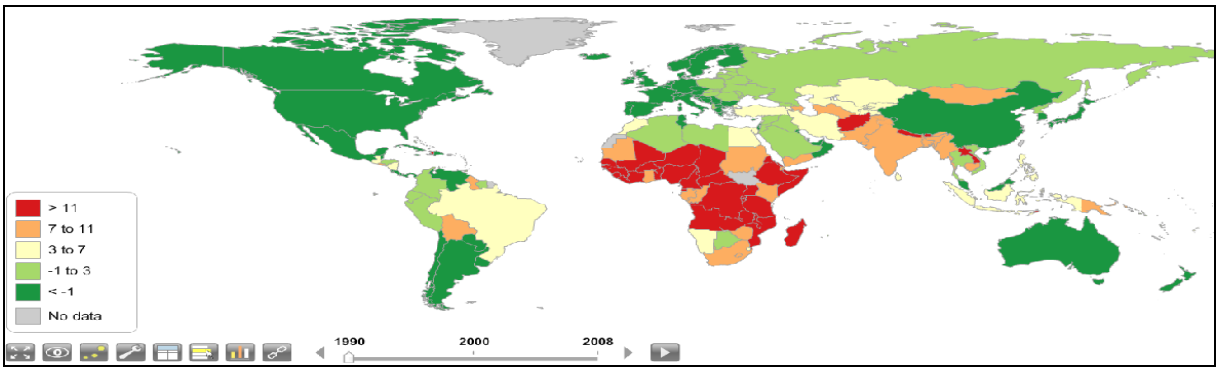



Figure 61: life years lost due to global health inequity, 1990

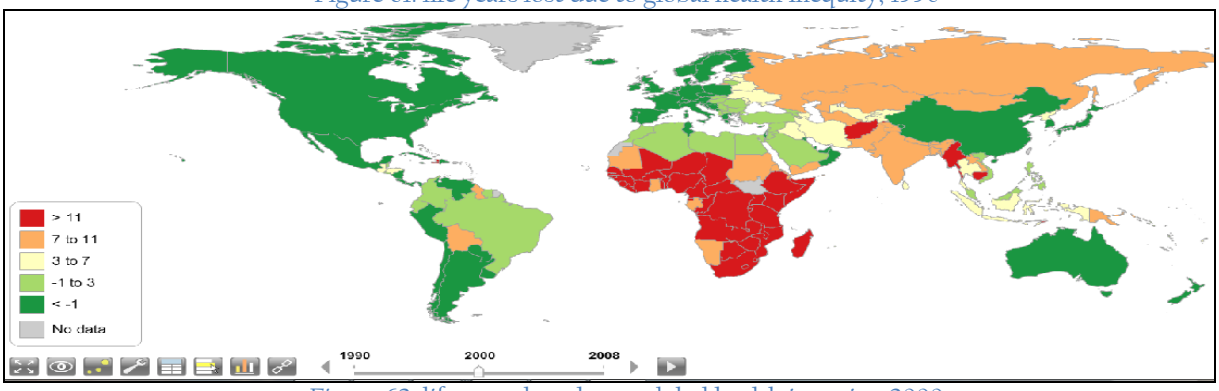



Figure 62: life years lost due to global health inequity, 2000

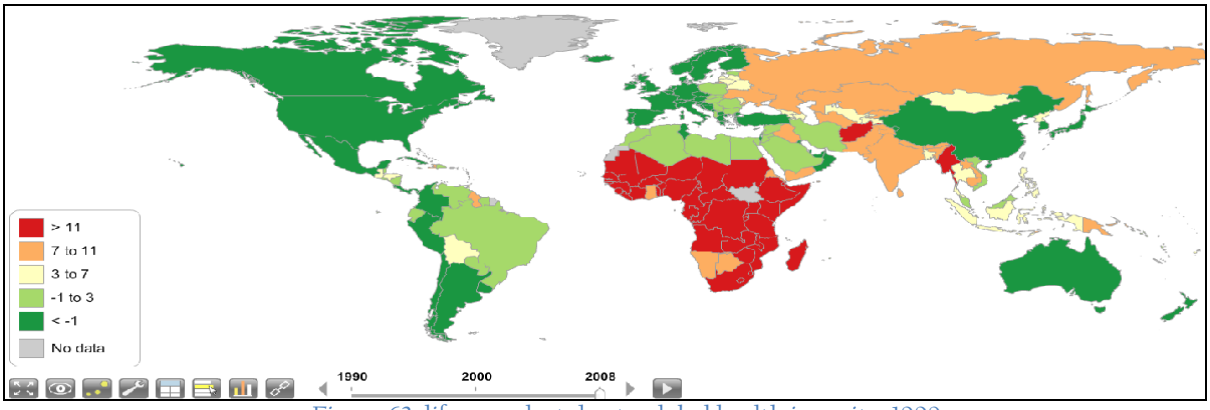



Figure 63: life years lost due to global health inequity, 1990

## Healthy life years lost

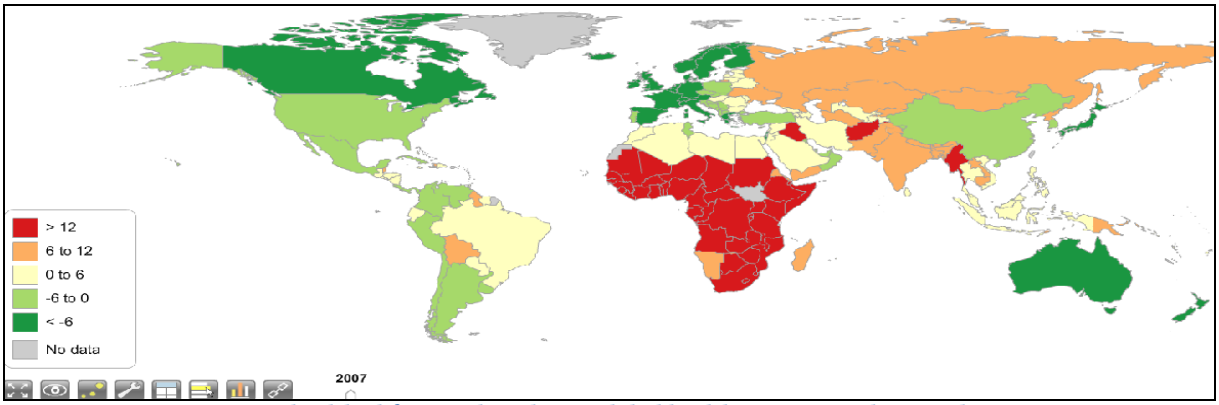



Figure 64 : healthy life years lost due to global health inequity, in boys and men.2007.

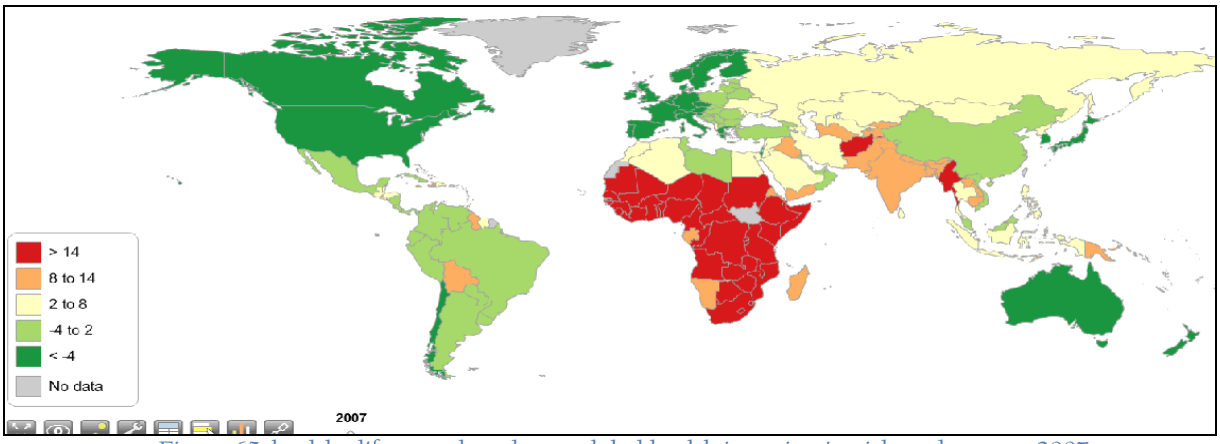



Figure 65: healthy life years lost due to global health inequity, in girls and women.2007.

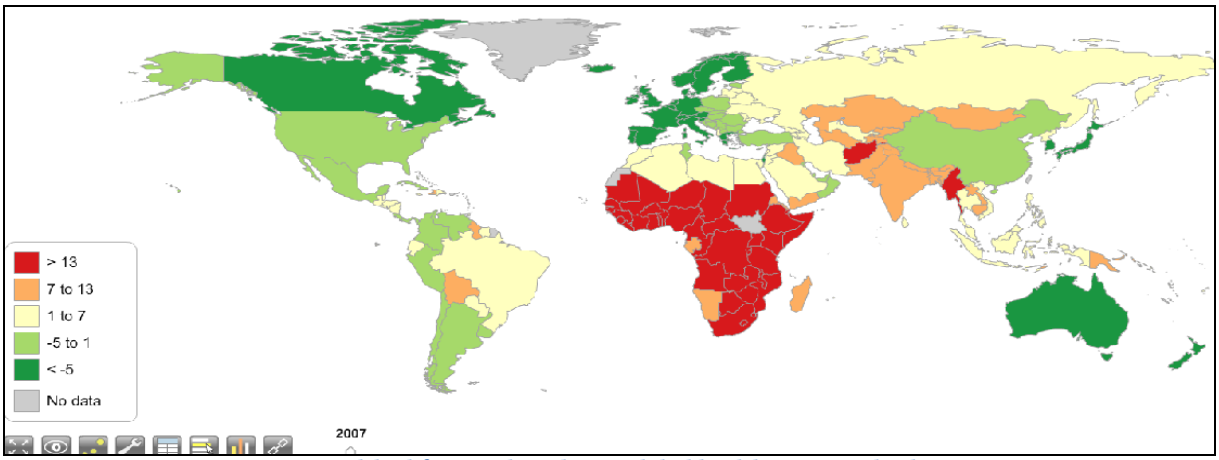



Figure 66: Healthy life years lost due to global health inequity, both sexes.2007.

## *Excess under five mortality rates*

The distribution of excess under five mortality by global health inequity reveals that in boys (figures 67-69) and girls (figures 70-72) there has been a gradual decrease in Latin America (with Bolivia lagging behind), the ex-soviet union and Asia (with a slower reduction in girls in India), with remains of high levels of boys' inequity death toll in sub-Saharan Africa, Afghanistan and Bangladesh.

### Boys

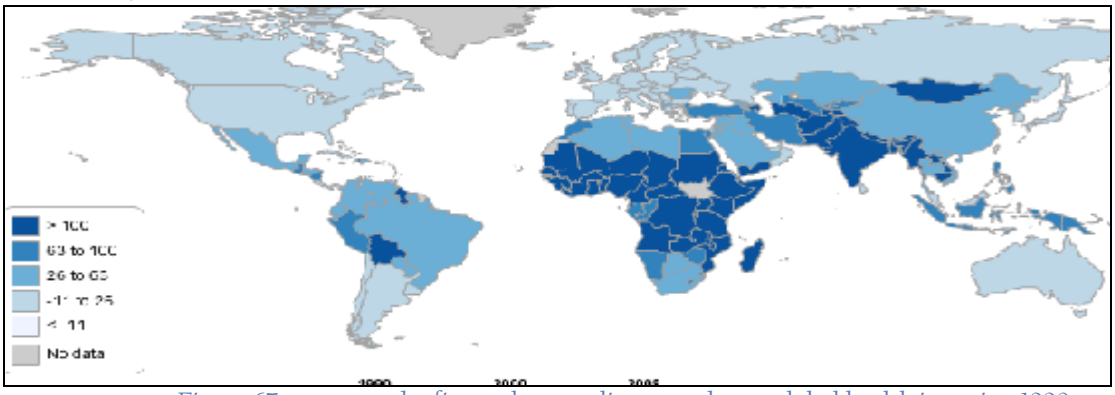



Figure 67: excess under five male mortality rates due to global health inequity. 1990.

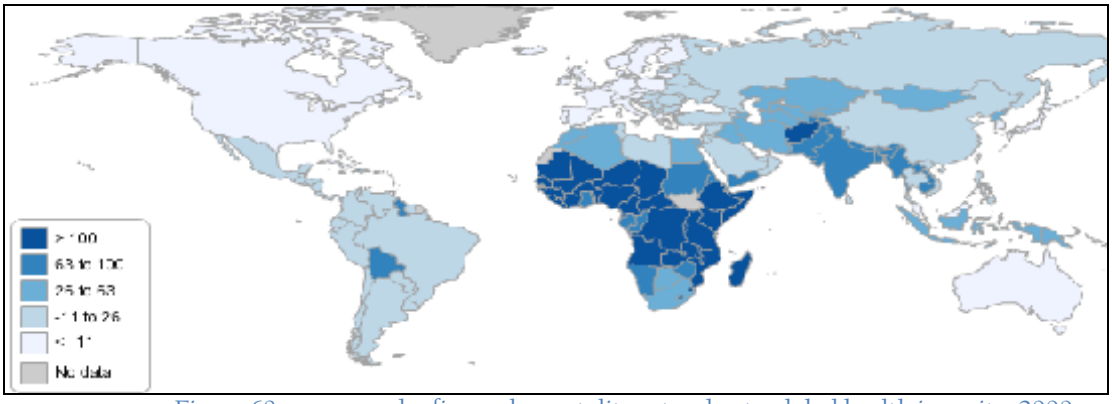


Figure 68: excess under five male mortality rates due to global health inequity. 2000.

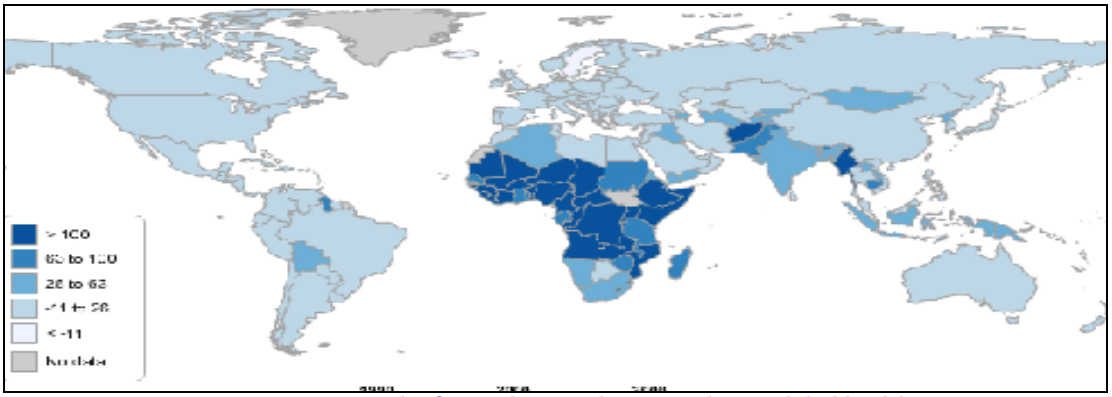


Figure 69: excess under five male mortality rates due to global health inequity. 2008.

## Girls

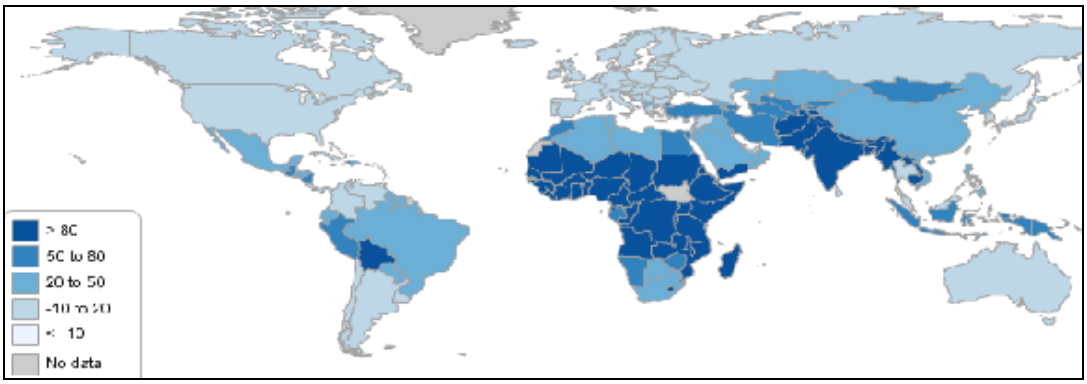



Figure 70: excess under five female mortality rates due to global health inequity. 1990.

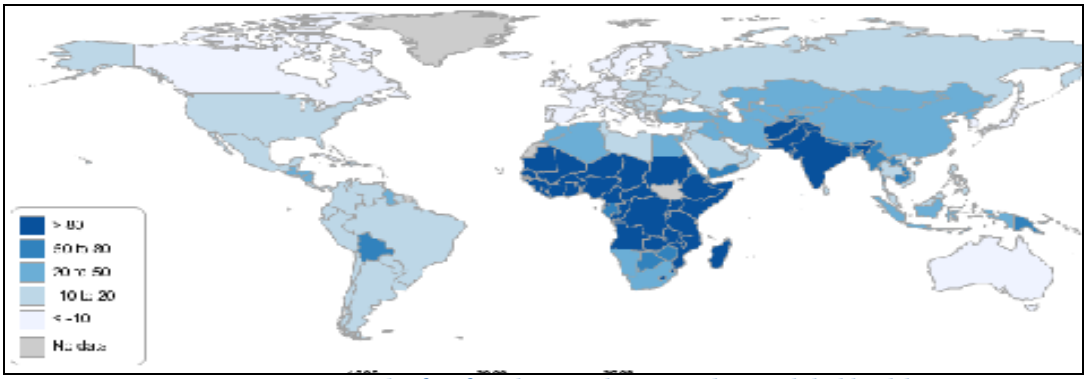



Figure 71: excess under five female mortality rates due to global health inequity. 2000.

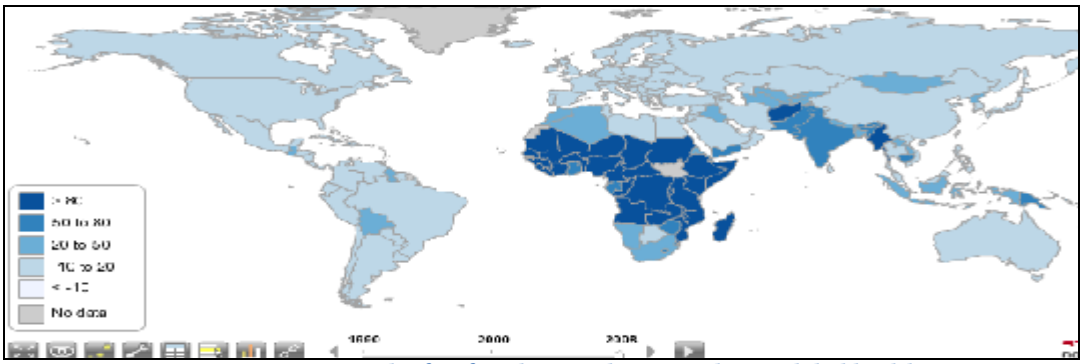



Figure 72: excess under five female mortality rates due to global health inequity. 2008.

## *Excess adult male mortality rates*

As regards excess adult male mortality by global health inequity, there has been an overall reduction in Latin America and Asia (and more rapidly in China), and also more moderately in sub-Saharan Africa, while it has increased in the ex-soviet union and in Southern Africa for the reasons explained above. Such excess adult mortality in women remains higher in parts of Latin America and sub-Saharan Africa.

### Men

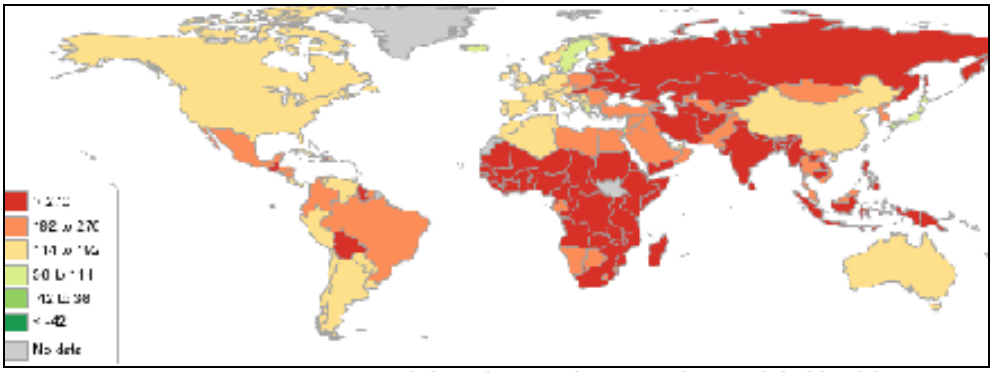


Figure 73: excess adult male mortality rates due to global health inequity. 1990.

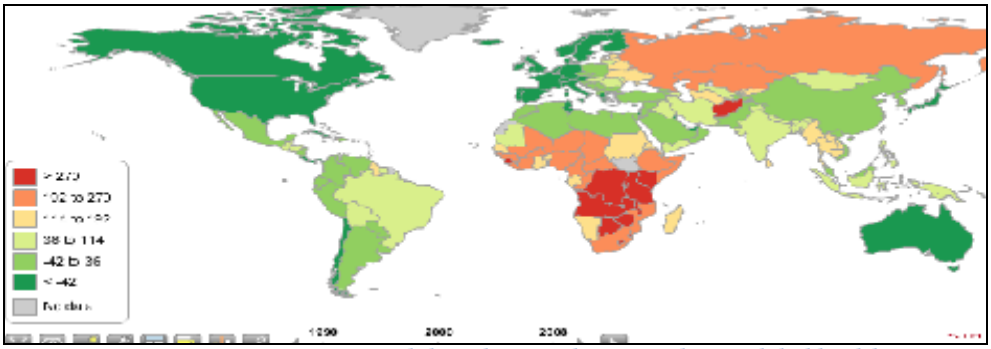


Figure 74: excess adult male mortality rates due to global health inequity. 2000.

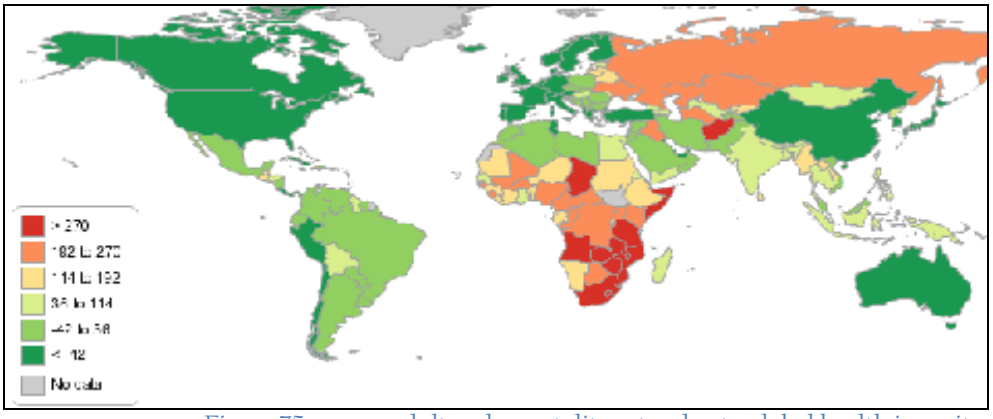


Figure 75: excess adult male mortality rates due to global health inequity. 2008

Women

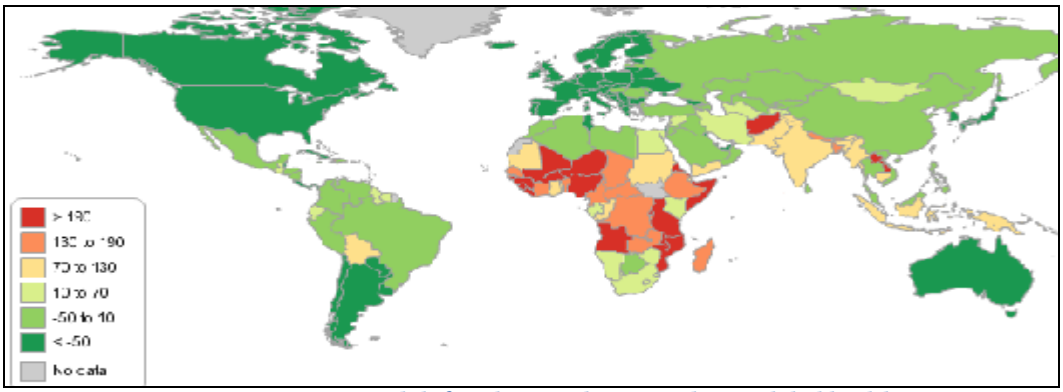



Figure 76: excess adult female mortality rates due to global health inequity. 1990.

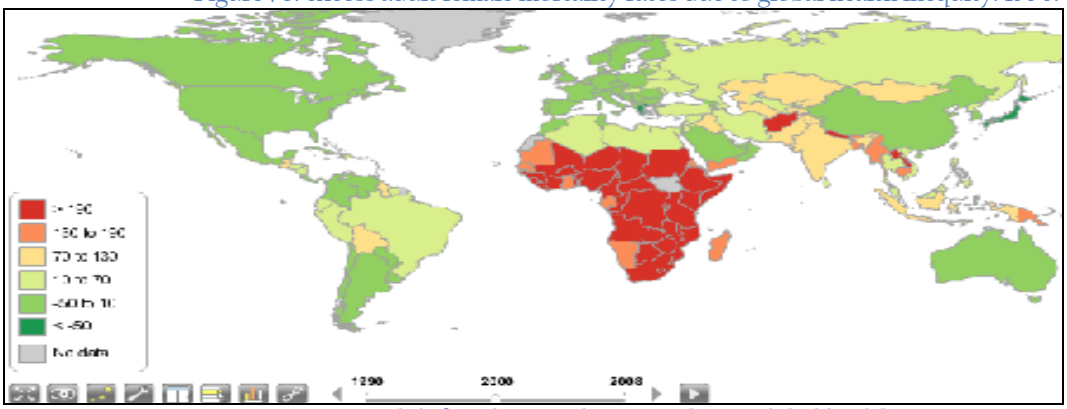



Figure 77: excess adult female mortality rates due to global health inequity. 2000.

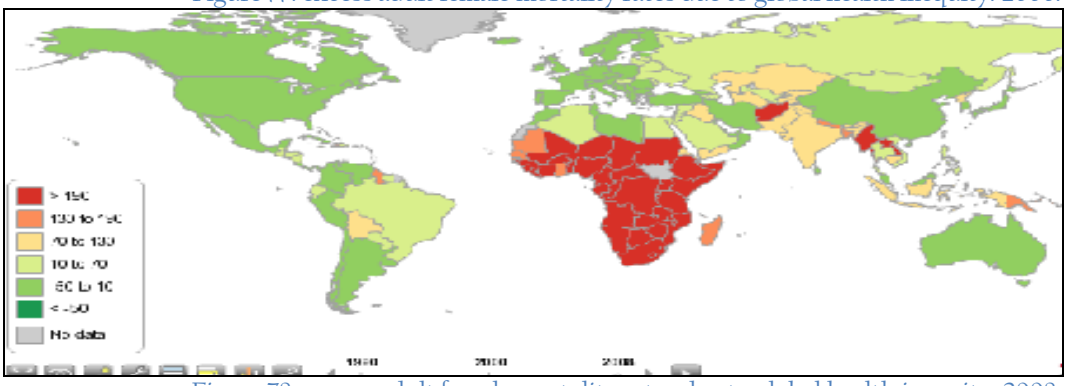



Figure 78: excess adult female mortality rates due to global health inequity. 2008.

## Proportion deaths due to global health inequity

The proportion of all deaths due to global health inequity shows that in children they are gradually reduced in Latin America and Asia while they remain high in sub-Saharan Africa and Afghanistan and Bangladesh, while in adults it also still affects Russia.

### *Children*

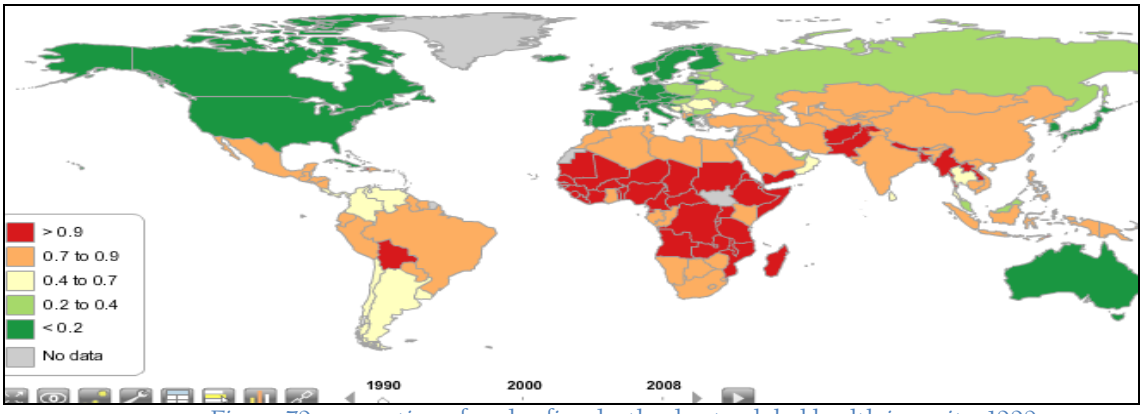



Figure 79: proportion of under-five deaths due to global health inequity. 1990.

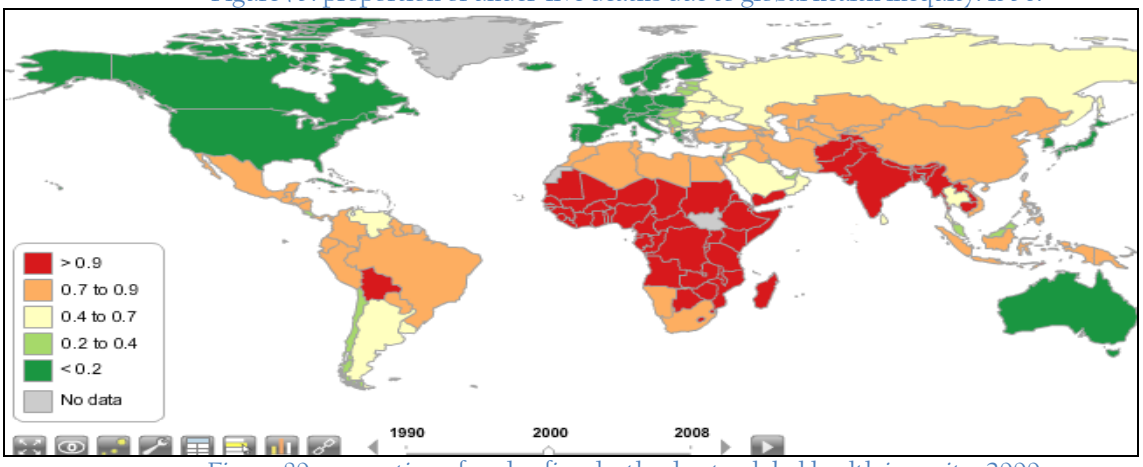



Figure 80: proportion of under-five deaths due to global health inequity. 2000.

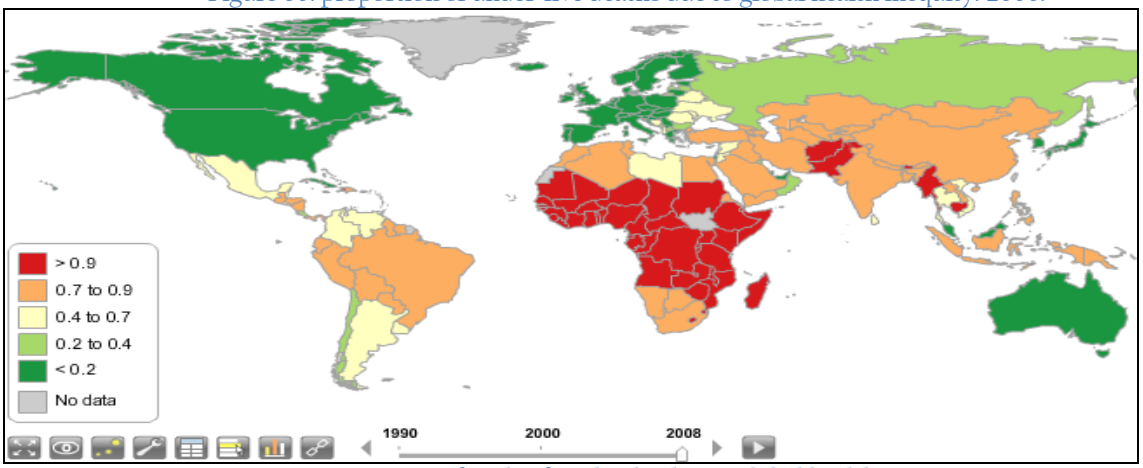



Figure 81: proportion of under-five deaths due to global health inequity. 2008.

## *Adults*

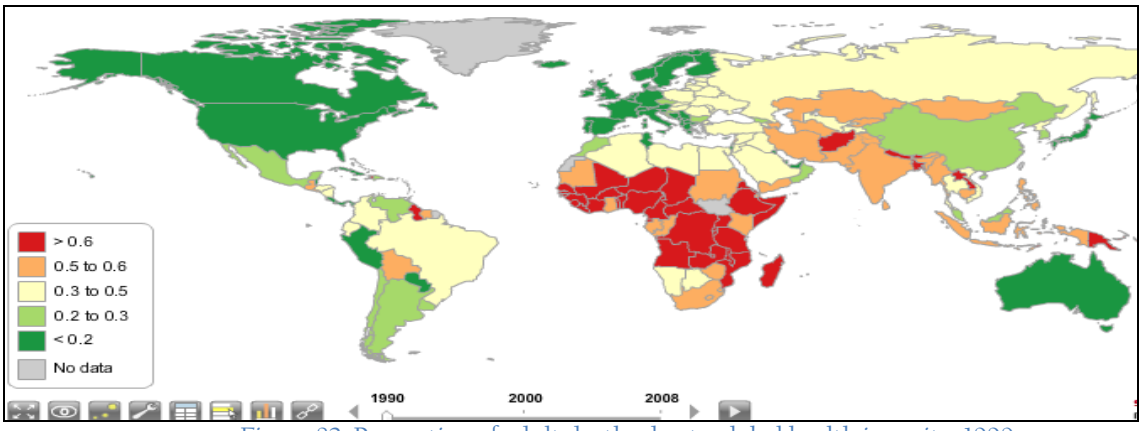



Figure 82: Proportion of adult deaths due to global health inequity. 1990

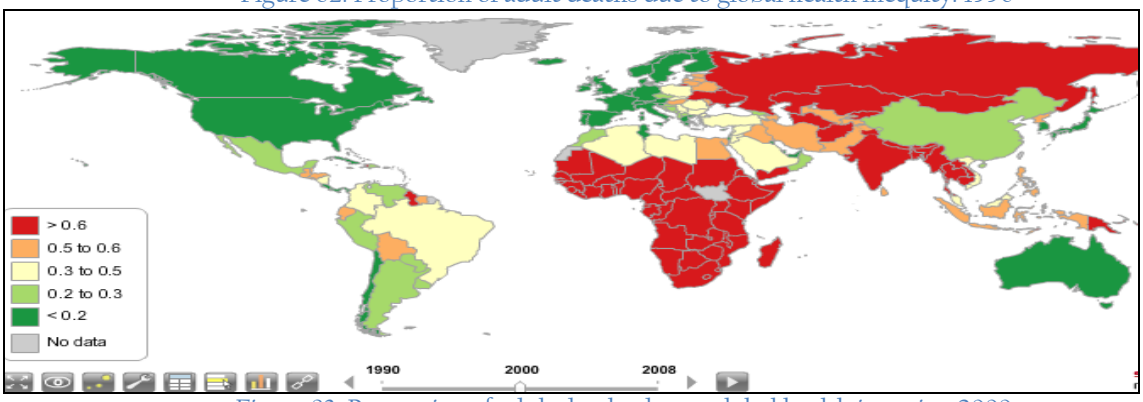



Figure 83: Proportion of adult deaths due to global health inequity. 2000.

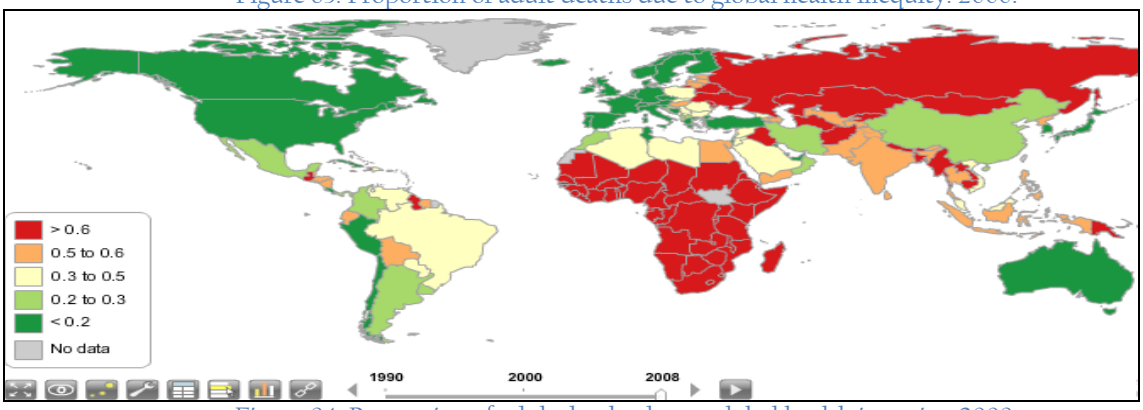



Figure 84: Proportion of adult deaths due to global health inequity. 2008.

## Limitations on the information available

The analysis of section 5 can be applied to intra-national inequities. What we require is data of health indicators in the lower and upper quintiles of the population. Of the many disaggregated indicators proposed by the final report of the commission on social determinants for health, very few have been collected by countries and reported to WHO. In its last world health statistics, only the rates of births attended by health personnel, the prevalence of measles vaccination and the under-five mortality rate were recorded disaggregated by rural/urban, wealth quintile and level of the mother's education. Some 80 countries have reported on some or all (only 50) of these data, and almost all of them (except one high income –Gabon- and six upper-middle income countries, while these regions have the highest GINI indexes) are low-middle or low income countries. The reliability of data at first glance is doubtful as in ten countries the under-five mortality rate in the highest wealth quintile is higher than the country's average as reported in the world health statistics!. However, the data represent 2,7 Billion population, which is 40% of the world's population and 57% of the population in low and low-middle income countries. As a sign of these differences, the lowest wealth quintile of the population in Ethiopia, has 30 times lower rates (or chances) of being attended during delivery by a health worker, and this is closely correlated with living rural and with a lower education of the mother. The reported differences and rations are not as high for under-five mortality, the highest ratio being 4 in Rwanda by wealth quintile.
Figure 73 shows the relation between the average GINI indexes estimated in countries and the ratio of under-five mortality between lower and upper quintile in the 38 countries were both data were available. The figure shows that there is no correlation and there are significant outliers as Rwanda (not-so-high GINI but the highest ratio of inequity for under five mortality) and Lesotho in the other end (with the highest GINI but half the inequity ratio of under-five mortality).

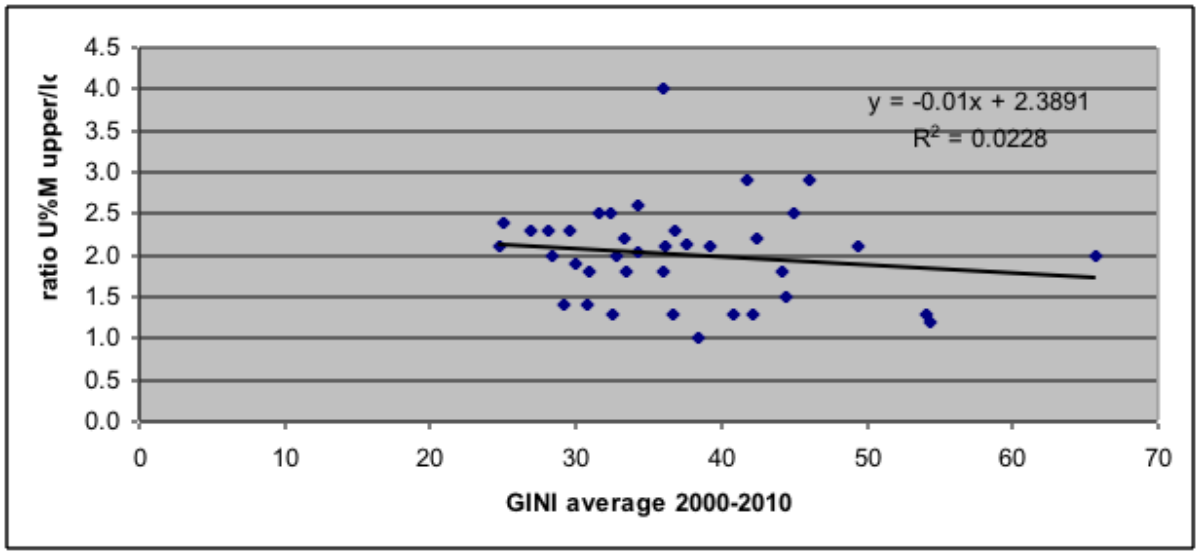



Figure 85 : Relation between GINI index and inequity ratio of under-five mortality

Despite the limitation of data of under-five mortality inequity ratios (and after discarding those that showed higher rates in upper wealth quintiles than the national average) the overall number of deaths of children under five of countries where from we have the national inequity ratio for that indicator is 6,75 million, that is, 71,4 % of all under five deaths and 76% of those in low and low-middle income countries.

## National vs. global health inequities

The effect of national inequity should be deducted from the total global inequity so as to estimate the contribution of global and national inequity factors. Figure 74 shows those contributions for the children deaths sampled where there was available data. Figure 75 displays them in their percentage of the total number of deaths.. It shows that, in the available sample, the proportions of the theoretical impact of national and of global health inequities varies, as expected, among income regions. The main impact in low income countries comes from global inequities (close to 70%) with a contribution by national inequities of 26%. In low-middle income countries the distribution is similar, with some 22% by national inequities and over 60% by global inequities, while in upper-middle income countries each one accounts to roughly one third of overall under five mortality.

## The geographical distribution of the burden of national health inequity

### *By income regions*

Applying the average proportion of national health inequity (some 25% of deaths) to high income countries, the burden of national inequity in this region would mean some 2 per thousand in a region that has less than 10% of the world's children, some 40,000 children each year, that is 0,4% of all children deaths in the world due to inequities (or one day of the annual burden).

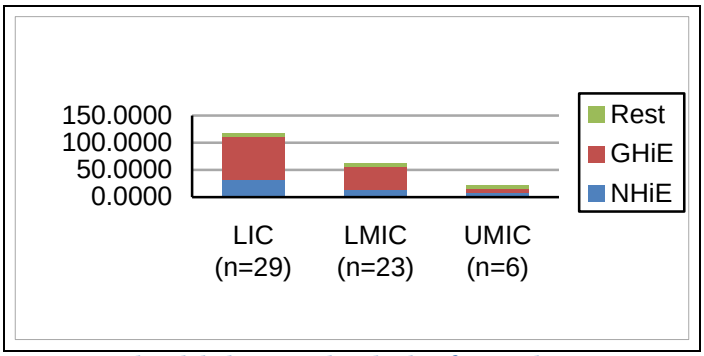



Figure 86 : IDT by global, national and other factors, by income regions.

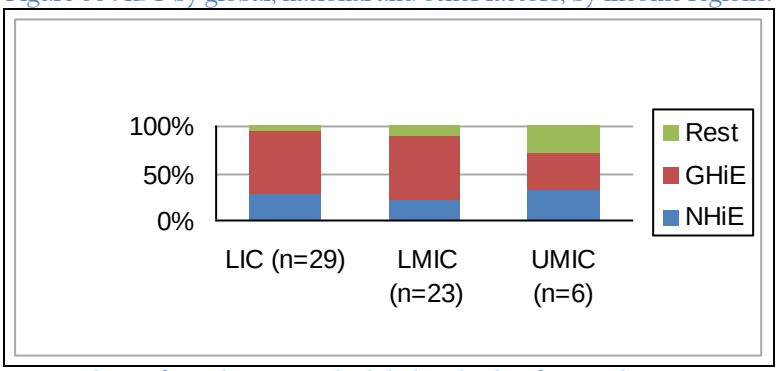



Figure 87 : Share of IDT by national, global and other factors, by income regions

*By countries*

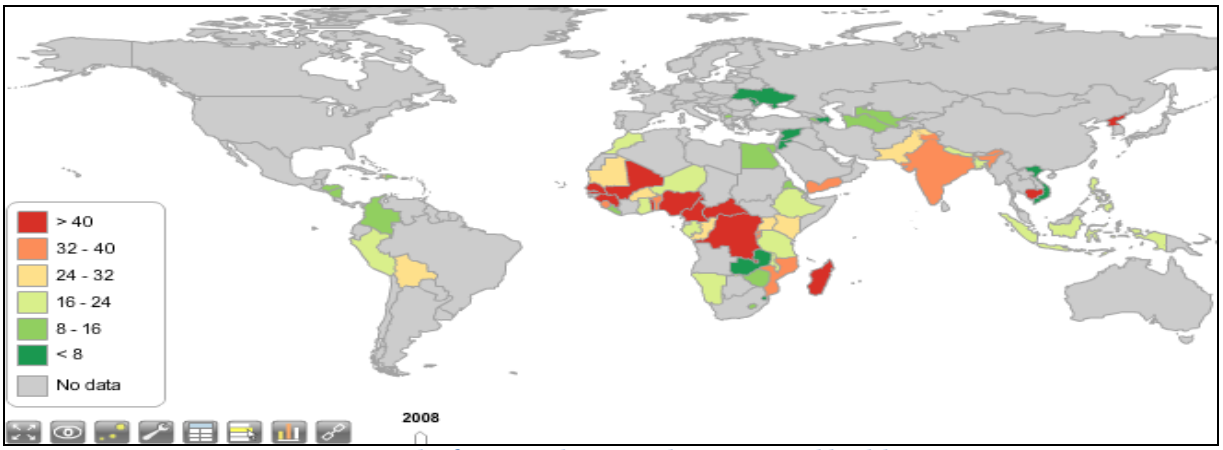



Figure 88: Excess under five mortality rates due to national health inequity. 2008.

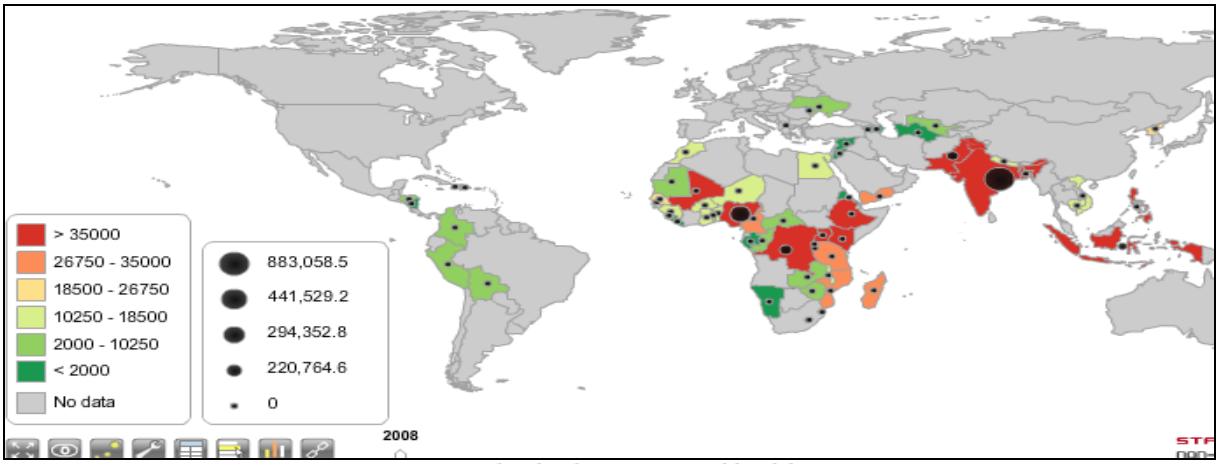



Figure 89 : Excess deaths due to national health inequity. 2008

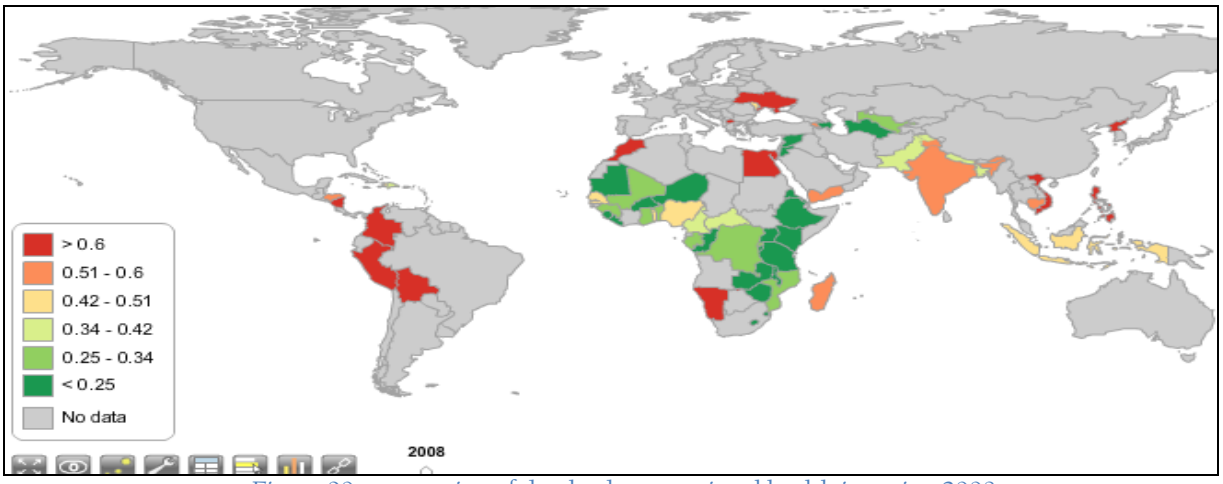



Figure 90 : proportion of deaths due to national health inequity. 2008.

As the maps above show, among the limited number of countries reporting national health equity indicators to the world health statistics, the estimated[117] excess rates due to national health inequities (vs. the upper quintile standards)

[117] The under-five mortality rate of the upper quintile (national standard) is estimated from the national average and the ratio of rates of the lower/upper quintiles (UQu5mr=2 U5MR/(1+LQ/UQ ratio), and the difference of the average with the upper quintile rates allows the estimation of the excess rate, excess deaths and proportion of national inequity deaths.

## Section III: Dynamics and response to global health inequity

### Global health dynamics

The state of global health and its inequities is related to the dynamics that undermine our global health potential, and the response to their effect on ill-health.

### Factors undermining the health potential: applying the Maslow's pyramid to health needs

Following Maslow's pyramid, humankind has the potential to satisfy its needs to enjoy that potential through sufficient basic needs (water, food, air), security from threats (adequate housing and prevention from extreme temperatures, trauma prevention, clean air and water, healthy and safe food, prevention from endemic and epidemic infections) and social and personal sense of belonging and fulfilling of potentials (freedom and equal opportunities (education, employment, income) and reduction of social stressors, enabling contexts for intellectual, affective and existential expressions and interactions). Factors undermining health needs and conditions (basic needs, security needs or enabling factors for social and personal fulfillment), lead to ill-health (physical, psychological, social). Addressing these health needs and enabling conditions has the greatest potential to reduce the burden of ill health.

In the event of ill-health, access to health services reduces the impact in the loss of healthy life. The potential impact of health services restoring the dynamics of ill-health varies between the epidemiology of the events themselves is somehow in inverse relation to the hierarchy of health needs: more effective in basic needs (by restoring them), less o in treatments of ill-physical health by acute/infectious diseases and trauma, and less even by chronic/non communicable diseases, less so by the social and personal stressors linked to the previously mentioned chronic conditions and to mental ill-health.

How the potential for healthy life is expanded depends on the reduction of genetic vulnerabilities (genetic screening replacing natural selection), the efficiency of preventive (vaccinations, screening and reduction of health threats) and curative (efficiency of treatments) interventions. It is not clear how modern knowledge can help increase the social and personal potential for fulfillment as these have often gone in inverse relation to the advancement of knowledge and the parallel competitiveness, market dynamics and social disparities (traditional societies seem to live with far lower levels of social stress).

From the Lalonde report in 1974, it is widely accepted that the main intervention s to reduce the burden of ill health lay outside the health sector, through promoting health living conditions and lifestyles, that is health needs and enabling factor for individual and social fulfilment. The most efficient impact of health services may not "rescue" more than 20% of the ill-health, but of course this may vary according to the scope of diseases (more effective in infectious diseases than in chronic non-communicable diseases) and their demographic distribution (most effective in child and maternal health).

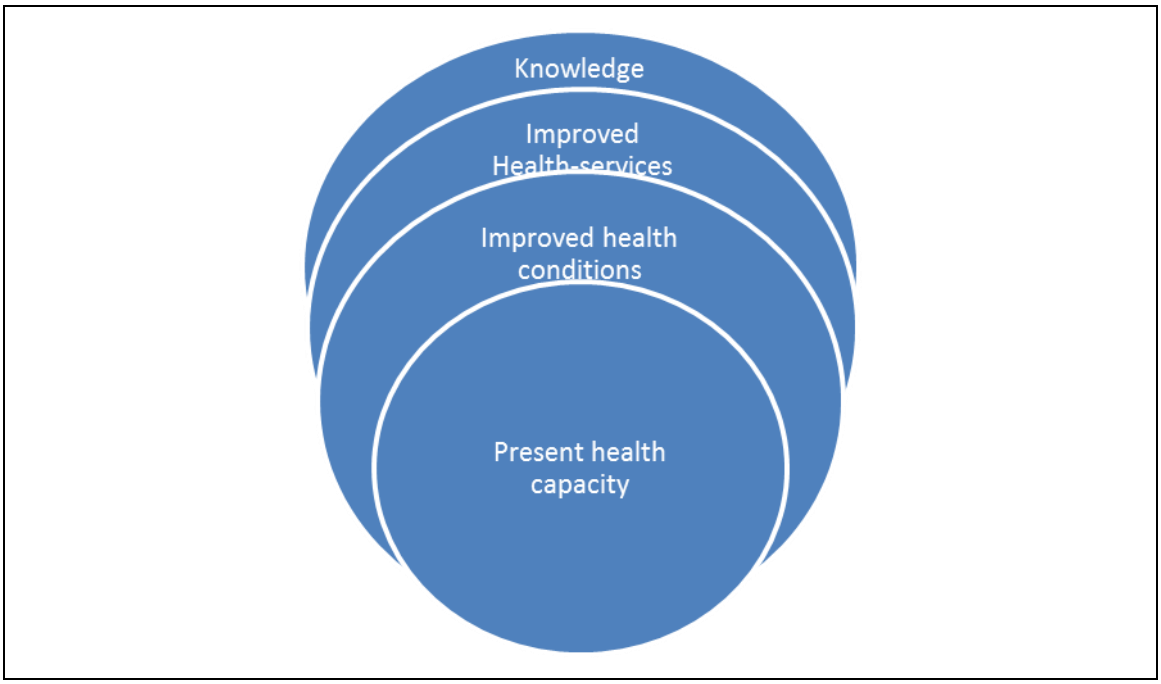



Figure 91: Potential health capacity

## Dimensions of causality

All books and training of health professionals start their account and teaching of each disease by the chapter of *ethiology*. The word has a Greek origin:" *aitia* "meaning cause" and *-logia* "a speaking". *Aristotle* conceived a causal investigation as the search for an answer to the question "why? He developed a theory of causality, which is commonly known as the doctrine of the four causes or answers to "why ": the material cause (e.g., the bronze of a statue), the formal cause (its form), the efficient cause (the artisan) and the final cause (why was it done)[118]. Two thousand years later, David Hume proposed a list of eight ways of judging whether two things might be cause and effect which may be summarized in the following: consistently contiguous in space and time (with the cause prior to the effect), same effects for the same causes (or their qualities), the intensity or level of the effect is related to that of the cause, co-existing or enabling causes[119].

The interpretations of causality have also philosophical implications. Determinists extrapolate cause-effect to all events (even human will) and some express it through fatalism, where humans have no control over their future or theological determinism, where God determines the fate of humans. Determinist ideas were challenged by quantum physicists at the mid of last century when they observed that at the most fundamental levels, conjugate variables of particles (such as position and momentum) cannot be known at the same time (principle of uncertainty). In Europe, from the XIX century, existentialists believed that the individual has the sole responsibility for giving one's own life meaning, although what role play external factors differs for instance assuming the existence or non-existence of God. Existentialism, in any case, became influential after the period of the World Wars to reassert the importance of human individuality and freedom. Outside the Western philosophies, Eastern religions related cause-effect with Karma, which goes beyond the effect of our will and actions in our destiny but

[118] Frede, M., 1980, "The Original Notion of Cause," in J. Barnes, M. F. Burnyeat, M. Schofield (eds.), Doubt and Dogmatism: Studies in Hellenistic Epistemology, Oxford: Oxford University Press, pp. 217–249

[119] Hume, David (1896) [1739], Selby-Bigge, ed., A Treatise of Human Nature, Clarendon Press

beyond it (connected to reincarnation) and even, by some religions, to the rest of the universe and even come back to us!

### *Causality in health*

Epidemiology studies the causes of ill health in a human group. It is a foundation of public health and informs policy decisions. While Aristotle studied causality, *Hippocrates* already examined the relationships between the occurrence of disease and environmental factors and introduced the concepts of endemicity and epidemics. And around the same time, *Plato* related primarily the origin of disease with the lack of wealth. Not until the 16th century disease was related to live particles and, with the development of the microspore, the germ theory of disease. The use of statistics allowed John Graunt to report time trends and comparisons among groups, and later John Snow to map cholera. Ever since the use of mathematical tools and statistics linked with epidemiological tools and concepts, allowed the knowledge of the direct causes of many diseases.

Carnap defines three concepts of science: descriptive, comparative and quantitative. The latter often not developed in many areas of research where knowledge does not allow for measuring[120]. Epidemiology can also be descriptive (incidence, prevalence, distribution), comparative (risks, odds) and quantitative, when we add statistical significance by measuring events and their variables. In many cases, this is not possible and the evidence is incomplete.

Causality in epidemiology follows the Bradford Hill criteria[121]. However none of them are essential for or against the causal relation. On the other side, scientists acknowledge that even the most simple and laboratory-based conditions it is often not possible to predict other than the immediate future. And the real world is far more complex than one cause-one effect. If we keep asking Aristotle "whys" epidemiology needs relate to on biology (and its relations to chemistry and physics), genetics, environment, anthropology and other social sciences, economics, politics and public policies and international relations.

This complexity requires complex mathematical analysis of the effects of multiple variables, but requires as well the analysis of the multiple relations between those variables and in turn, the relations of those variables or causes with others. Probably we need to live with the fact that no matter how wide (in the scope of variables related to one event), deep (in the relations of those variables with other causes and those with others..) and interconnected the analysis may be, it is bound to always be incomplete and causality, or its wider understanding, is bound to evolve with knowledge.
The latest version of the International Classification of Diseases ICD-10-CM lists a total of 68,000 different diagnoses. Many of them are idiopathic (of unknown cause) and most of them have identified risk factors or causative agents (as in infectious diseases) but many risks and processes are still unknown.

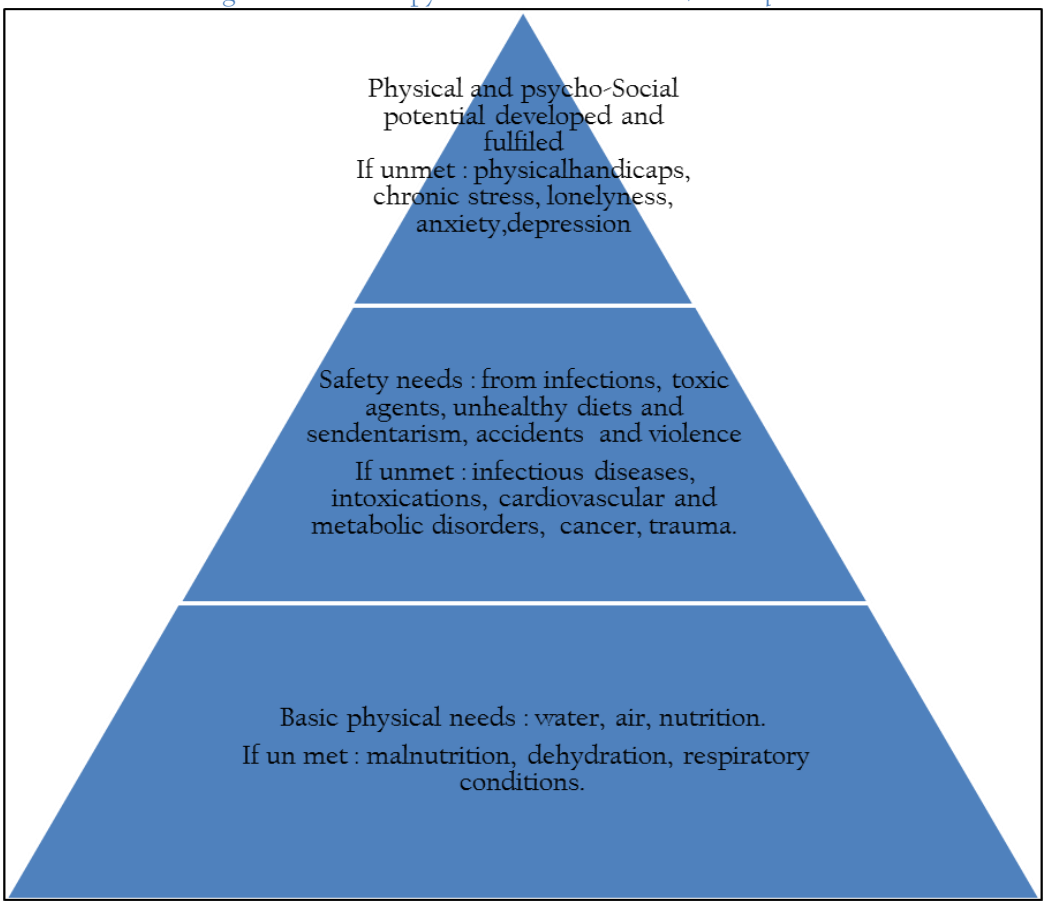
Public health is about prioritizing actions according to their pertinence (addressing priorities) and the availability of resources (maximum efficiency, minimum opportunity-cost). It also applies to epidemiology. While knowledge must evolve, the priority attention must be given to the major causes of ill health and its major attributable risks. Ultimately, the causes of ill health are related to an unmet need, which allows the specific cause to alter the healthy condition or homeostasis.

[120] Rudolf Carnap, Martin Gardner. An introduction to the philosophy of science Courier Dover Publications, 1995.
[121] Strength, Consistency, Specificity, Temporality, Biological gradient, Plausibility, Coherence, Experiment and Analogy.

## The needs pyramid and health

Maslow's hierarchy of needs is represented by a pyramid, with four layers of esteem, friendship and love, security, and physical needs[122]. While the basic and safety needs are essential for physical health, the other layers are important for the mental and social dimensions of health. Moreover, all these dimensions interact: the unmet physical needs hamper the satisfaction of the other needs and the lack of non-physical needs triggers stress, and it affects also physical health.
If we adapt and simplify this categorization of needs to health, we could see the following pyramid:

Figure 92: Barrows pyramid and health needs/consequences




How all meets health needs has to do with the legal framework (rights' approach) preventing them, the resources to guarantee them and choices made on the efficient and equitable use of those resources.

### *Basic physical health needs:*

The human body requires air, water and nutrition to survive. Water and food re in shortage for a large share of the population (die to mal-distribution) and are detailed below. Both are often not in shortage of quantity but of quality, linked with health threats through unsafe water (infections and toxic agents)

[122] A.H. Maslow, A Theory of Human Motivation, Psychological Review 50(4) (1943): 370-96

and unhealthy food (infections, toxics and low-level chronic effect of unhealthy food). Air is yet not in shortage but often polluted (physical and chemical agents) hence detailed in the chapter of security from health threats.

### g. Water:

Needs: The UN estimates that each person needs 20-50 liters of safe freshwater a day to ensure their basic needs for drinking, cooking and cleaning[123]. The most basic need of daily drinking water requirement is 2-4 liters per person. However, water is related with the nutrition basic need (see below) and it takes 2 000 to 5 000 liters of water to produce one person's daily food[124] (with major differences: it takes 1 000-3 000 liters of water to produce just one kilo of rice and 13 000 to 15 000 liters to produce one kilo of grain-fed beef).

Unmet needs: 87% of the world population gets their drinking water from improved sources of drinking water. At present, more than one in six people worldwide - 894 million - don't have access to this amount of safe freshwater[125]. Sub-Saharan Africa accounts for over a third of that number with only 60% of the population using improved.

Consequences: WHO estimates that some 4% of the global burden of ill-health (some 64 million healthy life years lost per year) and close to two million premature deaths is related to lack of safe water and adequate sanitation (leading to unsafe water)[126].

Resources, their distribution and causes: The world uses some 54 percent of all the accessible freshwater (rivers, lakes and underground aquifers). 70 percent is used for irrigation, 22 percent for industry and 8 percent for domestic use. Water use has been growing at more than the rate twice of population increase in the last century and over 1.4 billion people currently live in river basins where the use of water exceeds minimum recharge levels, leading to the desiccation of rivers and depletion of groundwater[127]. In a large share of cities in developed countries, groundwater is being used at a faster rate than it can be replenished[128]. FAO predicts that by 2025, 1 800 million people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under stress conditions. The lack of access to safe drinking water and sanitation is directly related to poverty, compounded by the lack of willingness and/or capacity of governments to finance satisfactory water and sanitation systems. Inequitable access is further hampered when market dynamics over-rule the government's responsibility to ensure the equitable access to this basic right (see below). Extreme examples are when the privatization of water resources or their distribution gave the monopoly to all sources of water (including rainwater from roofs!) did not regulate equitable and affordable prices[129].

The legal framework[130]: General comment 15 (2002) of the International Covenant on Economic, Social, and Cultural Rights[131] entitles everyone to sufficient, safe, acceptable, physically accessible and affordable

[123] UN Water statistics. World Water Assessment Programme (WWAP)
[124] Food and Agriculture Organization of the United Nations (FAO)
[125] World Health Organization (WHO) and United Nations Children Fund (UNICEF) Joint Monitoring Programme on Water Supply and Sanitation (JMP)
[126] Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization. 2009
[127] Human Development Report 2006
[128] World Business Counicl For Sustainable Development (WBCSD)
[129] In Cochabamba, Bolivia, a single company was given the monopoly over all water resources, including water used for irrigation, communal water systems and even rainwater collected on roofs and an investment return of minimum 15% annual return, which led to raised water tariffs by 35%.
[130] http://www.ohchr.org/Documents/Publications/FactSheet35en.pdf
[131] The International Covenant on Economic, Social and Cultural Rights (ICESCR) is a multilateral treaty adopted by the United Nations General Assembly on December 16, 1966, and in force from January 3, 1976. It commits its parties to work toward the granting of economic, social, and cultural rights (ESCR) to individuals, including labor rights and the right to health, the right to education, and the right to an adequate standard of living. As of July 2011, the Covenant had 160 parties. Notably, the United States signed the Covenant in but is not fully bound by it until it is ratified. The Reagan and George H.W. Bush administrations took the view that economic, social, and cultural rights

water for personal and domestic uses. The right to water contains both freedoms and entitlements: The freedoms include the right to maintain access to existing water supplies free from interference (including arbitrary disconnections or contamination of water supplies). The entitlements include the right to a system of water supply and management that provides equality of opportunity (and non-discrimination) for people to enjoy the right to water. States parties have immediate obligations in relation to the right to water, such as the guarantee that the right will be exercised without discrimination of any kind (art. 2, para. 2) and the obligation to take steps (art. 2, para.1) towards the full realization of articles 11 (adequate standard of living), paragraph 1, and 12 9right to health). Forty-one countries have enshrined in their constitutions the right to water.

On 24 May 2011, the 65th World Health Assembly unanimously adopted Resolution 64/24 on Drinking water, Sanitation and Health with specific requests to member states and to WHO[132].

International commitments and solidarity: The Millennium Development Goal[133] (MDG) 7 includes target 10 of the MDG's, where States commit themselves to: "*halving, by 2015, the proportion of people without sustainable access to safe drinking water*." This level relates to the 1990 baseline level of 22% and the target is 11% by 2015, which is almost met. However, this target is far from being met in low-income countries, especially in rural areas and in Africa (with 16 out of the 19 countries off track)[134]. Aid to water and sanitation has risen sharply during the last decade, reaching USD 8.2 billion in 2008-09 (total annual average aid commitments), that is 6,8% of total development aid, with sub-Saharan Africa receiving 30% of this support[135]. Others have analyzed in greater level and distribution of ODA for water and sanitation, and are more critical[136].

---

were not really rights but merely desirable social goals and therefore should not be the object of binding treaties. The list of signatories and rectifiers, and the 21 reservations may be seen here: http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=IV-3&chapter=4&lang=en

[132] 24 May 2011, 65th World Health Assembly, Resolution 64/24: It urges Member States to highlight the importance of safe drinking-water, sanitation and hygiene as the basis for primary prevention in national public health strategies and to ensure that these strategies contribute to the achievement of the water- and sanitation-related MDG target and to the progressive realization of the human right to water and sanitation. It requests the Director-General to formulate a new, integrated WHO strategy for water, sanitation and health with a focus on water quality and monitoring issues, and to increase technical assistance for enhanced drinking-water quality management. This was the first time in 20 years that the Assembly adopted a Resolution specifically addressing drinking water and sanitation. In relation to it, Resolution 64/15 on Cholera: mechanism for control and prevention, calls attention to the key role of access to clean water and Resolution 64/16 on Eradication of dracunculiasis and includes access to safe drinking-water, and the use of cloth and pipe filters are critical pillars of the strategy for final eradication.

133 In 2000, the United Nations General Assembly adopted the United Nations Millennium Declaration (Resolution A/res/55/2), which set out the Millennium Development Goals (MDGs) agreed to by 192 countries and 23 international organizations

134 2010 report. WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation

[135] See OECD/DAC focus on water and sanitation: www.oecd.org/dac/stats/water

[136] Cairncross S, Bartram J, Cumming O, Brocklehurst C (2010) Hygiene, Sanitation, and Water: What Needs to Be Done? PLoS Med 7(11):

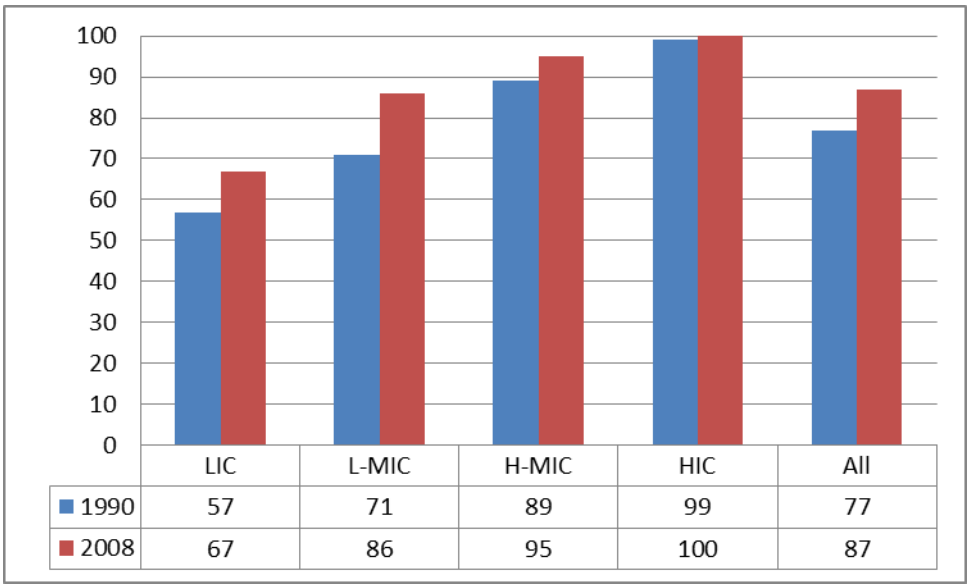



Figure 93: proportion of people with access to sufficient and safe drinking water

### h. Nutrition

Needs: WHO and FAO review new research and information on human nutrient requirements and recommended nutrient intakes. The nutrients that comprise the basis of all human nutrition are protein, energy and trace elements[137]. The energy requirements are on average 40-100 Kcal / k / day [138] according to age, sex and level of physical activity, the protein requirements are around 0,75 g-1,5 /k /day according to age and sex[139], and the trace elements' requirements are recommended also by FAO, WHO and UNICEF[140].

Unmet needs: The proportion of undernourished people in the world has gone down from 20% in 1990 to 16% in 2010, off-track the MDG 1 target (see below). In net numbers, FAO estimates that a total of 925 million people are undernourished in 2010, compared with 1.023 billion in 2009. That is higher than before the food and economic crises of 2007-2008 and higher than the number in 1996, the year that leaders at the World Food Summit set a goal of reducing the number of hungry people by half. Maternal under-nutrition results in 13 million children born with low birth weight every year. Chronic malnutrition (stunted) affects 171 million children with highest rates among children are highest in Africa and Asia

Consequences: WHO estimates that 6% of the global burden of disease is related to under-nutrition, that is, close to 100 million life years los annually, and that, together with vitamin A, iron And zinc deficiency, it accounts to more than 4 million deaths every year[141].
Resources, their distribution and causes: There is no shortage of world's food supply for population needs. Enough wheat, rice and other grains are produced to provide every human being with 3,500 calories and 50 grams of proteins a day, not considering other commonly eaten foods-vegetables, beans,

[137] Vitamin A and carotene, vitamin D, vitamin E, vitamin K, thiamine, riboflavin, niacin, vitamin B6, pantothenic acid, biotin, vitamin B12, folate, vitamin C, antioxidants, calcium, iron, zinc, selenium, magnesium and iodine.
[138] Report of a Joint FAO/WHO/UNU Expert Consultation. FAO Food and Nutrition Technical Report Series No. 1. Rome: Food and Agriculture Organization, 2004
[139] See: http://www.fao.org/docrep/003/AA040E/AA040E09.htm
[140] FAO/WHO. Vitamin and mineral requirements in human nutrition, 2nd ed. Geneva, World Health. Organization, 2005.
[141] Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization. 2009

nuts, root crops, fruits, grass-fed meats, and fish. Global per capita food production has been increasing for the past several decades[142]. Some estimate at 40% the waste of food. On the other side, vegetarian diets are healthier and based on a 40 factor of greater efficiency in terms of land, manpower and water use. In 2006 was the first year when the number of people who are overweight (more than one billion) has surpassed the number who are undernourished. There is a direct correlation of access to food and poverty. The steepness of this correlation is influenced by food prices and their relation with currency exchange rates, increased farming for use in bio-fuels, world oil price, increased food demand by global growth of population and increased intake demands (and shift to livestock and dairy products) from China and India, climate change and reduced crop yields and loss of agricultural land to residential, industrial development and acquisitions from richer countries.

The legal framework: The right to food is recognized in the Universal Declaration on Human Rights (article 25) and the (legally binding) International Covenant on Economic, Social and Cultural Rights (ICESCR), as well as a plethora of other instruments and many national constitutions. General Comment 12 of the Committee on Economic, Social and Cultural Rights (Committee on ESCR) in 1999 makes it specific[143] and identifies specific duties to the state[144].

In 2010 the World Health Assembly passed a resolution on Infant and Young Child Nutrition, which expanded the previous one from 1994 focused on infant feeding and the marketing codes of breast milk substitutes. It calls for a global plan of action across the UN agencies and bodies related to nutrition (UNICEF, FAO, WFP, WHO, UN Rapportteur on food security and nutrition, and several inter-agency coordinating committees and the Scale-up nutrition (SUN) framework), and to better link nutrition programs with socioeconomic underlying causes and with strengthened health systems.

International solidarity: MDG 1 aims to eradicate extreme poverty and hunger and includes as one of its two targets to halve, between 1990 and 2015, the proportion of people who suffer from hunger, measured by the prevalence of underweight children under five years of age and the proportion of population below minimum level of dietary energy consumption. As mentioned above and reflected in figure 3, the rate of global progress is on track towards the 2015 target as measured by weight for age in under-fives. However, the distribution of this progress is more worrying, as most of sub-Saharan Africa and parts of South Asia are grossly off-track, the total number of malnourished children has increased since 1990, and the last food-price and economic crises have hit the poor hardest, revealing a profound structural problem related to economic inequalities and poverty.

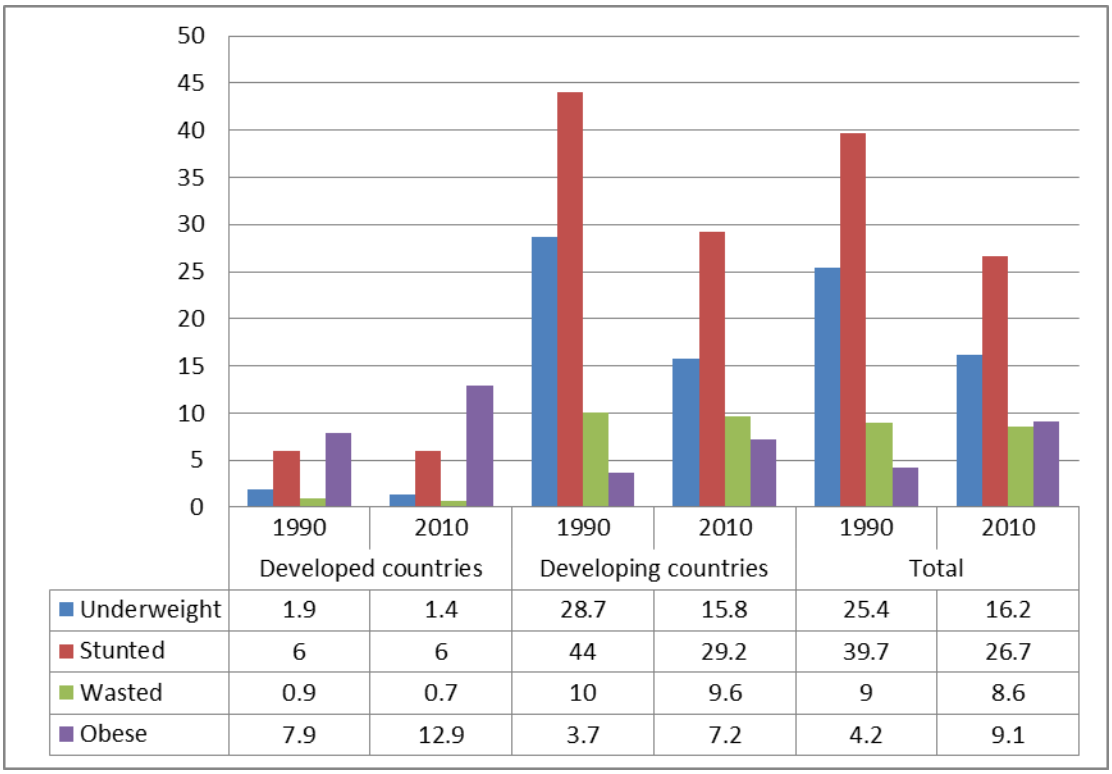
It is very complex to estimate the development aid levels to confront malnutrition as they relate to agriculture and food security as well as specific nutrition promotion and rehabilitation programs within the health sector. According to OECD/DAC the total annual average aid commitments to agriculture amounted to USD 7.2 billion in 2007-08. This reflects a decline from 17% in the late 1980s to 6% in recent years, of the share of the overall development aid. As regards specific nutrition programs earmarked –

[142] Agricultural Production Indices: Food production per capita index, World Resources Institute

[143] "the right to adequate food is realized when every man, woman and child, alone and in community with others, has physical and economic access at all times to adequate food or means for its procurement" (General Comment 12, 1999, para 6).

[144] State obligations- to respect, protect and to fulfill. These types of obligations were defined in General Comment 12 by the Committee on ESCR and endorsed by states, when the FAO Council adopted the Right to Food Guidelines (Voluntary Guidelines) in November 2004. The obligation to respect requires governments not to take any measures that arbitrarily deprive people of their right to food, for example by measures preventing people from having access to food. The obligation to protect means that states should enforce appropriate laws and take other relevant measures to prevent third parties, including individuals and corporations, from violating the right to food of others. The obligation to fulfill (facilitate and provide) entails that governments must pro-actively engage in activities intended to strengthen people's access to and utilization of resources so as to facilitate their ability to feed themselves. As a last resort, whenever an individual or group is unable to enjoy the right to adequate food for reasons beyond their control, states have the obligation to fulfill that right directly.

other than overall health support- , the majority relate to food aid in humanitarian contexts or in the post-emergency situation, and they add up to some $ 1,5 Bn annually




| | 1990 | 2010 | 1990 | 2010 | 1990 | 2010 |
|---|---|---|---|---|---|---|
| | Developed countries | | Developing countries | | Total | |
| Underweight | 1.9 | 1.4 | 28.7 | 15.8 | 25.4 | 16.2 |
| Stunted | 6 | 6 | 44 | 29.2 | 39.7 | 26.7 |
| Wasted | 0.9 | 0.7 | 10 | 9.6 | 9 | 8.6 |
| Obese | 7.9 | 12.9 | 3.7 | 7.2 | 4.2 | 9.1 |

Figure 94: Trend of hunger, chronic and acute malnutrition

## Other needs with sufficient universal "supply ":

Air and its vital component of oxygen may vary according to height and pollution but it is generally not – yet- in shortage to human kind. Section two reviews the availability of safe air when addressing safety needs (including the protection against in-door, urban and work-related air pollution).
Light: Humans need sufficient levels of Ultra Violet Radiation (UVR) exposure to activate vitamin D (1,25-dihydroxyvitamin $D_3$ (1,25[OH]D), related to at least 1,000 different genes governing virtually every tissue in the body, including calcium metabolism and neuromuscular and immune system functioning, as well as other immunological mediators and neurotransmitters, less studies[145]. Lack of sufficient exposure to UVR is associated with major disorders of the musculoskeletal system and possibly an increased risk of various autoimmune diseases and life-threatening cancers. WHO estimates that low UVR is associated to a disease burden of 3.3 billion DALYs world-wide.

[145] Nathaniel M Benefits of Sunlight: A Bright Spot for Human Health Environ Health Perspect. 2008 April; 116(4): A160–A167.

## Comments on the risk-analysis by WHO

WHO analyzed attributable risks (defined as "a factor that raises the probability of adverse health outcomes") of ill health in its *world health report 2002* based on estimates for the year 2000. The last update was published in 2009 with data from 2004[146]. It is based on the analysis of 24 global risk factors[147] (including behaviors, access deficits, inadequate health services, medical conditions and even global phenomena as climate change) . It is not clear how the selection of the 24 risks was made and the result seems arbitrary: for instance, why are pertinent risks with higher attributable risks of ill health than others in the list missing? : e.g. in each group : Iodine deficiency, high -fat and high-sugar intake, iatrogenic addictive medicines, high fertility rates, asbestos or dioxins, radioactivity, work-stress or other sources of violence as gender-based violence or iatrogenic effects through excess or inadequate treatments.

The choice of factors also includes in the same level a variety of categories as those related to basic health biological needs (nutrition, water, air), unhealthy lifestyles (inactivity, unsafe sex), exposure to toxic effects as individuals (unhealthy diets, tobacco, alcohol, , illicit drugs) at work (air, noise and other physical risks) and as community (air and water pollution, lead), effects of the previous factors on health (high glucose, high blood pressure, high cholesterol), access to services (access to contraceptives, unsafe injections), rights' abuse (sexual violence) and even global impacts (on most risks, as climate change). It leaves out, in this analysis of different categories, many risks or conditions at individual, community, health (and other social) services and global factors.

On the other side, the estimates from WHO programs and scientific studies relating exposure to burden of disease measured by mortality or by the controversial measure of disability-adjusted[148] life year (DALY)[149]. In their last update, of data from 2004, the leading global risks *for mortality* in the world are high blood pressure (responsible for 13% of deaths globally), tobacco use (9%), high blood glucose (6%), physical inactivity (6%), and overweight and obesity (5%). However, the leading global risks for burden of disease (DALYs) are underweight (6% of global DALYs) were unsafe sex (5%), followed by alcohol use (5%) and unsafe water, sanitation and hygiene (4%). Adjusting interactions, the 24 risk factors selected account for 44% of global deaths and 34% of DALYs. The spectrum of diseases and risks follows a transition as life expectancy, public health and medical care services increase, from infectious/environmental factors (nutrition, water and sanitation) to non-communicable /individual risk factors (tobacco, physical inactivity).

---

[146] Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization. 2009

[147] The report focuses on selected risk factors that have global spread, for which data are available to estimate population exposures or distributions, and for which the means to reduce them are known. They relate to maternal and childhood malnutrition (underweight, suboptimal breastfeeding, iron vitamin A and zinc deficiencies), over-nutrition and physical inactivity (obesity, hypertension, high cholesterol, high bold glucose, low fruit-vegetable intake , physical inactivity), addictive substances (tobacco, alcohol, illicit drugs), sexual and reproductive health ( unsafe sex and unmet contraceptive needs), environmental (urban air pollution, indoor smoke, unsafe water, and sanitation, lead exposure, climate change), occupational (air particles, injury risks, carcinogens, ergonometric stressors, noise) and other (child sexual abuse and unsafe health care injections)

[148] Mathers CD, Lopez AD, Murray CJL. The burden of disease and mortality by condition: data, methods and results for 2001. In: Lopez AD, Mathers CD, Ezzati M, Murray CJL, Jamison DT, eds. Global burden of disease and risk factors. New York, Oxford University Press, 2006:45–240.

[149] The DALY combines years of life lost due to premature death with years of healthy life lost due to illness and disability : . DALYs for a disease or injury are calculated as the sum of the years of life lost due to premature mortality (YLL) in the population and the years lost due to disability (YLD) for incident cases of the disease or injury. YLL are calculated from the number of deaths at each age multiplied by a global standard life expectancy of the age at which death occurs. YLD for a particular cause in a particular time period are estimated as follows: YLD = number of incident cases in that period × average duration of the disease × disability weight. The disability weight reflects the severity of the disease on a scale from 0 (perfect health) to 1 (death) and an additional 3% time discounting and non-uniform age weights that give less weight to years lived at young and older ages.

Although the report recognizes that very often risk factors co-exist as attributable risks and some of their interactions are adjusted in the final estimates, the final figures represent them in an artificial (virtually non-existent in reality) relation of one or few risks-one disease. The report also recognizes that "each risk has its own causes too, and many have their roots in a complex chain of events over time, consisting of socioeconomic factors, environmental and community conditions, and individual behavior." They quote income and education as underlying conditions related to most risk factors.
While the WHO analysis accounts for multiple causality for one disease and adjusts the weight of the attributable risk to these relations, it fails to take into account a higher complexity of causes. For instance, most relations are not linear but exponential, quadratic or others, that in many of them there is a threshold effect, and the fact that many cause-consequence relations have a feed-back (multiplier effect).

The GBD 2010 looks into 42 direct risks of ill health and estimates the attributable risk of loss of healthy life expectancy. It disaggregates data by 1990 and 2010, by world geographic regions, sex and age groups. This is the results of complex analysis including co-morbidity (inter-related causes of ill health). The graphs in the IHME webpage show this distribution. The selected risks relate to a mix of hierarchical causes: underlying global conditions (ozone), environmental conditions (household and ambient pollution, poor water and sanitation, occupational noise, exposure to lead, radon or occupational carcinogens), their effects (occupational injuries), social effects (such as partner or child sexual violence), lifestyles (smoking, alcohol and drugs; low breastfeeding or intake of fruits, nuts/seeds, whole grains, vegetables, omega3, fiber or milk; high intakes of sweetened drinks, sodium, processed meat or trans-fat; and low physical activity), effects in clinical signs (underweight, high blood pressure, high body mass index, high fasting glucose, high cholesterol or low calcium, bone density, vitamin A or zinc) or even cause-related diseases such as occupational back pain.

Given these limitations we could re-group the main health safety needs in the following physical, chemical, biological or radioactive health threats:

Table 7: Physical, chemical and biological health safety needs

| Health threats | Risks /Interactions | Effects and trend | Rights' framework/ Safety needs |
|---|---|---|---|
| i. Physical threats: | | | |
| Extreme temperatures: | Exposure in house (poor insulation)/off-house (homeless) and at work or leisure. | No global statistics: Some estimate that each year about 1.5 million people die from excess cold (and related respiratory conditions) and some 200,000 from heat dehydration and cardiovascular effects) in Europe alone.[150] | UDHR (art 25), International Covenant on Economic, Social, and Cultural Rights (article 11.1) and its general Comment 4[151]. UN Commission on Human Settlements' Global Strategy for Shelter to the Year 2000 (1998) definition of adequacy of housing[152].<br>• Insulated homes and work places.<br>• Adequate clothing according to temperatures.<br>• Information/education on the effects of extreme temperature exposure. |
| | Besides their direct physical effect, temperatures are related to exposure to biological agents | Given the population living in similar northern and southern latitudes, these numbers could be doubled in the world. In subtropical and tropical regions, the number may be opposite, but there are no solid world's estimates. | |
| Trauma | Exposure to physical injuries by natural hazards or man-made (work and household injuries, road traffic accidents, self-inflicted, violence). | Over 5 million deaths /year (9 % of total) and 12.6% of the burden of disease[153]. | UDHRs articles 3-5 refer to causes of violence[154]. The Geneva Conventions for the humanitarian treatment of the victims of war. The Geneva Convention on road traffic, 1949. Specific rights in the Convention of the rights |

[150] Perspective on Climate Change. Prepared by Bjørn Lomborg, adjunct professor at Copenhagen Consensus Center, Copenhagen Business School for the Subcommittee on Energy and Air Quality joint hearing with the Subcommittee on Energy and Environment of the Committee on Science and Technology on Wednesday March 21, 2007.

[151] All individuals, as well as families, are entitled to adequate housing regardless of age, economic status, group or other affiliation or status, and enjoyment of this right must not be subject to any form of discrimination (Paragraph 6).

[152] "Adequate shelter means ... adequate privacy, adequate space, adequate security, adequate lighting and ventilation, adequate basic infrastructure and adequate location with regard to work and basic facilities - all at a reasonable cost."

[153] 31% unintentional deaths and falls (1,6 m annual deaths), 23% due to road traffic accidents (1,2m ), 15% self-inflicted (suicidal, 0,78 m), 10% due to violence (over 0,5 m), 6% due to dawning (0,3 m), 3,8% due to fires (0,2m) and 3,5% due to wards and conflicts (0,18 m). The highest rates are in low income countries (close to 1/1000 pop and year), double to the rate in high income countries

[154] Article 4: Everyone has the right to life, liberty and security of person. Article 4.No one shall be held in slavery or servitude; slavery and the slave trade shall be prohibited in all their forms. Article 5.No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment.

| Health threats | Risks /Interactions | Effects and trend | Rights' framework/ Safety needs |
|---|---|---|---|
| | | | of the child and in women's rights.<br>• Protection from all forms of violence |
| Noise: | Exposure to excessive noise. | Noise health effects are the health consequences of elevated sound levels. Elevated workplace or other noise can cause hearing impairment, hypertension, ischemic heart disease, annoyance and sleep disturbance. Hearing loss corresponds to 4.5 million DALYs. | Environmental noise regulations[155] and WHO guidelines[156].<br>• Outdoor noise below 60 dB.<br>• Occupational noise max 40h at 85dB |
| Air and water particles: | Smoke and dust from industrial processes, agriculture, construction, and road traffic 2.5 to 100 microns in diameter. Combustion of fossil fuels: less than 2.5 microns in diameter.(PM 10) | 7 to 10 percent of all lower respiratory illnesses in children. 0.6 to 1.6 percent of deaths attributable to short-term pollution events[157].<br>Air pollution is estimated to cause approximately 2 million premature deaths worldwide per year. | WHO guidelines[158]:<br>• PM2.5: 10microg/m3 annual mean and 25microg/m3 24-hour mean<br>• PM10: 20microg/m3 annual mean and 50 microg/m3 24-hour mean |
| j. Chemical threats: | | | |
| Air chemical pollution: | 83% of the population in low income countries and 42% of the world's population still uses solid fuels for cooking inside the household. | Indoor pollution causes 3,3% of deaths and 2,7% of the burden of disease, and urban outdoor pollution 2% of deaths and 0,6% of DALYs. | k. WHO Guidelines[159]: |
| | Ozone (O3) from | Breathing problems, trigger asthma, reduce lung | |

[155] Usually specify a maximum outdoor noise level of 60 to 65 dB, while occupational safety organizations recommend that the maximum exposure to noise is 40 hours per week at 85 to 90 dB. For every additional 3 dB(A), the maximum exposure time is reduced by a factor 2, e.g. 20 hours per week at 88 dB

[156] Birgitta Berglund , Thomas Lindvall, Dietrich H Schwela, Guidelines for Community Noise,. World Health Organization 1999

[157] R. Bertollini et al., Environment and Health 1: Overview and Main European Issues, WHO Regional Publications, European Series, No. 68 (World Health Organization, Copenhagen, 1996), pp. 34-38.

[158] WHO Air quality guidelines, Update 2005. See: http://www.who.int/phe/health_topics/outdoorair_aqg/en/

[159] WHO Air quality guidelines, Update 2005 . see : http://www.who.int/phe/health_topics/outdoorair_aqg/en/

| Health threats | Risks /Interactions | Effects and trend | Rights' framework/ Safety needs |
|---|---|---|---|
| | photochemical reaction of light with pollutants such as nitrogen oxides ($NO_x$) | function and cause lung diseases. Daily mortality rises by 0.3% per 10 µg/$m^3$ increase in ozone exposure. | • $O_3$ 100 µg/$m^3$ 8-hour mean<br>• $NO_2$ 40 µg/$m^3$ annual mean and 200 µg/$m^3$ 1-hour mean<br>• $SO_2$ 20 µg/$m^3$ 24-hour mean and 500 µg/$m^3$ 10-minute mean<br>• Lead in drinking water : 0.1 milligrams per litre[160] |
| | Nitrogen dioxide (NO2) from combustion processes (heating, power generation, and engines in vehicles and ships). | Bronchitis in asthmatic children, reduced lung function growth. | |
| | Sulfur dioxide (SO2) from the burning of sulfur-containing fossil fuels for domestic heating, power generation and motor vehicles | Bronchitis, asthma, prone to infections of the respiratory tract and cardiac disease. (When $SO_2$ combines with water, it forms sulfuric acid rain which is a cause of deforestation). | |
| | Heavy metals: Lead, cadmium, Mercury. From industrial sources, leaded gasoline and lead piping. Distributed mainly by air. | Exposure to lead in the womb and during childhood reduces intelligence quotient (IQ), among other behavioral and developmental effects; for adults, it increases blood pressure. It has been associated by WHO to 0,2% of world's deaths and 0,6% of DALYs[161]. | |
| Persistent Organic Pollutants (POPs): | Insecticides and pesticides[162] | Effects on nervous system, immune system, cardiovascular system. | Stockholm Convention on Persistent Organic Pollutants.<br>Code of Practice for the Prevention and Reduction of Dioxin and Dioxin-like PCB Contamination in Foods and Feed'[163]. |
| | Dioxins from industrial processes accumulate in the food chain, mainly meat and dairy products and fish. | Reproductive and developmental problems, damage the immune system, interfere with hormones and cause cancer. | |

[160] WHO. Guidelines for drinking water quality. 2nd edition. Volume 1: Recommendations. Geneva: WHO, 1993

[161] Global health risks: mortality and burden of disease attributable to selected major risks. World Health Organization. **2009**

[162] See : http://www.uspopswatch.org/global/dirty-dozen.htm

[163] WHO, in collaboration with the Food and Agriculture Organization (FAO), through the joint FAO/WHO Codex Alimentarius Commission, has established a 'Code of Practice for the Prevention and Reduction of Dioxin and Dioxin-like PCB Contamination in Foods and Feed'. This document gives guidance to national and regional authorities on preventive measures. The establishment of Codex guideline levels for dioxins in foods is under consideration.

| Health threats | Risks /Interactions | Effects and trend | Rights' framework/ Safety needs |
|---|---|---|---|
| | Other occupational carcinogens | At least 150 chemical and biological agents are known or probable causes of cancer and account for an estimated 8% of lung cancer, which is the most frequent form of occupational cancer. | |
| Unhealthy diets | Over 1,3 billion people are obese and it is increasing at a rate > 100 million per year across all income levels. | Unhealthy diets based on high fat and calorie and low fiver intake lead to obesity, high blood pressure, high glucose and high cholesterol. These risks compounded account for 19% of global deaths and 7% of global DALYs. | No regulations in place. |
| Tobacco, | 41% of the world's men and 9% of the world's women over 15, smoke, 17% of young men 13-15 years and 10% of women 13-15 years smoke. | Globally, smoking causes about 71% of lung cancer, 42% of chronic respiratory disease and nearly 10% of cardiovascular disease. It is responsible for 12% of male deaths and 6% of female deaths in the world. | Framework Convention on Tobacco Control, regulates its marketing towards reducing consumption and ill-effects. |
| Alcohol | Consumption global average of 4,4 liters of pure alcohol per year, 9,4 in high income countries. | Alcohol contributes to more than 60 types of disease. Also responsible for approximately 20% of deaths due to motor vehicle accidents .Worldwide, alcohol causes more harm to males (6.0% of deaths, 7.4% of DALYs) than females (1.1% of deaths, 1.4% of DALYs) | No regulations in most countries. WHA resolution on alcohol marketing under discussion. |
| Illicit drugs: | Opiate users are estimated to have risen slightly to around 16 million. | Illicit drugs cause 0.4% of deaths and 0.9% of DALYs were attributed to illicit drug use in 2004. | Illegal and counter-trafficking measures in most countries. |

| Health threats | Risks /Interactions | Effects and trend | Rights' framework/ Safety needs |
|---|---|---|---|
| l. Biological threats: | | | |
| | There are 1415 species of infectious organisms known to be pathogenic to humans[164]. The main routes of transmission are oral, respiratory, sexual, topical and through vector bites[165]. | Infectious diseases cause 15% of all deaths and 33% of deaths in low income countries (the highest proportion), and 18% and 26% respectively, of DALYs. | Many WHA resolutions, UN declaration of Commitment on HIV/AIDS and MDG 6. |
| m. Radioactivity: | | | |
| | Ionizing radiation is a type of *energy* released by atoms that travels in the form of electromagnetic waves (gamma or X-rays) or particles (neutrons, beta or alpha) from nuclear power generation, medical uses of radiation diagnosis or treatment, especially | Cancer, cerebral damage, neurological embryological abnormalities. | the dose threshold for acute radiation syndrome is about 1 Sv (1000 milliesieverts).<br><br>Cancer risk at chronic doses above 100 mSv. Prenatal brain damage following an acute dose exceeding 100 mSv between weeks 8-15 of pregnancy and 200 mSv between weeks 16-25 of pregnancy. |

[164] Taylor, Latham & Woolhouse, 2001.

[165] Oral transmission is enhanced by poor sanitation (still 42% of the world's population has no access to improved sanitation). Respiratory transmission is enhanced by crowding (house crowding is directly related to income levels and poverty).Sexual transmission is channeled through unsafe sex (less than 60% of the population uses condoms with unstable partners). Vector control and barrier methods can prevent vector-borne diseases (only 30% of people in malaria endemic areas sleep under bed-nets).

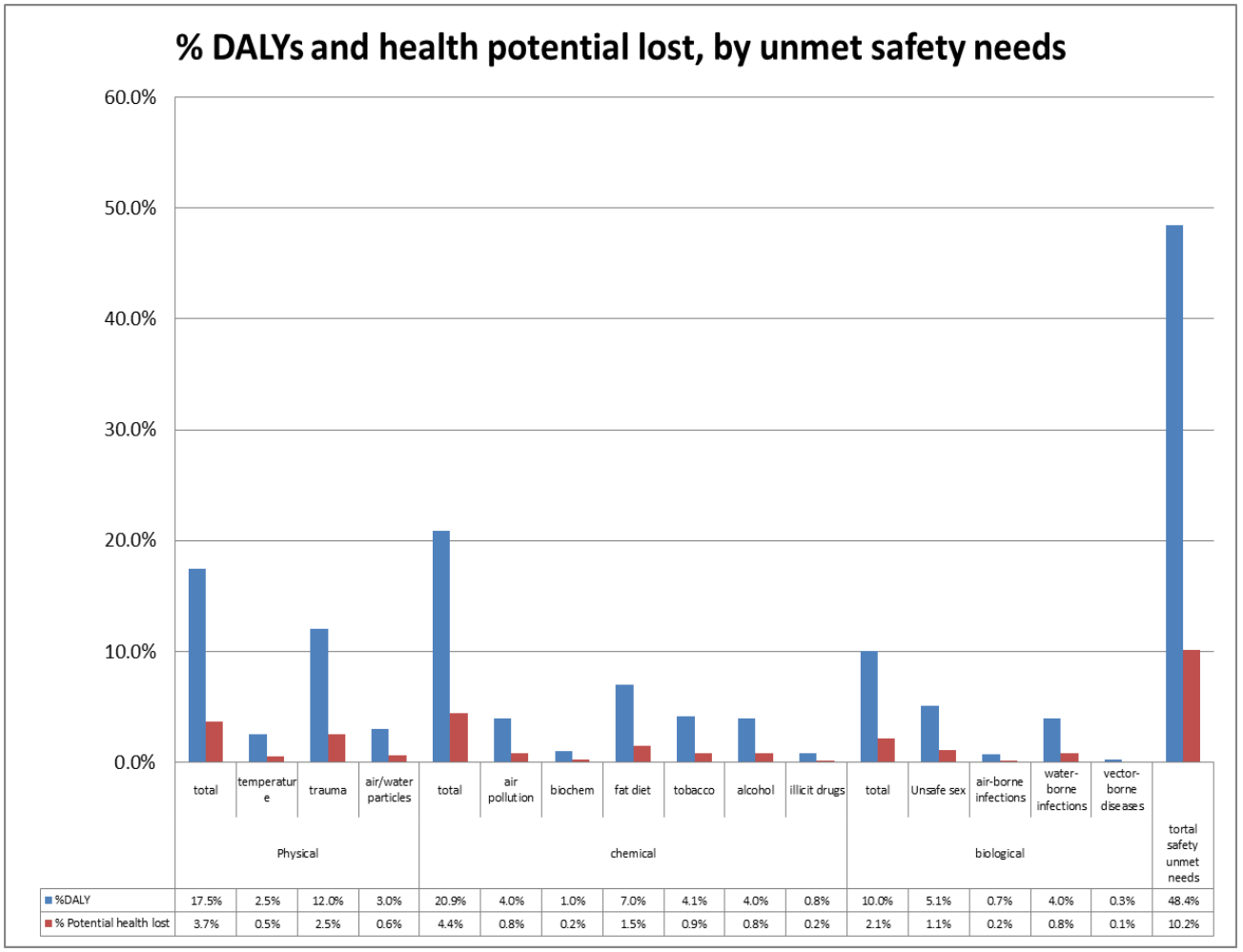



Figure 95: Healthy life lost to unmet safety needs

*Conditions and decisions to develop and fulfill the human potential*

### n. Physical fulfillment

Needs: The human body is the result of 2 million years of evolution. During 99,95% -some 25,000 generations- of the evolution of human kind, physical exercise was essential for survival. In order to use our physical potential, the body needs to deliver adequate levels of oxygen to the tissues. This maximum capacity is known as VO2 max. There is a clear relation with adequate levels of exercise and higher levels of health in almost every aspect of physical health that has been studied[166]. There is also a relation with psychological wellbeing (see section 3) as adequate levels of exercise reduce levels of cortisol and improve levels of mental health[167]. Evidence indicates that in order to achieve the optimum level of physical fitness (high VO2 max) it is necessary to exercise strenuously and repetitively three times a week at least one half hour each time or other equivalent regimes[168]. This level of exercise corresponds with the hunting pattern of the Bushmen, closest to the hunting-gatherer way of life and survival of the vast majority of the generations before us[169]. A more accurate measurement of physical activity described as Physical Activity Level (PAL) is calculated by multiplying the basal metabolic rate (BMR)[170] by a factor appropriate to that activity, known as the Physical Activity Ratio (PAR)[171]. The World Health Organization recommends a PAL for cardiovascular health of 1.7[172].

Each level of activity is linked a level of needs in calories (see section 1.b). A sedentary life of PAL, 1,6 requires 150 kJ (36 kcal)/kg/d, an adequately active lifestyle with PAL of 1,6-1,8 requires some 173 kJ (41 kcal)/kg/d and a vigorous lifestyle needs 235 kJ (56 kcal)/kg/d. Dietary energy intake of a healthy, well-nourished population should allow for maintaining an adequate BMI (Body Mass Index = weight/height$^2$ ) -21 kg/m$^2$ for population average- at the population's usual level of energy expenditure and average normal calorie intake[173]. PAL in this group (healthy group, both men and women) ranges from 1,7, peaks at 40-50 years of age up to 1,8-1,9 and gradually decreases after 60 years of age towards to 1,2-1,3 at 90[174].

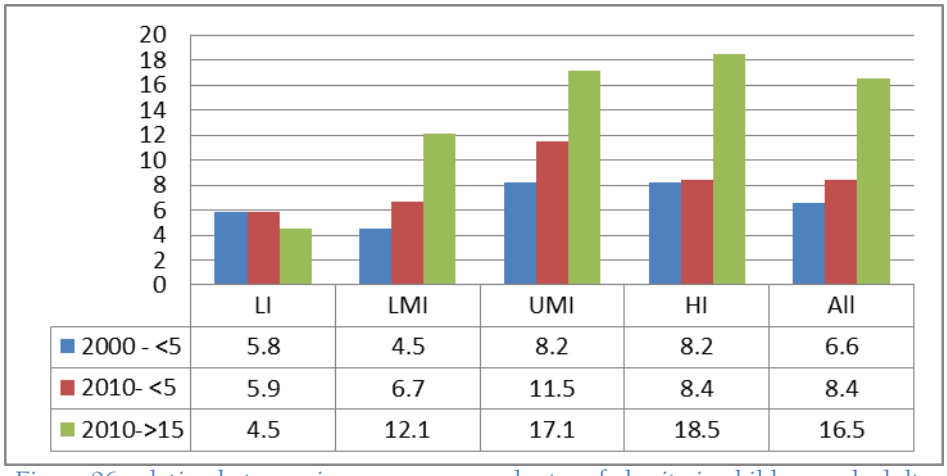
Likewise, the human body requires rest and sleep. Sleep is mediated by the circadian and light-related levels of melatonin, a hormone produced by the pineal gland during the dark hours[175]. Some studies have shown in the past that, for adults, sleeping 7-8 hr is associated with the most favorable physical health with lower levels of health for those sleeping on average less than 6 hours or more than 9 hours[176].

Unmet needs (in contrast with malnutrition, due to choice of lifestyles rather than access to means to satisfy needs): We lack information on the average PAL rates in the world but some studies point at

---

[166] Ari Heinonen, Sarianna Sipilä Physical activity and health Advances in Physiotherapy Jan 2007, Vol. 9, No. 2: 49–49.
[167] Marie E. Donaghy Exercise can seriously improve your mental health: Fact or fiction? Advances in Physiotherapy Jan 2007, Vol. 9, No. 2: 76–88. Read More: http://informahealthcare.com/toc/phy/9/2
[168] WHO/FAO. 2002. Joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases. Draft 28 March 2002. Geneva.
[169] Walter M. Bortz II Physical exercise as an evolutionary force Journal of Human Evolution, Volume 14, Issue 2, February 1985, Pages 145-155
[170] Schofield, W.N. 1985. Predicting basal metabolic rate, new standards and review of previous work. Hum. Nutr. Clin. Nutr., 39C (suppl. 1): 5-41.
[171] PAR = energy cost of an activity per minute/energy cost of BMR per minute. The energy cost of sitting at rest is 1.2; for walking at a normal pace, 4; and for jogging, 7. See table 5.1 in http://www.fao.org/docrep/007/y5686e/y5686e07.htm
[172] WHO. 1985. Energy and protein requirements: Report of a joint FAO/WHO/UNU expert consultation. WHO Technical Report Series No. 724. Geneva.
[173]. At the individual level, a normal range of 18.5 to 24.9 kg/m$^2$ BMI is generally accepted (WHO 1995 and 2000). At a population level, a median BMI of 21.0 was suggested by the joint WHO/FAO Expert Consultation on Diet, Nutrition and the Prevention of Chronic Diseases (WHO/FAO, 2002).
[174] Roberts and Dallal, 2001; Food and Nutrition Board/Institute of Medicine, 2002.
[175] Shochat T, Haimov I, Lavie P Melatonin--the key to the gate of sleep.Ann Med. 1998 Feb;30(1):109-14
[176] Nedra B. Belloc, Lester Breslow Relationship of physical health status and health practices Preventive Medicine Volume 1, Issue 3, August 1972, Pages 409-421

PALs ‹ 1,5 in developed countries and less than 20% of the population (lower in women) achieving adequate PALs. The graphs below show the indirect estimate of inadequate physical activity in its relation to calorie intake. They show the increasing trend in child obesity in the last decade and the higher rates with higher average income by regions, yet this is beginning to change as reflected in the trend of child obesity during the last decade.




| | LI | LMI | UMI | HI | All |
|---|---|---|---|---|---|
| 2000 - <5 | 5.8 | 4.5 | 8.2 | 8.2 | 6.6 |
| 2010- <5 | 5.9 | 6.7 | 11.5 | 8.4 | 8.4 |
| 2010->15 | 4.5 | 12.1 | 17.1 | 18.5 | 16.5 |

Figure 96: relation between income groups and rates of obesity in children and adults

When seen in greater detail, with the available data (limited from low income countries), there is no clear correlation between GDP pc and rates of obesity in adults and neither with GINI index and adult obesity.

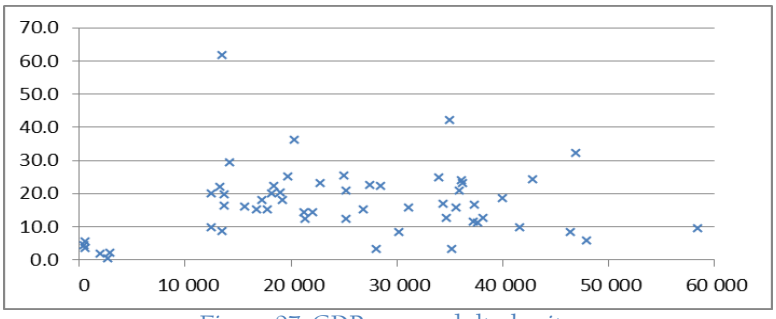



Figure 97: GDP pc vs. adult obesity

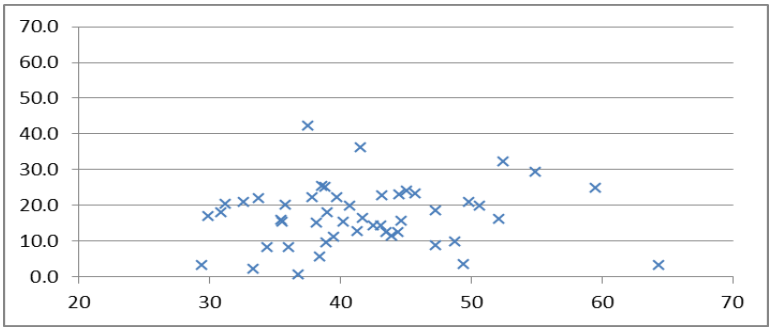


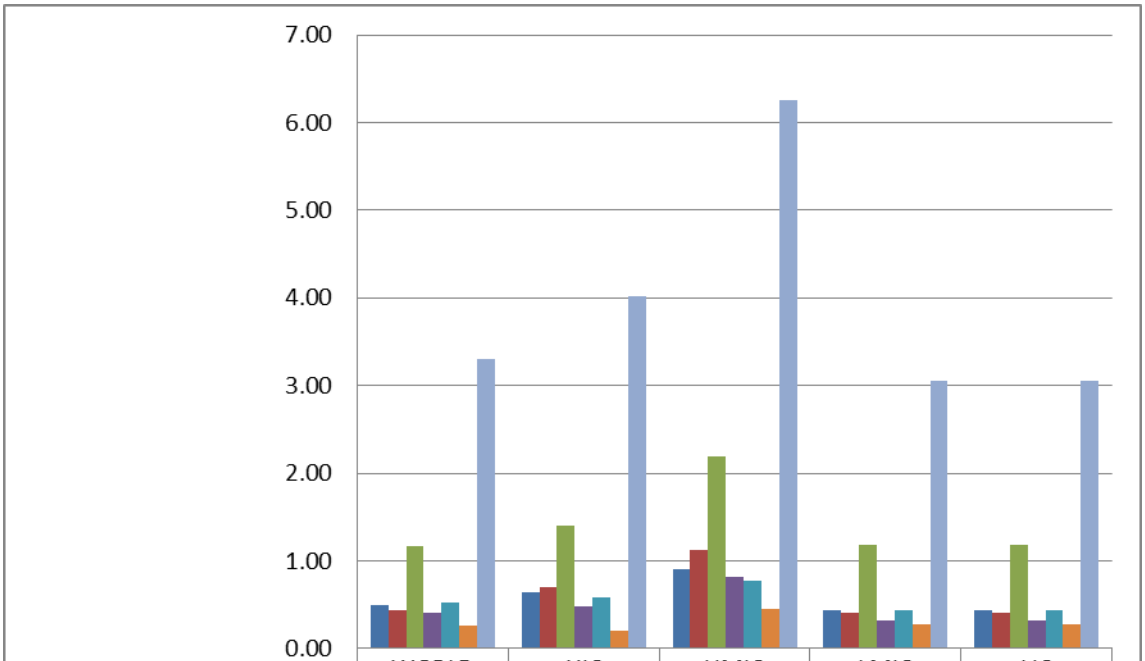

Figure 98: GINI vs. adult obesity

As regards insomnia, studies in developed countries estimate that while 10% to 15% of the adult population suffers from chronic insomnia, an additional 25% to 35% have transient or occasional

insomnia[177]. Who estimates in its latest global burden of disease statistics, that insomnia accounts for 3,2 million DALYs, 0,2% of the global burden of disease.

Consequences: As mentioned in section 2 and according to WHO, together, lack of physical activity and obesity (only artificially separated in their attributable risk as one is a consequence of the other) – or relative low physical activity-, are responsible for 11% of the world's mortality. They have a more direct relation with some diseases in which the attributable risk has been estimated at 21–25% for breast and colon cancers, 27% for diabetes and 30% for ischemic heart disease burden. Figure 7 shows the estimated effects in mortality of physical in (hipo-) activity, obesity and also one associated factor to low exercise-high calorie intake: low fibre diets, and three other risk factors related to sedentary lifestyles: high blood pressure, high cholesterol, and high blood glucose. The overall proportion of deaths and of burden of disease as estimated by DALYs is represented in figure 8.

Insomnia has been shown to be independently associated with worsened quality of life. It is often difficult to assess precisely as insomnia is also the consequence of many causes of ill physical and mental health. However, there is enough evidence to confirm that patients with abnormal sleep patterns predict lower life expectancy, and that people with insomnia are more likely to develop affective disorders, substance abuse, and other adverse health outcomes[178].




| | WORLD | HIC | UMIC | LMIC | LIC |
|---|---|---|---|---|---|
| Physical inactivity | 0.50 | 0.64 | 0.91 | 0.44 | 0.44 |
| Overweight and obesity | 0.44 | 0.70 | 1.12 | 0.40 | 0.40 |
| High blood pressure | 1.17 | 1.40 | 2.19 | 1.18 | 1.18 |
| High cholesterol | 0.41 | 0.48 | 0.81 | 0.32 | 0.32 |
| High blood glucose | 0.53 | 0.58 | 0.77 | 0.44 | 0.44 |
| Low fruit and vegetable intake | 0.26 | 0.21 | 0.46 | 0.28 | 0.28 |
| Total sedentary effects | 3.30 | 4.01 | 6.26 | 3.06 | 3.06 |

Figure 99: Mortality rates by sedentary life-risks, by income region

[177] Karl Doghramji The Epidemiology and Diagnosis of Insomnia Am J Manag Care. 2006;12:S214-S220
[178] Karl Doghramji The Epidemiology and Diagnosis of Insomnia Am J Manag Care. 2006;12:S214-S220

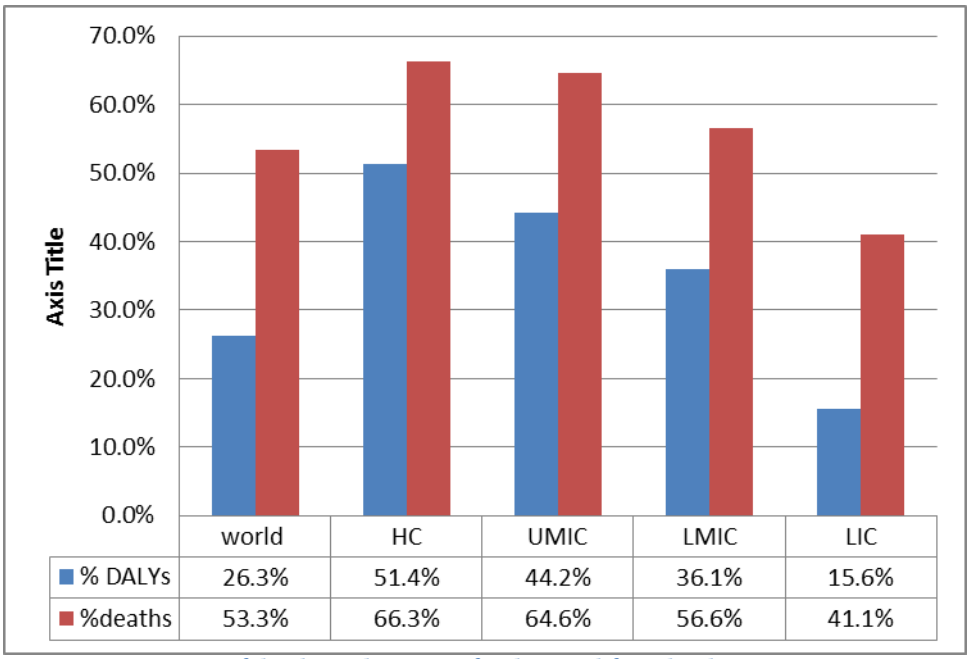


Figure 100: % of deaths and DALYs of sedentary life styles, by income region

The legal framework: WHO Global Strategy on Diet, Physical Activity and Health, from May 2004 provides recommendations for Member States, WHO, international partners, private sector, civil society and nongovernmental organizations on the promotion of healthy diets and regular physical activity for the prevention of non-communicable diseases. Obesity and inadequate physical activity are two of the four major risk factors identified in the WHA Action Plan in 2008[179] and UN political declaration on non-communicable diseases in 2011[180].

### o. Social fulfillment

Needs (social capital vs. thrive for dominance): In our psycho-social dimension, we share common genetic traces from ape ancestors which show very different social structures and relations, ways to confront challenges and fear, and ways to satisfy the social need or desire for several dimensions of social relations. Apes and humans share some 98% of the genetic structure. Different species of apes have different social structures and dynamics. Studies in Bonobos have shown how they base their social structures and dynamics in *counter-dominance* strategies enhancing social, physical and sexual contacts and relations and a predominantly egalitarian society[181]. Such social structure enhances the capacity and exercise of *empathy*,[182] which enables a common sense of belonging and increases the levels of trust and human contact (sharing) and happiness. This has been shown to have a biological expression (and causal relation?) of higher levels of dopamine and serotonin[183] (feeling of happiness).

These attitudes and biological markers or contributors, lead to what is defined as "social capital" (sum of involvement in community life)[184]. The levels of social capital are correlated with greater levels of equity and the latter with higher levels of solidarity within and with others[185]. On the other side, and as shown by other ape-ancestors such as chimpanzees, a hierarchy of dominance can also guide human social relations between higher and lower status, including sexual relations[186]. This social

[179] http://apps.who.int/gb/ebwha/pdf_files/A61/A61_8-en.pdf
[180] http://www.un.org/ga/search/view_doc.asp?symbol=A%2F66%2FL.1&Lang=E
[181] FB de Waal, F Lanting, Bonobo: the forgotten ape. Berkeley: University of California Press, 1997.
[182] G Rizzolatti, L Craighero, The mirror-neuron system, Annual Review of Neuroscience (2004) 27: 169-72.
[183] JK Rilling, GA Gutman, TR Zeh, G Pagnoni, GS Berns, CD Kilts. A neural basis for social cooperation, Neuron (2002) 35:395-405.
[184] RD Putnam, Social capital: measurement and consequences. ISUMA: Canadian Journal of Policy Research (2001)2 (1): 41-51
[185] OECD, International development Statistics Online. OECD. Statistics.
[186] K Jensen, J Call, M Tomasello. Chimpanzees are rational maximizes in an ultimatum game, Science (2007)318 (2007): 107-9.

pattern is based on maximizing the social self (differentiation from the rest) and is linked with thrive for possession. While these dynamics maximize the individual freedom and include the *freedom to be superior*, they are associated to lower levels of trust and higher levels of sense of loneliness and anxiety[187], stimulating the HPA (hypothalamic-pituitary-adrenal) axis and the autonomic nervous system triggering higher chronic levels of cortisol[188 189] and a number of negative effects in human's physical health[190 191 192 193] and mental health which feed-back into further dysfunctional social and psychological attachment [194 195 196 197 198]. These attitudes, and the biochemical spirals of feed-backs they may trigger to insecure self-esteem, threatened egotism and narcissism[199], associated with increased consumption related to keeping or advancing in status[200 201]. This process leads to higher levels of social stratification and gradient and lower mobility, which feed-back in the same dynamics of dominance and social-self.

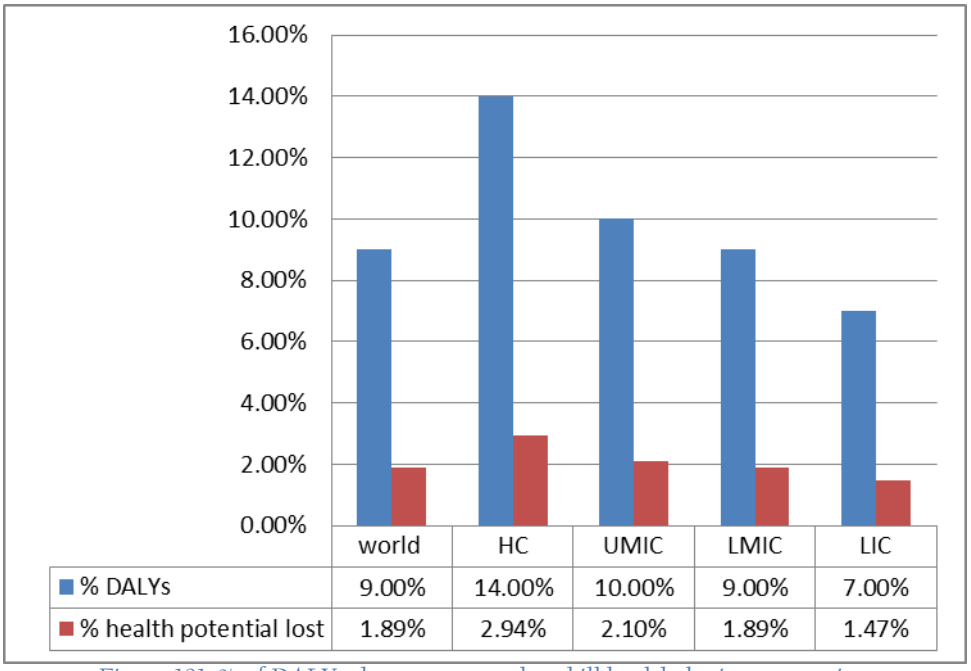
### p. Psychological fulfillment

Needs: In a closer circle –yet overlapping with the social needs described above- humans require giving and receiving affection and love. Love needs include the physical contact and reproductive and sexual relations. By the Maslow pyramid this is labeled as love and belonging needs and include longings for an intimate relationship with another person as well as the need to belong to a group and to feel accepted. There is a chemical basis to this need and its effect, when satisfied, in wellbeing. The feelings of love, wellbeing and optimism activate the limbic system and release oxytocin,[202] which has the capacity to increase social attachment and other positive social behaviors, providing additional indirect benefits of sociality[203]. Love, compassion and joy improve our physical and mental health [204 205], and make our immune system function better and help to battle diseases[206 207 208].

---

[187] JM Twenge, the age of anxiety? Birth control change in anxiety and neuroticism, 1952-1993, Journal of personality and Social Psychology (2007) 79 (6): 1007-21.
[188] R Sapolski, Sick of poverty, Scientific American (2005) 293 (6): 92-9.
[189] L Viretta, B Anton, F Cortizo and A salli, Mind-body medicine: stress and its impact on overall health and longevity, Annals of the New York Academy of Sciences (2005) 1057 : 492-505.
[190] Esch T, Stefano GB, Fricchione GL, Benson H. Stress in cardiovascular diseases. Medical Science Monitor 2002; 8:RA93-RA101. health. Science 1988; 241:540-5.
[191] 22 Esch T, Stefano GB, Fricchione GL, Benson H. Stress-related diseases: A potential role for nitric oxide. Medical Science Monitor 2002; 8:RA103-RA118.
[192] 23 Esch T, Stefano GB, Fricchione GL, Benson H. The role of stress in neurodegenerative diseases and mental disorders. Neuroendocrinology Letters 2002; **23**:199-208.
[193] House JS, Landis KR, Umberson D. Social relationships and health. Science 1988; **241**:540-5.
[194] Carter CS. Neuroendocrine perspectives on social attachment and love. Psychoneuroendocrinology 1998; **23**:779–818.
[195] Esch T, Fricchione GL, Stefano GB. The therapeutic use of the relaxation response in stress-related diseases. Medical Science Monitor 2003; **9**:RA23-RA34.
[196] Insel TR. A neurobiological basis of social attachment. Am J Psychiatry 1997; **154**:726-35.
[197] Kirkpatrick B. Affiliation and neuropsychiatric disorders: the deficit syndrome of schizophrenia. Ann N Y Acad Sci 1997; **807**:455-68.
[198] Modahl C, Green L, Fein D, Morris M, Waterhouse L, Feinstein C et al. Plasma oxytocin levels in autistic children. Biol Psychiatry 1998; 43:270-7.
[199] JM Twenge, the age of anxiety? Birth control change in anxiety and neuroticism, 1952-1993, Journal of personality and Social Psychology (2007) 79 (6): 1007-21.
[200] RW Emerson, Conduct of Life. New York: Cosimo, 2007.
[201] A Kalma, Hierarchization and dominance assessment at first glance, European Journal of Social Psychology (1991) 21 (2): 165-81.
[202] M Kosfeld, M Heinrichs, PJ Zak, U Fischbacher, E Fehr. Oxytocin increases trust in humans
[203] Carter CS. Neuroendocrine perspectives on social attachment and love. Psychoneuroendocrinology 1998; **23**:779–818.
[204] Esch T, Fricchione GL, Stefano GB. The therapeutic use of the relaxation response in stress-related diseases. Medical Science Monitor 2003; **9**:RA23-RA34.
[205] Esch T, Stefano GB. Proinflammation: A common denominator or initiator of different pathophysiological disease processes. Medical Science Monitor 2002; **8**:1-9.
[206] Esch T, Guarna M, Bianchi E, Zhu W, Stefano GB. Commonalities in the central nervous system's involvement with complementary medical therapies: Limbic morphinergic processes. Medical Science Monitor 2004; **10**:MS6-MS17.
[207] Esch T, Stefano GB. The neurobiology of pleasure, reward processes, addiction and their health implications. Neuroendocrinology Letters 2004; **25**:235-51.
[208] Keltner D. Expression and the course of life: studies of emotion, personality, and psychopathology from a social-functional perspective. Ann N Y Acad Sci 2003; **1000**:222-43.

Unmet needs of social and psychological fulfillment: Stress-related ill physical and mental health is difficult to estimate. Mental health disorders excluding those related to neurological diseases and substance addictions (part of the latter induced and perpetuated by stress and anxiety), are responsible for 153 million of DALYs per year, that is, some 9% of the global burden of disease (14% in high income countries, 10% in upper-middle income countries, 9% in low-middle income countries and 7% in low income countries). This does not include the effects of stress, anxiety and chronically high cortisol in morbid-mortality from cardiovascular diseases, respiratory conditions, gastrointestinal diseases, musculoskeletal disorders and other manifestations of mental health (violence, drug addiction, others). It neither takes into account the effects of stress in unhealthy sedentary lifestyles, which are a consequence and a feeding-back cause of chronic stress and anxiety.




| | world | HC | UMIC | LMIC | LIC |
|---|---|---|---|---|---|
| % DALYs | 9.00% | 14.00% | 10.00% | 9.00% | 7.00% |
| % health potential lost | 1.89% | 2.94% | 2.10% | 1.89% | 1.47% |

Figure 101: % of DALYs due to stress-related ill health, by income region

The following figure shows an estimate of the risks as clustered by the Maslow's pyramid. A local and dynamic view at these risk areas and their interaction is useful to guide the main direct interventions, but the comprehensive approach relates to the analysis and actions of root causes.

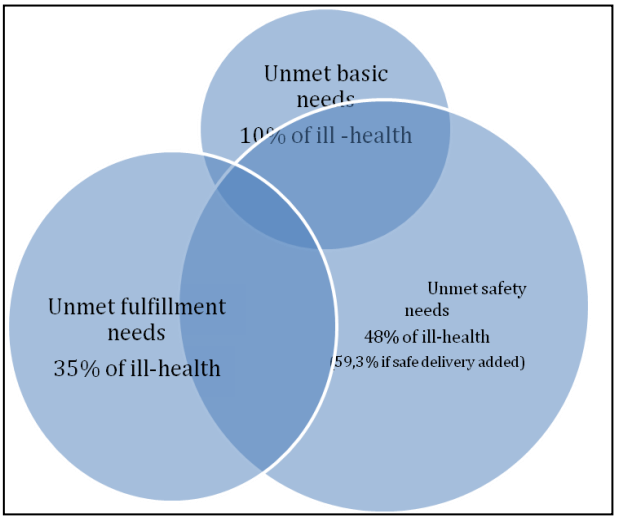



Figure 87 : Global dynamics of unmet health needs

## The present global health framework

### The MDG Agenda

The MDG agenda gathered in year 2000 the commitments of all UN member states around priority areas for poverty reduction and sustainable development. The eight MDGs direct attention to three main areas of human development: strengthening human capital, improving infrastructure, and raising social, economic, and political rights. Human capital advances through improved nutrition (MDG 1), better health status (MDG 4, 5 and 6), and education (MDG 2). Infrastructure advances through improved access to water and sanitation, sustainable agro-ecological practices, environmental preservation, and improvement in urban slum conditions (MDG 7) and modern information/communication (MDG 8). Thirdly social, economic (MDG 1), and political rights advance through empowerment of women (MDG 3), higher employment and commitment to good governance (MDG 8). Lastly, the goals specify the need for 'a global partnership for development' to improve the function of the trade and financial systems, ensure adequate development assistance, and resolve national debt problems (MDG 8). During the last decade it triggered unprecedented commitments on the levels of ODA (Monterrey and beyond) and on the principles to increase its efficiency (Paris and beyond). The MDG agenda is especially relevant to global health challenges. Three (MDGs 4, 5 and 6) out of the eight MDGs are health-specific, and the rest are highly relevant to global health challenges (poverty reduction and nutrition, gender equality, education–, water and sanitation and coherence for development), especially in relation to access to medicines.

#### *Health-MDG progress and shortcomings*

##### Insufficient progress towards most health MDG targets:

From the baseline levels of 1990, there has been significant global progress on the proportion of underweight children in developing countries (from 29% to 18%), the rate of under five mortality (from 88 deaths per 1000 live births to 57), the coverage of measles vaccination (reaching 85%) and deaths (decreased by 78%), the number of maternal deaths (from 546 000 to an estimated 358 000) and proportion of births attended by skilled personnel (from 55% in 1990 to 65% in 2009, reductions in the number of deaths due to malaria (by some 20%), tuberculosis (by a third) and in the number of new HIV infections (25% decline in the last decade) and 16 times more people in HIV treatment as they were in year 2000, the proportion of the population without sustainable access to safe drinking-water (from over 30% to only 16%) and to basic sanitation (from 46 to 39%).

However, at the present rate of progress, the world will fail to meet the target on child mortality (some 30% excess deaths from target) and maternal mortality (less than half of the progress required). This translates in the excess number of deaths of some 3 million children under 5 and 150,000 women during pregnancy. The cumulative failure (burden of lagging behind) during the last decade will be of over 20 million children and half a million women during pregnancy and delivery. The limited success is due to the failure of progress in developing countries where over 90% of child deaths and 99% of maternal deaths, took place. While there has been clear success in reducing infections and deaths from HIV/AIDS, malaria and tuberculosis (which altogether attracted a significant part of the increased development health aid) there are still 9 million untreated HIV-positive people, malaria still kills close to 800,000 children every year and multidrug-resistant TB is on the increase. As regards the other MDGs most relevant to health, over 100 million children remain undernourished, close to a billion still lack access to drinking water, over 2,5 billion have no access to a adequate sanitation and the availability of the required medicines at public-health facilities in low income countries is only 44% and are paid at prices at an average of three times higher the international reference price.

### Weakly measured:

Unfortunately, the actual amount of progress is obscured by the lack of measurement reliability in all countries. For example, between 2010 and 2011, three different agencies responsible for estimations of maternal mortality published maternal mortality ratios for Nigeria of 608, 840, and 487[209]. This vast range of estimates confuses discussions of policy strategies and programs to avert deaths. This lack of reliable and valid measurements of many of these targets and indicators has hampered even greater accountability for progress.

On the other side, measure of progress is based on national average figures, ignoring the role of inequities in perpetuating absolute and relative levels of poverty. Only MDG1 specifically has an indicator which measures the poverty gap between the richest and poorest wealth quintiles. Other factors such as ethnic origin, gender, location (urban, rural, slum) might be more dominant. For the other MDGs, there is no breakdown by variables that influence health disparities, therefore national averages may hide major inequities and progress on average levels may not reflect the absolute numbers of people not enjoying the MDG progress. Relying on national averages means that countries can make progress toward MDGs by improving the health of those who are relatively well-off to begin with, leaving the poorest behind and potentially increasing health inequalities[210]. Indeed, such inequalities have been demonstrated with MDG 4, the goal of which is to reduce child mortality, and this phenomenon likely holds true for MDG 5 as well[211]. Equity-adjusted goals and measures are much more likely to promote the original spirit of the MDGs and to encourage real progress in reaching those who have the greatest need for health services[212].

## *Reasons for the health MDG shortcomings*

Evidence proves that health is deeply related to economic, ecological and social policies and determinants. Any analysis that ignores any of these three pillars is bound to fail in addressing in a sustained and effective way the health challenges of today and the future.

UNDP's Human Development Report of 2011 focuses on sustainability and equity and defines sustainable human development as the *expansion of the substantive freedoms of people today while making reasonable efforts to avoid seriously compromising those of future generations*.
On the other side, many analysts have concluded that one of the factors undermining MDG progress has been the focus on MDGs in isolation, "in silos", duplicating or at times counteracting efforts, and leading to approaches without the required balance of attention to needs and their root causes or to the functioning of the whole health care system. An approach to health gains that disregards the root causes in the economy, ecology and wider social policies will fall in the same mistakes of the recent past.

That is why the approach to sustained, equitable and effective human development requires an integrated social, ecological, and economic approach which is balanced and maximizes the synergies between these three pillars of human development.

---

[209] Byass & Graham W. 2011 Grappling with uncertainties along the MDG trail. Lancet Sep 24;378(9797):1119-20.
[210] Gwatkin, D. R. (2005). How Much Would Poor People Gain from Faster Progress Towards the Millennium Development Goals for health? Lancet, 365(9461), 813-817.
[211] Reidpath, D. D., Morel, C. M., Mecaskey, J. W., & Allotey, P. (2009). The Millennium Development Goals Fail Poor Children: The Case for Equity-Adjusted Measures. PloS Medicine, 6(4), e1000062.

### *Economic determinants:*

In the last years the evidence has mounted to prove the impact of economic determinants on health. Income levels and disparities, and their relation with access to education, decent working and living conditions and social protection, condition the health in all countries and social groups within them. Income disparities within and between countries influence health inequities and pose an overall negative effect in the health of all strata[213]. MDG1 includes indicators related to income and poverty (share of the population under 1$/day). Robust growth in the first half of the decade reduced the number of people in developing countries living on less than $1.25 a day from about 1.8 billion in 1990 to 1.4 billion in 2005[214], but the protracted crisis (financial, food price, economic) in the second half of the decade threatens to turn back that limited success. On the other side, in some countries the share of people in absolute poverty may have decreased but inequity gaps remain poverty and its ill effects in health therefore persist.

### *Ecological determinants*

Ecological factors influencing ill health determine the levels and safety of nutrition, water, air and temperatures have worsened: nearly 40% of land is degraded due top soil erosion and land productivity is declining, much of that land unsustainably uses water, the world still loses some 13 million hectares of forests every year, has increased 50% its carbon emissions (from 20 in 1990 to 30 billion tons in 2008), the rate of animal species disappearing increases and so does the stock of global fisheries. Economic policies prioritize competition and growth above all other criteria. The dominant economic model influences lifestyles that negatively affect the environment: abuse of energy for transportation, heating/cooling and overall growing consumption and increasing sedentary lifestyles. These lifestyles affect also people's health increase the prevalence of chronic non-communicable diseases and health care costs.

### *Social policies: with a focus on health factors*

MDG1 includes monitoring of decent work and employment, MDG 2 includes targets related to child and adult education and MDG 3 aims at greater gender equality. The employment rates have barely changed in the last two decades and neither have the working conditions and the rates of workers on "own account". Net enrolment rates have increased in developing countries and youth literacy has increased but over 100 million children remain out of school. Gender parity at all levels of education has improved but the access of women to decent working conditions and decision making positions remains low in the majority of countries.

## Health systems failing universal equitable quality services

Health systems' performance has remained stagnant or even weakened in much of the developing world. The main factors are weak right to health frameworks, limited public financing for integrated health services and growing and/or ageing populations, health care demands (given the double burden of communicable and non-communicable diseases) and increasing prices of key health resources (human resources for health and medicines, vaccines and other health products) on global markets.

The international binding health right framework captured in the International Covenant of Economic, social and cultural rights (ICESCRs) and its General Comment 14 (year 2000) on the right to health, defines the state responsibilities and the wide scope of health rights in relation to social determinants for health and access to health services. However, it has not been ratified by all countries (notably the United States), and is meant to be realized in a "progressive" way, as "national

[213] The Spirit Level: Why More Equal Societies Almost Always Do Better, . Richard G. Wilkinson and Kate Pickett, 2009.
[214] UN MDG report 2011

means allow". In the absence of global health governance defining needs and responsibilities, the progressive nature of the right to health framework leaves it vague and unaccountable for. At national level, most countries replicate this ill definition of responsibilities of duty bearers and right holders.

Taking again the agreed objective of global health equity and the standard of health indicators in the high-income region, there are no countries that can achieve those standards at a public financing level for health lower that 50 Euros per capita. Between 50 and 70 Euros per capita, there is a group of countries that are able to achieve under child and adult mortality rates within the confidence interval of the high income region (where average public spending is ten times higher and in some cases (as the US), over 40 times higher). Even if developing countries would allocate some 15% of their national budgets (Abuja target and OECD average), increase their fiscal revenue rate to 20% of the GDP and maintain economic growth rates of 3%, there would still be some 30-40 countries with public budgets for health below the above referred minimum level as achieved by the best performers. **The gap of public financing required to enable those countries, most of them off-track the MDGs, to improve the health of their people, would be in the region of $ 60 Bn.**

Besides the insufficient levels of health financing, low-income countries often have inefficient health systems and with low levels of equity towards populations in greatest needs and health risks and problems with greater burden of diseases.

### Weak global health governance and its consequences

In very few countries there are legal frameworks that effectively protect and promote, protect and, when required, enforce the right to health. At global level, global health conventions which are binding and address some of the root causes of ill health, are only limited to the International health Regulations targeting health threats, and the Framework Convention for Tobacco Control. Many of the above mentioned root causes of ill health require international binding conventions: such as on health risks as alcohol, drugs, unhealthy foods, equitable innovation, a more effective TRIPS framework and a global redistribution of health resources to guarantee minimum levels of public financing for health towards universal coverage of health services.

The present structure of WHO financing undermines the democratic nature of the World health Assembly and the pertinence of global health strategies and action, influenced at present by economic power rather than the voice and the needs of the populations.

#### *Innovation, trade and migration dynamics*

The so-called 10/90 gap refers to the bias whereby only 10% of health research targets the health problems of 90% of the population, lacking enough purchasing power to attract, under the dominating market dynamics, adequate levels of investments in research and development for their needs. There are worrying signs that the new molecules in the pipeline for pertinent health problems, have decreased in parallel to the implementation of TRIPS. The World health Assembly Strategy on Innovation, Public health and Property rights opens the possibilities of alternative frameworks to encourage global public and private funding and for global goods for health.

Besides the weak pipeline of pertinent new health tools for the world's needs, their affordability is limited and increasingly challenged. Trade agreements influence the access to essential medicines and medical products. The implementation of WTO rules on medicine patents and the low use of TRIPS provisions which prioritize public health needs to patent-holders' profits, may undermine the access to affordable and quality essential, often live-saving, medicines in developing countries. Certain trade agreements may tighten the patent rights and extend their periods of monopoly so that the pharmaceutical public budget may increase significantly and undermine access to quality health care for all.

The migration of health professionals (especially from low-income countries) is one of the factors that decreases the availability and retention rates of health works in low- income countries, rural areas and the public service. The World health Assembly voluntary code of conduct for the recruitment of health workers indicates a number of priority areas to to address the causes and consequences of brain drain. However, the economic disparities between countries, the flow of information, and the growing health demands in aging and sedentary populations in developed countries continue to drain health works from developing countries and undermine efforts of health systems.

### *Development aid*

The MDG agenda gathered the commitments of all UN member states around priority areas for poverty reduction and sustainable development. It succeeded in mobilizing increased levels of ODA and in raising attention to health as three out of the eight MDGs are health-specific, and the rest are highly relevant to global health challenges. It led to an increase in the level of health ODA, especially by the US (which multiplied its aid by a factor of 6,5, and caused over 50% of the overall increase in ODA), and the EU (with a factor of 3,5 and leading to 30% of the overall increase). This increase has been higher in HIV/AIDS programmes (which increased by a 30-fold) and through non-governmental recipients (which share went from 4 to 44%)[215].

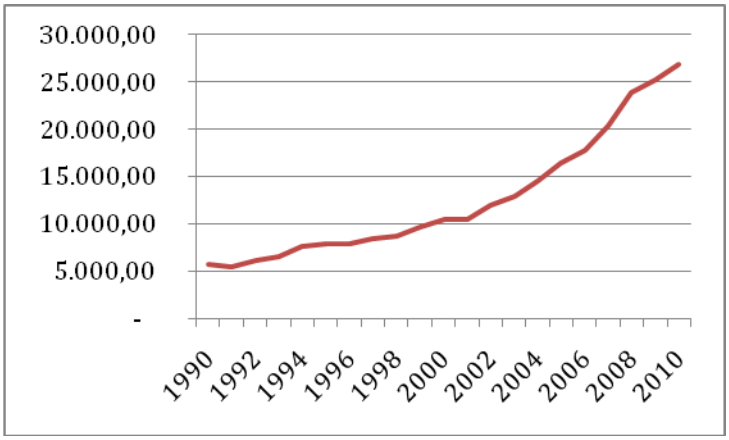



Figure 102: levels of health ODA 1990-2010

However, in the absence of a strong health governance and a definition of responsibilities and accountability to political commitments, health aid has been insufficient to meet the health public financing gap mentioned above (the present level of health development aid is one third of the 40 Bn Euro gap), only half of it goes to these countries in greatest financial need, has been volatile with very low levels of predictability, has been poorly aligned to countries' priorities and policy and budgeting processes and has often distorted the health sector in detriment of supporting recurrent costs (vs. investments), the public service (vs. the private sector) and the integrated health services (vs. specific disease programmes). The large fragmentation and volatility of a mainly sill dominating project-based approach of health aid, places the health sector as one of the worst off in its compliance with the aid effectiveness principles and commitments. The low levels of equity of health ODA also applies to the donor community taken as a whole.

[215] Data from the Institute of health Metrics and Evaluation : http://www.healthmetricsandevaluation.org/

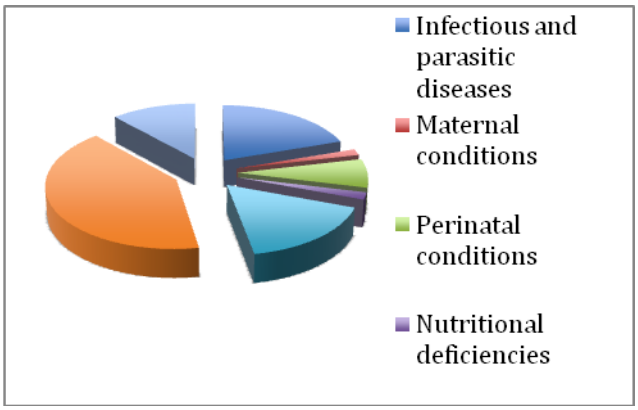



Figure 103 : Burden of disease by 2015

The graph below shows the low correlation of global health aid and the potential financial needs:

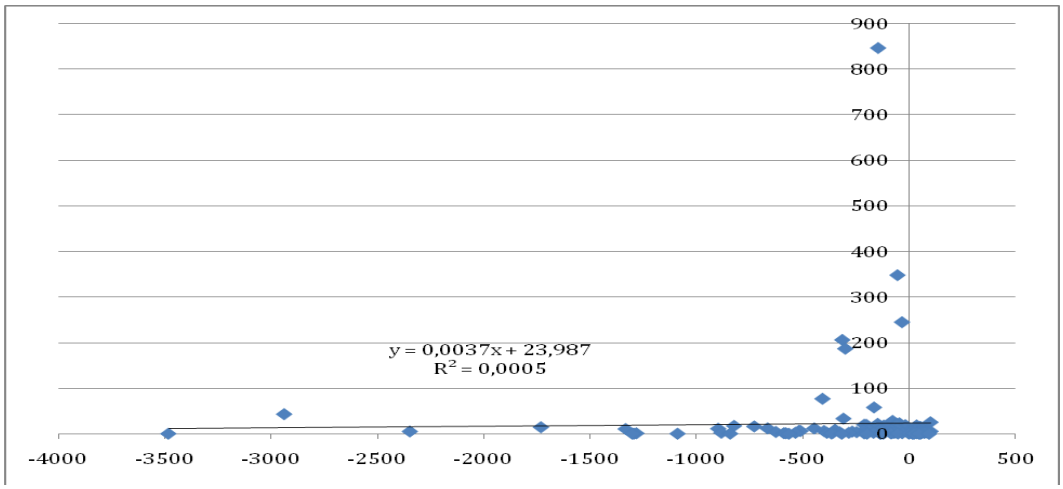



Figure 104 : Distribution of global health aid in relation to needs

The countries with highest health aid per capita are small pacific island states:

| Recipient country | health aid per capita | Potential financing gap |
|---|---|---|
| Niue | 846 | -146 |
| Palau | 348 | -55 |
| Marshall Islands | 245 | -34 |
| Micronesia (Federated States of) | 206 | -314 |
| Nauru | 187 | -301 |
| Cook Islands | 77 | -408 |
| Kiribati | 58 | -165 |

These countries are followed by Israel, major recipient of US aid, yet with a "negative"(surplus) potential gap of almost 3000 $ per capita.

Excluding Israel and the island states mentioned above, this is how the correlation shows:

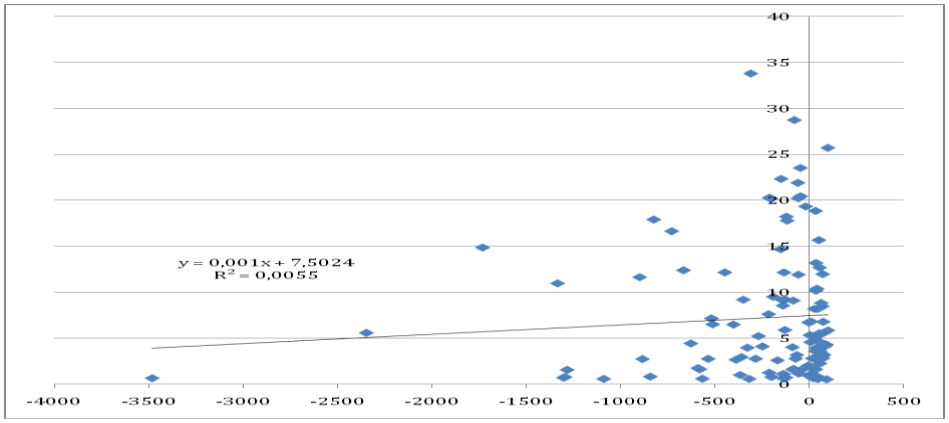
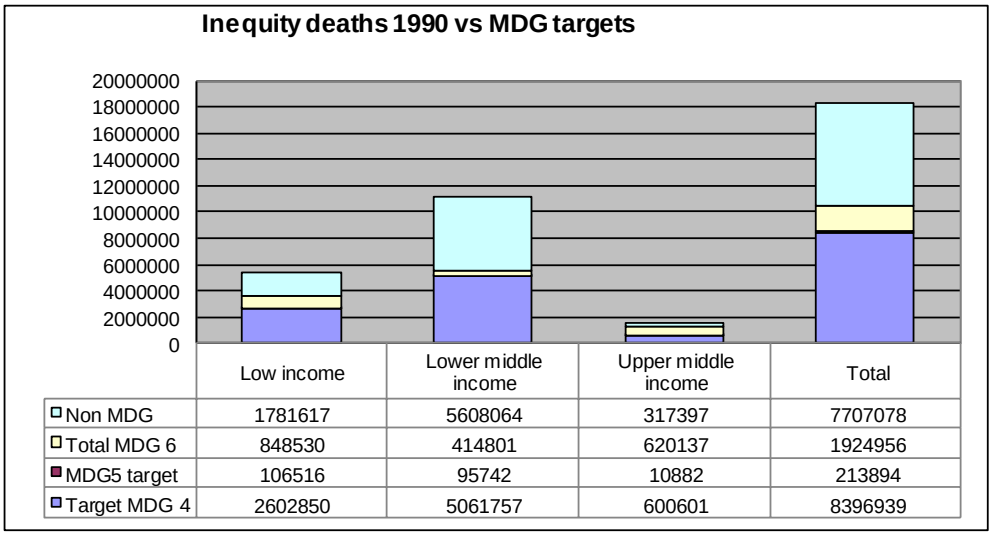



Figure 105 : global health aid and needs (excluding island states and Israel)

Besides the low equity of development aid, the degree of compliance with the aid effectiveness principles aimed to increase the pertinence, impact and ownership of development aid, is very low. The last high level summit on aid effectiveness in Busan showed that ONLY ONE (coordination of capacity building) of the 13 targets of aid effectiveness has been met (and with doubts on how it is interpreted and measured)[216].

## *Present and projected pertinence of the MDG agenda*

The WHO constitutional objective in 1945 stated the ambition to advance the best attainable standard of health by all peoples. Taken the best standard as the average under five and adult mortality in the high income region of the world, the gap with other regions translates in some 20 million deaths a year, one third of all world deaths. The health MDG targets of two thirds reduction of under five mortality, three fourths of maternal mortality and halting the AIDS and malaria epidemic (even if understood as avoiding all deaths by these diseases), mean only 60% of the global health inequity burden.




| | Low income | Lower middle income | Upper middle income | Total |
|---|---|---|---|---|
| Non MDG | 1781617 | 5608064 | 317397 | 7707078 |
| Total MDG 6 | 848530 | 414801 | 620137 | 1924956 |
| MDG5 target | 106516 | 95742 | 10882 | 213894 |
| Target MDG 4 | 2602850 | 5061757 | 600601 | 8396939 |

Figure 106 : Pertinence of health MDGs vs. GHE

216 http://www.oecd.org/dataoecd/49/11/48726738.pdf

The economic, ecological and social factors in the next 30 years need to be taken into account to estimate which will be the main health challenges and needs in the coming, say 20 to 30 years. Under the current economic and demographic dynamics and their effects in society and the ecology, most forward looking models estimate growing economic inequities, growing climate change and its negative effect in natural resources and growing disparities in social conditions and services. In terms of health, the IHME and WHO estimate that a growing share of the burden of disease will be caused by non-communicable diseases, mental health and injuries, which together will be responsible for two thirds of the burden of ill health in 2015 and gradually growing to 80% by 2050.

This low present and future pertinence is due to two failures of the framework: On the one hand, that the MDGs do not include the adult (other than maternal deaths) population, and the non-communicable diseases, responsible for a large and growing share of the burden of disease.

### Lack of attention to health equity

On the other hand and as mentioned in the measurement shortcoming, the MDG agenda does not take into account national and international health inequities. Even if the MDG targets were met, the differences between countries and income regions would remain and the progress towards the agreed global health objective, stagnated. Preliminary analysis developed by partners in the consortium, indicates that the "global health inequity burden" has not decreased, in absolute and relative terms, in the last twenty years.

## *Social epidemiology and the CSDH framework*

Social epidemiology has looked at social and biological influences in health and health inequities from psychosocial approaches (stressing the role of self-perception of personal status triggering neuro-endocrine dysfunctions), political economy of health (political and economic factors influencing material means of individuals influencing their health) and eco-social theory (multi-layer biological, ecological and sociological factors), which lead to disease distribution. The above directions have influences models or perspectives, which explain socio-economic inequities through social selection (how health influences social status), social causation (how social status influence health) and life-course perspectives (by critical periods and by accumulation). :

There are different models in identifying levels of causality or determinants. The conceptual framework of the Commission on Social Determinants for health (CSDH) aims at identifying the social context conditioning health, the relations between them and their influence in health inequalities. It is based on a previous model by Diderichsen on the "social production of disease" where the social position is at the center the mechanisms of health inequality". In understanding social position, the model looks at the variables conditioning social stratification.
This is based on the evidence (more studies in OECD countries) that social stratification leads, at the individual level, to four effects on health inequity: different vulnerability, different exposure to health-damaging condition, different health outcomes, different consequences and different access to mechanisms to treat or cope with ill health. The last two elements of consequences and response have, on the one side socioeconomic impact which can perpetuate and increase the stratification effect on ill health, and, on the other hand, depend on the society's environment and social policies, which may influence up to 20% of the different state of health between countries.
The latest models of Diderichsen, influencing the approach of the CSDH, depict the continuum of political and social context influencing throughout the four effects of social position on individual health.

In this conceptual framework, the CSDH identifies six variables in the socio-economic and political context, influencing stratified social positions: governance according to the UNDP definition, five which in fact are part of the wide understanding of governance: macroeconomic policies, social policies, public policy, culture and societal values; and epidemiological conditions. One of the key elements influencing governance is the concept of welfare state based on the principles of equality of opportunity, equitable distribution of wealth, and public responsibility for those unable to avail themselves of the minimal provisions for a good life. The different types of welfare states are correlated with different outcomes in health.

The choices of the CSDH as key policies in that wide governance spectrum, are based in the analysis of Whitehead are those influencing income redistribution before earnings (market regulation for inclusive and equitable growth, wage polices, gender policies) and after earnings through fiscal policies (mitigating the income ratios).

This must be done through multi-sectorial actions beyond health. The CSDH lists those most relevant, according to a WHO report of 1986: agriculture, food and nutrition; education; gender and women's rights; labour market and employment policy; welfare and social protection; finance, trade and industrial policy; culture and media; environment, water and sanitation; habitat, housing, land use and urbanization.

The structural determinants influence socioeconomic positions which the CSDH unfolds in social class, gender, ethnicity and their influence/relations with education, occupation and income, which in turn has a multi-faceted influence in health equity.

Structural determinants (socioeconomic and political context influencing social position) condition intermediary determinants (material circumstances and bio-psychological factors). Intermediary determinants influence the level of health and wellbeing and its inequity in society. How the health system, responds is also influenced by the structural determinants.

In summary, social epidemiology and the latest attempt of the CSDH to suggest a conceptual framework, decides on stratifying variables (through an arbitrary and not completely clear-cut selection of six variables) influencing socioeconomic position, which influence the intermediary variables, which were described in section following the Maslow pyramid.

### Limitations of the CSDH model:

1. The stratifying determinants are arbitrarily chosen and overlap among them. They can be better seen in terms of economic governance (influencing income disparities) and social governance (mitigating income inequities though the types of welfare state policies). These and both are rooted in the rights framework, influenced by culture and societal values
2. The model is based on analysis predominantly from OECD countries and by their scientists. The dynamics of income disparities influencing ill health may be different in non-OECD countries.
3. A major factor influencing the above-mentioned variables is the global disparities (with their own dynamics, different from the ones emphasized by the CSDH framework).
4. The CSDH framework makes it implicit that the ecological epidemiology is influenced or included in social epidemiology. The epidemiology of certain diseases is not necessary influenced by the mentioned stratifying determinants (e.g. the major components of climate, ecosystems, eco-epidemiology of vector-borne diseases).

## An alternative framework of root causes of health and its distribution

The analysis above shows that the current MDG framework has major shortcomings related to the fact that the economic, ecologic and social determinants of ill health remain (and are projected to) challenging to human health, the MDG agenda has limited pertinence to the health problems (and it will further lower with the projected disease dynamics) and the major and stagnant global and national health inequities are neither addressed nor measured by the present MDG framework.

### Global health Equity (GHE)

Health equity is not only the agreed international objective from the constitution of WHO, but is also a highly sensitive indicator of the economic, ecological and social pillars of human development.

One strength of the MDG framework is that it triggered political and social attention given its focus on selected and measurable development indicators. However, the definition of pertinent, sensitive and measureable targets needs to be improved for the health goals to be defined after 2015. While health equity is an internationally agreed priority (CSDH 2009, Rio declaration 2011), there is no agreed standard of health equity and no common reference to the measurement of the burden of health inequity.

Recent work concludes that the EU Research agenda in global health should consider the priority of health and equity research. The WHO Commission on Social Determinants of health called for strengthening research to improve health equity. This agenda should include the analysis of 'global factors and processes that affect health equity (economic, ecological, social); structures and processes differentially affecting people's chances to be healthy in a given society; (governance) and health

system factors that affect health equity (health system and universal coverage)[217]. The quest for greater equity and narrowing the inequalities in health, needs to come hand in hand with a boost to the knowledge generation which continues to advance the best attainable standard of health. Trade and market rules need to incorporate concepts of global goods for health so as to drive health innovation with greater pertinence and equity[218].

The opportunity of addressing health equity as an internationally agreed goal and reflecting the progress of the economic, ecological and social pillars of human development, meets the challenge of defining equity goals, indicators and feasible targets.

The conclusions above lead to a focus on health goals beyond 2015 related to increasing global and national health equity by addressing the root causes related to economic, ecological (trans-generational equity) and social determinants. This approach will avoid the conflict of recreating the "silos approach" of different human development challenges being addressed in parallel.

## Root causes of Global health dynamics: Pillars of the new global health framework

The analysis of the complex universe of causes influencing health (and ill health) and its distribution (and disparities/inequities) may be analysed from the top of the Maslow's pyramid: what are the conditions that enable, beyond the basic and protection met needs, the fulfilment of the physical and psycho social human potential?

Societies are built around values and principles that translate into **legal frameworks**. In order to exercise the rights approach to health, by the duty-bearer (democratic governments ruling the official institutions) and the rights-holder (the citizens entitled to conditions to preserve and recover the best feasible/sustainable level of health), they both need to have access and use **knowledge**, and have sufficient **resources** (in whichever way society is organized in the spectrum from individual to collective property dimensions). Besides the way society is organized through laws and the flow of knowledge and resources, the **environment** surrounding society, influenced in turn by three other pillars, will influence health.

Each of the pillars influencing health needs (basic, security and fulfilment) is interconnected with the others and has local, national and global dimensions.

## *Global Health law and participation:*

A society based on rights identifies those conditions that should be of universal nature, equal to all. When the rights are not recognized, the actions on them are up to the biased effects of market dynamics, the often-interested and arbitrary choices of political willingness or the often-random or selective actions of philanthropy.
As Braveman and Gruskin put it, "A human rights perspective removes actions to relieve poverty and ensure equity from the voluntary realm of charity … to the domain of law"

In this respect, there are international obligations on the right to health. Some remain aspirational and vague in targets, such as the 1945 constitutional objective of WHO which aims at "the attainment by all peoples of the highest possible level of health" (where in fact, possible can brought to a minimum

[217] P. Ostlin, et al, 'Priorities for research on equity and health: Towards an equity focused health research agenda,' PLoS Medicine, 2011, 8(11): e1001115. doi:10.1371/ journal.pmed.1001115.
www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.1001115

218R.D. Smith, K. Lee, N. Drager, Trade and health: an agenda for action, The Lancet 2009, 373, 768 – 773 doi:10.1016/S0140-6736(08)61780-8.
www.thelancet.com/journals/lancet/article/PIIS0140-6736%2808%2961780-8/fulltext?_eventId=login

in low resource settings…). Some, like the 1948 Universal Declaration of Human Rights (UDHR), which states that everyone has the right to a standard of living adequate for the health and well-being of himself and his family, including … medical care and necessary social services' (Art. 25) are not legally binding. The binding nature of the 1966 International Covenant on Economic, Social and Cultural Rights (ICESCR), which Art 12 replicates the UDHR article 25, is limited to those that ratified it.

Besides the above limitations of the international legal framework on the right to health, a rights framework does not only need the official recognition. An operational rights-based approach identifies a duty-bearer and rights holder. The duty bearer require resources to deliver, in their best capacity and choice of strategies, on the provisions that guarantee those rights and the right holder requires empowerment to influence those strategies, monitor them and demand responsibilities when neglected and unmet. So, the question is what are the governmental responsibilities to help promote individual and collective wellbeing, and therefore the actions that governments should not do (discriminate, torture, imprison under inhumane conditions, interfere with the free flow of information, invade privacy, prevent associative life in society), and the basic minimum that governments should ensure for all (education, housing, food, water, medical care, justice.).

To this question, the year 2000 General Comment on the Human Right to Health states that it is the governments' responsibility to address social and environmental determinants in order to fulfil citizens' right to the highest attainable standard of health. The limitation, however, is that such state obligation is labelled as "progressive". However, this legal framework does have an immediate effect in that the government's guarantee will be exercised without discrimination.

Governments interpret these international obligations and translate them into public health law which concerns the legal powers and duties of the state to assure the conditions for people to be healthy and the limitations on the power of the state to constrain the autonomy, privacy, liberty, proprietary, or other legally protected interests of individuals for the protection or promotion of community health. WHO guides, under the article 63 of the WHO Constitution the development of health law, and monitors the related laws and regulations pertaining to health.

The second part of these national obligations of public health law, the State must ensure, through ex-ante impact assessments, before it adopts any proposed law, policy, program or project, that it is consistent with its human rights, as well as other, legal obligations. This should also be monitored and include ex-pots evaluations. The Committee of the Rights of the Child monitors these assessments, for instance, in the case of the rights of children. In relation to the right to health, there are six elements which should be included in the analysis: explicit Human Rights Framework, Progressive Realization, equality and non-discrimination, Participation, information, accountability and interdependence of Rights.

In order to operationalize and introduce the essential binding and accountability dimensions to an effective global health framework convention, Professor L. Gostin, leading a global coalition of civil society and academics, has proposed a new model based on the Framework Convention for Tobacco Control, which is inspiring many thoughts towards a transformative post-MDG framework for global health justice[219]. It would define national responsibilities for the population's health; international responsibilities for reliable, sustainable funding; the setting of global health priorities; coordination of fragmented activities and reshaping the global governance for health through leadership by the World Health Organization.

[219] A Framework Convention on Global HealthHealth for All, Justice for All Lawrence O. Gostin, JD . *JAMA*. 2012;307(19):2087-2092. doi:10.1001/jama.2012.4395.

### Health by all:

The involvement of all actors in health, has been accepted as a principle of public health based on the rights' approach (participation in decisions that affect their lives), on the pertinence of programs and services (to adjust decisions and services to people's needs and sensitivities) and on the accountability of decision makers (so that transparent process with involvement of civil society can help duty bearers accountable to their responsibilities).

The main international agreement and commitment to community involvement was adopted in 1978 in Alma-Ata in 1978 . Article IV states that " *people have the right and duty to participate individually and collectively in the planning and implementation of their health care* " and article VI specifies its relation to Primary Health Care, defined as "*essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community*", as to be achieved through "their (community) full participation " ... "*in the spirit of self-reliance and self-determination*'. Article VII further defines that participation as " *in the planning, organization, operation and control of primary health care, ... and to this end develops through appropriate education the ability of communities to participate*"

Thirty years after Alma-Ata, in 2008, WHO focused its annual world health report in "primary Health Care and strengthening health systems"[220]. It adjusted the Primary Health Care principles of 1978 to a new global context, moving from a focus on primary level of care and mother and child health priorities, to a reforms aimed at universal coverage and more comprehensive and multi-sectoral health services. It is based on four principles: inclusive leadership, patient-centered approach, universal coverage and health-in-all policies. As regards inclusive leadership, a participatory approach led by the government requires strategies to empower and involve civil society. Civil society participation is seen essential as exercising social demand for reforms towards greater health equity and "*to address what they consider to be their most important health problems and as a necessary complement to the more technocratic and top-down approach to assessing social inequalities and determining priorities for action*".

The ultimate responsibility for shaping national health systems lies with governments[221]. The report lists different groups that have a role to play under the government leadership: national politicians and local governments, the health professions, the scientific community, the private sector and civil society organizations, as well as the global health community. Besides the Governments' responsibilities to protect health, guarantee access to health care and to safeguard people from the impoverishment that illness can bring, they should also correct market failures that undermine the equity of the health sector[222].

The world health report of 2009 triggered the world health assembly resolution 62.12[223] . This resolution refers to previous agreements in relation to the primary health care principles in Alma-Ata, the Ottawa Charter for Health Promotion (1986), the United Nations Millennium Declaration (2000) and some twenty major regional or global conferences on strengthening health systems, including community participation[224], and at least ten resolutions form the World Health Assembly recalling those principles in the last decade[225]. It also relates to the growing evidence of social determinants[226],

[220] The world health report 2008: Primary health care – now more than ever. Geneva, World Heath Organization, 2008.

[221] Porter D. Health, civilization and the state. A history of public health from ancient to modern times. London and New York, Routledge, 1999.

[222] The World Health Report 2000 – Health systems: improving performance. Geneva, World Health Organization, 2000.

[223] See page 19 : http://apps.who.int/gb/ebwha/pdf_files/WHA62-REC1/WHA62_REC1-en-P2.pdf

[224] the G8 Hokkaido Toyako Summit (2008), International Conference on Global Action for Health System Strengthening (Tokyo, 2008), International Conference dedicated to the 30th Anniversary of the Alma-Ata Declaration of WHO/UNICEF on primary health care (Almaty, 2008), and G15 Summit (2004); WHO regional meetings on primary health care, such as those at Buenos Aires (2007), Beijing (2007), Bangkok (2008), Tallinn (2008), Ouagadougou (2008), Jakarta (2008) and Doha (2008); and conferences on health promotion, such as Ottawa (1986), Adelaide (1988), Sundsvall (1991), Jakarta (1997), Mexico City (2000), Bangkok (2005) and the MERCOSUR Task Force on Health (since 1995).

[225] Resolutions WHA54.13, WHA56.6, WHA57.19, WHA58.17, WHA58.33, WHA60.22, WHA60.24, WHA60.27,

to the principles of levels and approach of international health aid (aid effectiveness agenda) and to the effects on health and health systems of the international financial and food crises and of climate change.

The 62.12 resolution renews the commitment to Alma-Ata, progress towards comprehensive health services through national equitable, efficient and sustainable financing mechanisms. In its fourth article/paragraph, it calls on member states and all other global health actors to "promote active participation by all people, and re-emphasize the empowering of communities, especially women, in the processes of developing and implementing policy and improving health and health care, in order to support the renewal of primary health care". It also called on WHO Secretariat to prepare implementation plans for the four broad policy directions, one of which is the inclusive leadership and effective governance for health 9still pending).

## *Global health and the environment: The synergies of healthy and ecological lifestyles.*

The United Nations Conference on Environment and Development in Rio de Janeiro in 1992, agreed to the Rio Declaration recognized the integral and interdependent nature of the Earth, "our home". In its operational framework, the so-called "Agenda 21", chapter 6 identifies – still under the overall strategy to achieve health for all by the year 2000-the links of health with environmental and socio-economic improvements and the need of efforts. It lists a number of areas that overlap with the priority areas identified by the CSDH. A more in-depth analysis is on-going under the WHO's Health in the Green Economy series.

There are dimensions of health-ecology that require complementary attention to the approaches proposed by social epidemiology and the recommendations and emerging plan of action of the agenda on social determinants for health. These are based on the premise that all ecological factors influencing health can be tackled by equitable social policies and that all policies tackling equity are eco-friendly. However, there are some social policies and/or actions that may lead to income and/or health equity in societies, but damage the ecosystem in which they live. For example, increased and equitable access to cars, transport, energy or heating, may have, under social equitable policies, appositive effect on equity, but be based on means of production, which are detrimental to the ecosystem. Specific regulation is required for these matters.

On the other side, it is important to take into account the global dimension of health-ecology, now clearly visible due to climate change, which is having and will have a growing negative impact on the quantity, distribution (worse on the poorer) and quality of air (pollution and temperature), water, food, housing, access to services and exposure to some infectious diseases with an effect on excess mortality. There are other effects, besides climate change, which may be negative for the world's ecology and which require regulations at global level.

### Concept of intra and inter-generational equity encompassing equity and ecology

The UNDP development report of 2011[227] focused on the concepts of equity and sustainability, as key principles and requisites for development. It can be brought down to equity across groups and countries and across generations. The abuse of resources for a group in relation to the rest (inequities) or for a generation, undermining the resources for future ones (un-sustainability = intergenerational inequity), are essential in all policies.

Following the Maslow's pyramid, the satisfaction of basic, safety and fulfillment should be planned in a way which is equitable across communities and countries and across generations. In terms of food

WHA61.17 and WHA61.18.

[226] Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Geneva, World Health Organization, 2008.

227 http://hdr.undp.org/en/reports/global/hdr2010/chapters/en/

and water, the evidence seems to show that agro-ecology is the most sustainable and often also efficient way to provide these basic needs[228]. This approach combines the sustainable use of natural resources, through a more equitable access to land and means, and by encouraging social cohesion strategies as cooperative frameworks. This approach decreases also the chemical risks and climate change effects of *food miles*[229] . There is also evidence on the low efficiency of the livestock industry vs. non-animal foods (15 times higher use of water per kilo, 40-200 larger use of land), besides the subjective ethical considerations of animal living and slaughtering conditions).

## *Global health and knowledge*[230]*: The Global Public Goods for health*

Economic input in human well-being is classified as either a public or a private good. Most goods are private in nature. They cannot be consumed again (they are rival) and their consumption can be withheld until payment is made (they are excludable). Private goods are best provided by the market mechanisms of supply and demand. By contrast, public goods are not diminished by use (non-rival) and are available to all (non-excludable). A classical example is a lighthouse, whose benefits are available to all ships all the time. Public goods are underprovided in free markets, as there is no natural incentive to produce them. Therefore the state has a role to play in order to secure the collectively optimum level of public goods, either by providing them directly or by ensuring that private companies produce them. That is not to say that no knowledge would be produced without intervention by the state. However, there would be much less.

Knowledge is considered a public good, even if it is embodied in a tangible good (e.g. a drug).
Public policy is therefore crucial to ensure that knowledge is acquired, either by subsidising research directly or by providing effective incentives for private engagement in research.

Innovation in health sciences has made a major contribution to improving longevity and quality of life worldwide. However, innovation can only make a meaningful contribution to public health if it can be put to the benefit of the entire population. It is not enough for new treatments or medical products to be effective and safe. They also have to be acceptable, affordable and accessible. Access issues therefore need to be built into the research process at an early stage.

Knowledge can generally be considered a 'public good' that is underprovided in perfect markets as there is no direct link between the costs of production and the benefits of consumption. In order to benefit fully from medical research, public intervention is necessary. This can take the form either of public subsidies for research (e.g. grants) or of a regulatory framework that allows the private sector to reap the benefits of its research and development efforts with the aid of exclusive marketing rights (e.g. intellectual property rights — IPR).

While IPRs are a key element in promoting innovation and gaps in the innovation process have emerged. First, despite increasing investment in research and development (R&D), pharmaceutical companies are not refilling the product pipeline effectively. Consequently, the number of novel medicines reaching the market is decreasing. Second, IPR provide big incentives to develop new medicines and medical technologies. However, these incentives are much less effective when patients are either too few or too poor. Third, there is an enormous gap between what is available. Third, there is an enormous gap between what is available and known to maximise the quality of healthcare and what is being delivered in practice. It is therefore essential that research priorities are geared to making the biggest impact on public health public research funding and regulation of medical innovations are coherent and aligned with those priorities.

228 Agro-ecology and the Right to Food", Report presented at the 16th Session of the United Nations Human Rights Council [A/HRC/16/49], 8 March 2011

229 http://www.adbi.org/files/2008.10.wp118.limitations.food.miles.pdf

230 Taken from the staff working document on global health knowledge, from the EU policy on global health: see http://onetec.be/global_health/doc/SWD_SEC_2010_381_Research.pdf

Based on the analysis described in the previous sections, this section proposes a proposal to regulate and mitigate the excess economic disparities which translate in the chronic and tragic burden of global health inequity. As previously argued, the result of the current system is marginalizing a proportion of humanity below the minimum resources for a decent life. The following analysis concludes the level of redistribution of resources needed globally to prevent incomes below the minimum necessary and meet international standards of global health for all peoples in our generation, and in harmony with the environment, that is, for coming generations:

The average of available resources (Av): equals Total resources (TR) / population: about 11.200 U.S. dollars per capita.

We define the minimum level for human dignity (**mD**) as the minimum resources to meet basic needs (water, food, shelter, hygiene) and resources or guarantee that enable universal access to basic social services (education, health, justice). Based on the analysis of country data, the best efficiency of public resources associated with life expectancy and mortality in the range of high-income countries, requires at least some $ 100 per capita public health funding (see table 4). If this accounts for 15% of public funding (as is the average public budget allocation to health in the OECD and is committed to the Abuja declaration to the African Union), and the revenue rate could reach 35% of the domestic product (which is the global average), the lower threshold of income per capita to enjoy that life expectancy would be around $ 4,000,. This is also the average per capita GDP of the ten most health-efficient countries listed in table 4 and those that also meet the ecological sustainability criteria. This level of GDP per capita (reflecting access to resources) may be called the national minimum dignity (**NmD** ) level.

The graphs below show the distribution of countries (Figure 107) and according to their population (Figure 108) and per capita income averages. They reveal a skewed curve towards a low proportion extending to very high levels and two peaks in the lower half (India and China). This curve would be softened "softened" if the income average of countries with high population would be disaggregated by provinces. Economic growth in these two countries anticipates that both are moving toward the middle and would leave, in the case of India, the group of countries below the previously named national minimum dignity (**NmD** ) level.

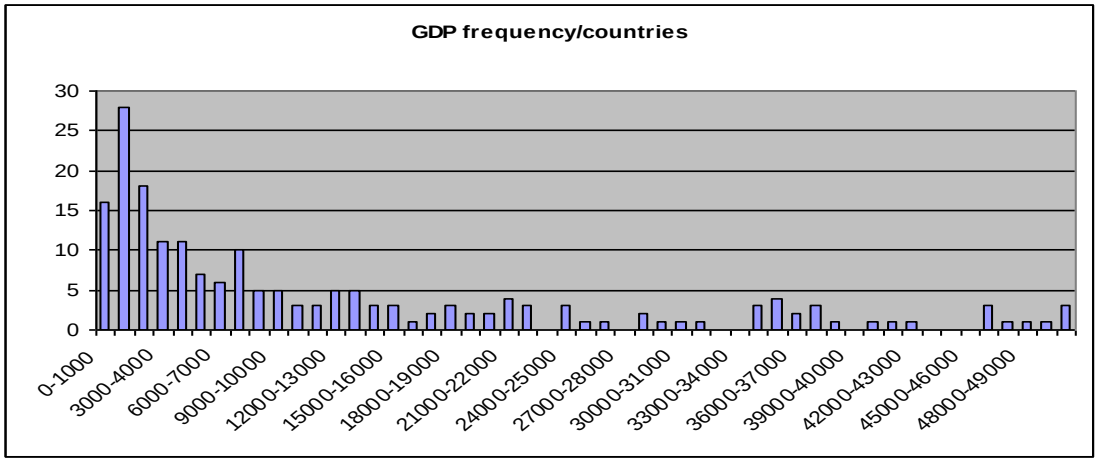



Figure 107 : Number of countries by per capita GDP levels

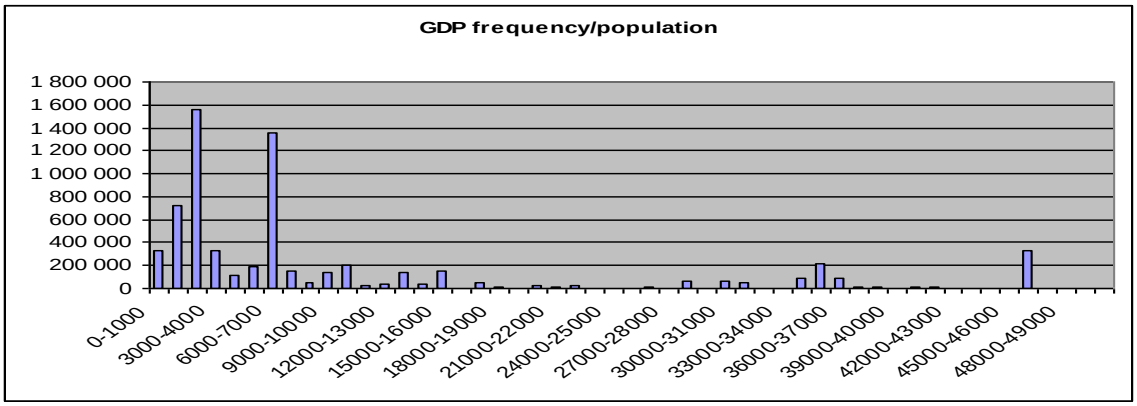



Figure 108 : Población de países según sus medias de renta per capita

The definition of the "equitable" (fair inequality : fair dispersion) standard deviation of national incomes (EqSDi) which would limit under 1% the proportion of countries with resources living below the minimum of dignity may be estimated from the average of national pc GDP (Av) and the national minimum dignity (NmD ).

EqSDi= (Av- NmD)/ 2,6 = 11200- 4000/ 2,6 = **2769 $**

The above levels of equitable dispersion enable the estimation of a máximum level of per capita GDP (national maximum abundance: NMA) above which, the "equitable" distribution is restrained.

NMA = Av + 2,6 x EqSDi = 11200 + (2,6 x 2769) = 18398 $

This allows an spectrum of resources across countries where the upper threshold is almost five times higher than the lower threshold.

On the other side, as figure 109 shows, above the calculated maximum, there is no correlation between higher income and better life expectancy ( and other indicators of well-being).

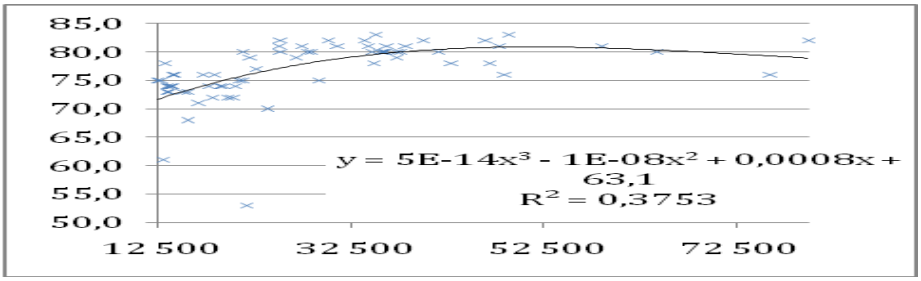



Figure 109 : correlación entre renta per cápita y esperanza de vida en países de alta renta.

Moreover, no country above that level of income during the last 20 years has managed to have an economy which is ecologically sustainable (carbon emissions ‹ 2,3 Tm per capita and use of hectares ‹ 2,6 per capita).

In order to achieve a balance that prevents countries below the minimum and above the maximum income limits estimated above, mitigation measures are required against the market dynamics of increasing inequality between countries. This requires, as market, labor and fiscal policies do at country level (e.g. though the European social model), regulations and redistribution mechanisms.

On the other hand, countries should contribute according to their capacities to global public goods under democratic and rights-based global governance.

This requires knowing the proportion of global wealth necessary to ensure the minimum resources in all countries –for all peoples- (solidarity contribution), and define the "slope" of the contribution

related to national average per capita income (direct overall solidarity contribution , equivalent to countries' direct-income- taxes) and related to trade transactions in relation to the nature of goods (indirect Global solidarity contribution).

The per capita income gap under the minimum threshold mentioned above, is of 2, 235 854 000 $ per year, affecting 2,612,000 people, or 38.7% of the global population (differences accumulated an income below the NmD -estimates for 2012 based on the growth economic environment: see table below)

Table 8 : Gap below the national minimum of resources for global health equity

| Country | Population | Pc GDP in 2012 | Gap under NmD |
|---|---|---|---|
| Somalia | 8 926 | 221 | 27 487 617 |
| Democratic Republic of the Congo | 64 257 | 320 | 191 503 531 |
| Liberia | 3 793 | 331 | 11 262 365 |
| Burundi | 8 074 | 419 | 23 261 598 |
| Afghanistan | 27 208 | 536 | 75 207 945 |
| Guinea-Bissau | 1 575 | 584 | 4 277 188 |
| Zimbabwe | 12 463 | 650 | 33 021 030 |
| Eritrea | 4 927 | 695 | 12 836 929 |
| Niger | 14 704 | 750 | 37 499 611 |
| Myanmar | 49 563 | 772 | 125 307 655 |
| Central African Republic | 4 339 | 805 | 10 826 564 |
| Sierra Leone | 5 560 | 827 | 13 750 575 |
| Mozambique | 22 383 | 849 | 54 862 412 |
| Togo | 6 459 | 904 | 15 475 441 |
| Malawi | 14 846 | 915 | 35 406 597 |
| Ethiopia | 80 713 | 959 | 188 935 008 |
| Rwanda | 9 721 | 1 114 | 21 254 723 |
| Madagascar | 19 111 | 1 147 | 41 153 627 |
| Mali | 12 706 | 1 202 | 26 660 682 |
| Nepal | 28 810 | 1 235 | 59 498 412 |
| Uganda | 31 657 | 1 257 | 64 680 000 |
| Burkina Faso | 15 234 | 1 279 | 30 789 437 |
| Chad | 10 914 | 1 279 | 22 058 285 |
| Comoros | 661 | 1 290 | 1 328 660 |
| Haiti | 9 876 | 1 301 | 19 742 618 |
| Guinea | 9 833 | 1 312 | 19 548 250 |
| Democratic People's Republic of Korea | 23 819 | 1 323 | 47 090 163 |
| United Republic of Tanzania | 42 484 | 1 356 | 82 585 710 |
| Zambia | 12 620 | 1 356 | 24 532 334 |
| Gambia | 1 660 | 1 411 | 3 135 408 |
| Ghana | 23 351 | 1 577 | 40 243 697 |
| Bangladesh | 160 000 | 1 588 | 273 984 000 |
| Benin | 8 662 | 1 610 | 14 641 812 |
| Côte d'Ivoire | 20 591 | 1 742 | 32 081 808 |

| Country | Population | Pc GDP in 2012 | Gap under NmD |
|---|---|---|---|
| Kenya | 38 765 | 1 742 | 60 397 808 |
| Mauritania | 3 215 | 1 819 | 4 761 013 |
| Senegal | 12 211 | 1 940 | 16 602 076 |
| Sao Tome and Principe | 160 | 1 962 | 214 008 |
| Cambodia | 14 562 | 2 007 | 18 835 219 |
| Tajikistan | 6 836 | 2 051 | 8 540 557 |
| Sudan | 41 348 | 2 128 | 48 467 092 |
| Nigeria | 151 212 | 2 139 | 175 579 814 |
| Lesotho | 2 049 | 2 205 | 2 243 655 |
| Papua New Guinea | 6 577 | 2 205 | 7 201 815 |
| Laos | 6 205 | 2 249 | 6 520 835 |
| Kyrgyzstan | 5 414 | 2 359 | 5 092 679 |
| Cameroon | 19 088 | 2 403 | 17 113 346 |
| Yemen | 22 917 | 2 437 | 19 788 257 |
| Djibouti | 849 | 2 569 | 620 768 |
| Iraq | 30 096 | 2 756 | 16 364 700 |
| Guyana | 763 | 2 767 | 406 469 |
| Solomon Islands | 511 | 2 844 | 232 786 |
| Marshall Islands | 61 | 2 867 | 26 444 |
| Nicaragua | 5 667 | 2 889 | 2 331 687 |
| Uzbekistan | 27 191 | 2 933 | 9 988 614 |
| Pakistan | 176 952 | 2 977 | 57 199 734 |
| Viet Nam | 87 096 | 2 977 | 28 153 782 |
| India | 1 181 412 | 3 263 | 43 239 679 |
| Total | 2 612 657 | | 2235 854 527 |

This deficit should be covered by the redistribution of global resources. Some theories and experiences warn about the effects of increasing the level of foreign exchange (exports or cooperation grants) and their effect on inflation of local currency value, and in competitiveness of exports, with negative effects on national macroeconomic, microeconomic -household level-, and internal equity in the distribution of resources ("Dutch Disease").

In order to minimize the negative effects described above, and estimate that the space of economic growth in the lower income economies if the current growth rate (average of 5.14% in the last year, if trend is maintained, 50% cumulative increase during this decade) is maintained, the solidarity contribution could initially target 50% of the described deficit through a global solidarity contribution so as to progressively achieve health equity conditions without countries or people below the minimum of dignity, by 2020.

This amount would be $ 1, 117,927 million, 1,8 % of the collective GDP of countries with pc GDP above the mínimum threshold above estimated. This amount could be collected (as in most OECD countries) through direct (some three quarters of the total revenue) contributions over national incomes and through indirect (one quarter) revenues from global trade , both through a progressive (equitable) scheme.

The current global economic framework is based on the lack of regulation of minimum and maximum income, the absence of a binding solidarity contribution system based on income and transactions, and weak global governance at the expense of the market with no mechanism to generate global public goods.

In the absence of a world government and dynamics of equity, the only mechanism to attempt greater equity is international cooperation, with about 100 billion dollars (5% level required), no distribution of equity (more than half goes to countries with incomes above theNmE), volatile over time (predictability average less than two years) and not aligned with policies, strategies and processes national sovereign.

In this context, global health inequity is constant over time and continues to generate 20 million deaths per year (unfair distribution of resources), one in three. The contrast between the necessary redistribution and the current framework of international cooperation represented in the figure below reveals that ODA accounts for 10% of the levels needed, and is of low predictability, alignment and equity.

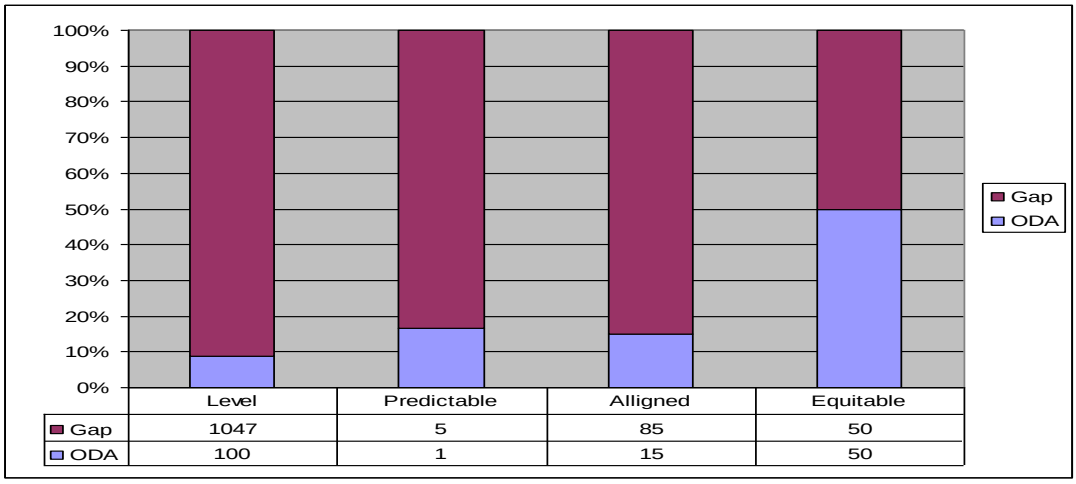



Figure 110 : Present ODA vs. Required global solidarity to avoid global health inequity