

# Non-communicable Diseases: Equity, Action and Targets

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## KEY POINTS

- Non-communicable diseases (NCDs), including cardiovascular diseases, cancers, diabetes and lung diseases are the leading drivers of morbidity, mortality and disability globally; 80% of deaths to NCDs occur in low- and middle-income countries.
- The 'causes of the causes' of NCDs make them difficult to address; proximal causes include raised cholesterol, blood pressure and glucose; intermediate causes include tobacco, poor diet, physical inactivity and harmful use of alcohol. These risks are largely man-made and relate to how we live, age, work and play. Distal causes include urbanization, population ageing and trade. Premature death and disability due to NCDs can therefore be viewed as failures of a broader socioeconomic system.
- On the one hand, financing for NCDs with respect to overseas development assistance for health remains scarce (2.3% of all international donor assistance is focused on NCDs, US\$503 million out of \$22 billion). On the other, the interventions for NCDs (e.g. tobacco taxation) are highly cost-effective.
- Free trade and globalization concerns, including intellectual property and free-trade treaties surrounding access to essential medicines for the treatment of non-communicable diseases, remain a key twenty-first century priority, as observed for HIV/AIDS.
- A UN 'High Level Meeting' on NCDs in 2011, only the second such meeting on health in the UN's history, put the spotlight on NCDs as barriers to development and deserving a multidisciplinary response across all of society.

## Introduction

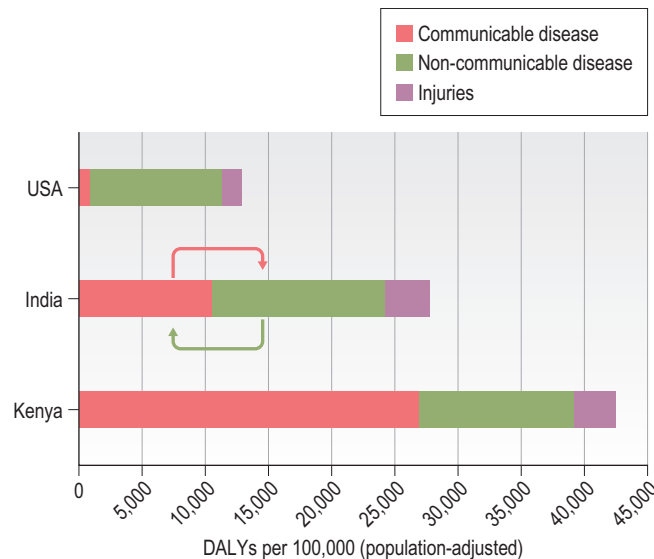
Imagine being the Director General of the World Health Organization (WHO), a Minister of Health in a developing country or even a Head of State. In our current century of globalization and inter-dependence, where would you prioritize your attention to safeguard the health of your constituency? That is, if you have a dollar to improve your population's health, where and how would the 100 cents of that dollar be apportioned to maximize its benefit? Devastating infections such as HIV/AIDS or childhood pneumonias will compete for your attention. Both critique and applause will await your every decision. Whenever a unit of capital (whether it is financial, social, or time) is expended, it is gone. You look to population health statistics to justify and prioritize your budget – what do you find?

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To respond to these critical questions, we first adopt a definition from the WHO that examines the disease burden. There are three 'buckets' or categories of disease. One bucket consists of communicable, maternal, perinatal and nutritional disorders and diseases. In developed countries, we often forget that diseases such as malaria ravished the world, including the whole southeastern seaboard of the USA, as little as 130 years ago. Strategic, focused investments in sanitation, public health and hygiene successfully diminished the burden of these disorders over the last century. This, then, helped drive an epidemiological transition towards chronic, non-communicable diseases (NCDs) such as diabetes, unipolar depression, cancers, heart disease as the second category. These are diseases that accompany globalization, are typically associated with developed countries and are driven by man-made, modifiable risk factors, which is our second bucket. Finally, the third bucket consists of physical injuries to the body. These could be traumas inflicted by war, by traffic incidents or by conscious intent (e.g. suicide).

Where is the bulk of the money going (and thus attention, time and energy currently being expended)? In the past decade, the WHO had incurred 87 cents for every dollar on 'first category' communicable diseases; 12 cents of every dollar on 'second category' non-communicable diseases; and 1 cent for every dollar on 'third category' injuries.<sup>1</sup> In this section, we will examine how WHO priority trend, as outlined above, has also been reflected in international development assistance budgets and Millennium Development Goals.

We next ask a very basic question: What kills us, globally? Annually, there is about a 1% turnover in the population; a global burden of 57 million human deaths.<sup>2,3</sup> Surprisingly, the leading driver of international mortality consists of 'second bucket' chronic, non-communicable diseases (NCDs). Cardiovascular disease, whether in the arteries of the heart (ischaemic heart disease) or brain (cerebrovascular disease), is now the leading killer worldwide. What surprises many is that nearly 80% of all global heart attacks occur in low- and middle-income countries – and this disease alone claims more than twice as many lives as HIV/AIDS, tuberculosis and malaria combined.<sup>4</sup> Other NCDs such as chronic obstructive pulmonary disease and lung cancer are also top-10 killers. Additionally, age-standardized mortality shows that NCDs are claiming people at increasingly younger ages in resource-poor settings, i.e. *premature mortality* (death before age 60) to NCDs, is on the rise. Death from NCDs in resource-poor settings often occurs in the backdrop of 'first category' communicable, tropical diseases, including pneumonias, HIV and tuberculosis. This constitutes the 'double' burden of disease. Finally, as a potential triple burden, traumatic traffic accidents are the ninth leading cause



**Figure 61.1** The Burden of Disease: Non-communicable Diseases. The burden of disease in terms of DALYs per 100,000. (Full explanation of figure is provided in the text.) (Data provided by Mathers C, Fat DM, Boerma JT, World Health Organization. *The Global Burden of Disease: 2004 update*; Geneva, Switzerland: World Health Organization; 2008).

of death globally, and suicides claim as many lives as malaria each year.

To quantify not just the mortality, but also morbidity of disease, we use the disability-adjusted life year (DALY) to assess the total disease burden. One DALY is equal to the number of years of life lost to disease (YLL) added to the number of years lived with disability (YLD). It is thus a more useful robust measure for chronic illnesses, in which many individuals living with their disease cannot be maximally productive during their convalescence. Figure 61.1 presents disease burden in terms of DALYs per 100,000 people in three countries with three different income settings: high-income (USA), middle-income (India) and low-income (Kenya). A higher burden of disease results in more DALYs lost. According to these data, Indians are twice as 'sick' (have twice as many DALYs lost) as the Americans; Kenyans are three times as 'sick' as the Americans (have three times as many DALYs lost).<sup>4</sup>

Figure 61.1 also demonstrates that for the first time in India's history, the burden of non-communicable disease has eclipsed that of communicable diseases. This same trend is playing out in other middle-income contexts including China, South Africa, Brazil, Russia and even urban environments of low-income settings. Finally, a close look at low-income settings like Kenya reveals two major points. The first point is quite unsurprising in a global health and topical medicine context: malaria, hookworm and other neglected tropical diseases continue to rage, constituting nearly three-quarters of the total burden of disease. At the same time, however, we see a second, surprising pattern: the burden of NCDs in Kenya is now equivalent to, or even slightly greater than, the burden of NCDs in the USA.

Deciding priorities on national and international health spending is critical when the health budgets of each country vary enormously. According to National Health Accounts, the USA spends close to US\$8000 per person per year;<sup>5</sup> India spends about \$43 per person per year; and Kenya spends just \$19 per

person per year. Based on the discussion of disease burdens above, how would you allocate your razor-thin health resources if you are the minister of health of Kenya? Would you consider prioritizing NCDs over communicable diseases?

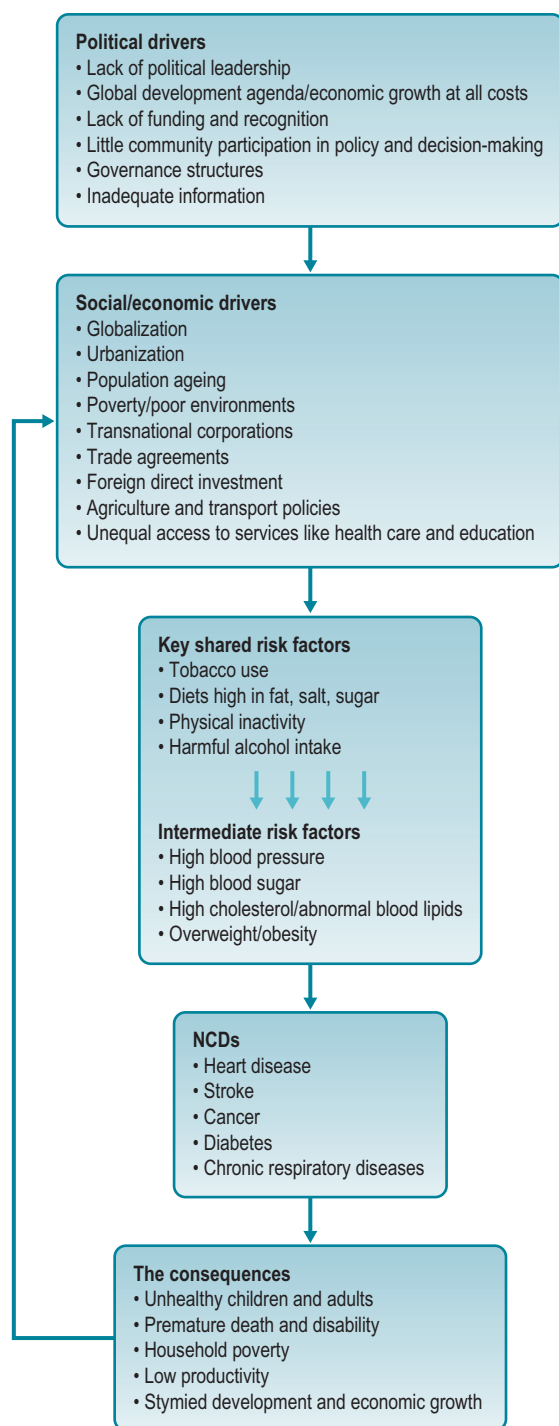
A crucial point is that there is clear cross-talk between these categories of disease – these diseases are not isolated, but are inter-dependent and linked (as shown by the arrows in Figure 61.1). In India, for example, type II diabetes is one of the principal risk factors for manifesting active tuberculosis.<sup>6–8</sup> Moreover, up to 30% of what we typically think of as chronic diseases, such as cancers, actually have an infectious origin (e.g. HPV driving cervical cancer or hepatitis B driving liver cancer). Emerging data showing the cross-links between infectious and chronic disease drivers, coined 'Endemic NCDs' provides a strong scientific, public health and clinical rationale for concerted action.<sup>9,10</sup> This underscores the need for a more holistic approach to address twenty-first century health – and makes it very clear that there is no need for resource 'wars' to tackle 'disparate categories' of disease burden. Resources spent on non-communicable diseases need not come out of the resources currently spent on communicable diseases. Instead, advocates of both sides should instead seek to address underlying systemic factors of all diseases together as part of a common ecology or system. To be sure, this is easier said than done!

## Twenty-first Century Health: the 'Causes of the Causes'

To answer how resources could be allocated, we need to next ask what the systemic causes behind NCDs are. Globally, what is causing all the heart attacks and cancer cases? It is natural to first look towards proximal risk factors such as high blood pressure or high cholesterol levels. Indeed, when assessing the leading risk factors driving the burden of disease worldwide, blood pressure ranks at number three and high cholesterol ranks at number seven.<sup>3</sup> What, however, is driving the high cholesterol? What, in essence, are the causes of the causes?

Four principal risks stand above the rest: *tobacco*, *poor diet*, *inadequate physical inactivity*, and *harmful use of alcohol*. Tobacco alone accounts for 1 in 10 deaths globally, killing half of the people that use it. Moreover, its use is rising in women and youth of both genders globally.<sup>11</sup> Fast food and high-fat, processed diets have percolated across the globe from the West, influencing how, when and what the world consumes. Alcohol use and over-drinking have increased; in Russia in particular, it accounted for a loss of 7 years in life expectancy in the 1990s alone.<sup>12</sup> Tobacco use in India<sup>13</sup> and obesity in Egypt have been inversely correlated with education status;<sup>14</sup> nutritional determinants such as sugar exposure explain increased diabetes rates<sup>15</sup> with each 1% increase in GDP of the food service industry associated with a 1% increase in diabetes prevalence.<sup>16</sup> These show that the causes of the causes run deep (Figure 61.2).

It is worth noting that the impact of such changes is felt even by the world's youth. Over the past two decades, we have witnessed the slow and steady rise of childhood obesity in all income strata, regardless of country. This effectively means more children are sick early on in their lives – some even with fatty streaks in their arteries as seen in Seychelles as young as 8 years old.<sup>17,18</sup> Indeed, if the trajectories of earlier onset of disease patterns hold, data from the USA suggest that children born in this generation may not live as long as their parents: for the first



**Figure 61.2** The 'Causes of the Causes'. (Credit: Philip Baker.)

time, life expectancy could stall or even decline.<sup>19</sup> This trend could be reflected in other countries in middle- and low-income settings by 2050. Furthermore, a set of compelling epidemiological data and laboratory science additionally suggests that the earliest origins of NCDs are in the womb and the first 2 years of life – demonstrating how systems biology affects predisposition to NCDs. Fetal re-programming and a 'reset' to slower metabolism in mothers without adequate nutrition and growth support causes greater rates of premature metabolic

syndrome – observations that portend even greater premature mortality to NCDs for the next 2–3 decades.<sup>20,21</sup>

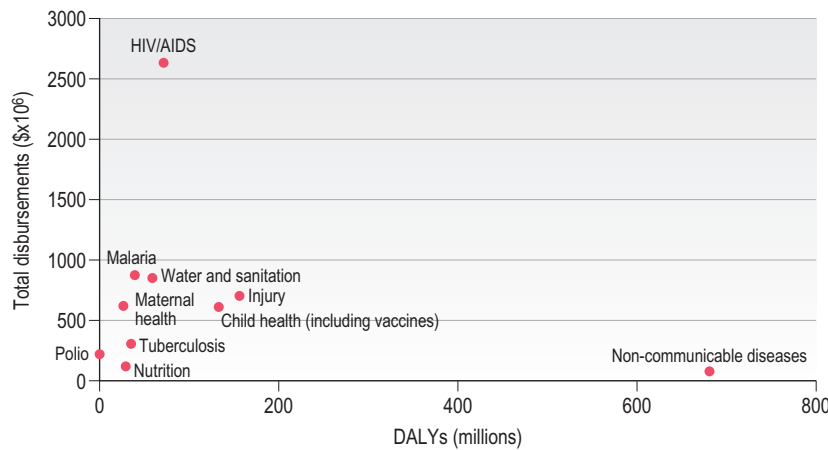
## How to Set Priorities in the Twenty-first Century?

It is therefore clear that addressing NCDs, particularly in the tropics, is complicated. The diseases themselves represent a long series of causes that must be contextualized in the broader settings of social, economic and political links. Attempting to lessen the burden of NCDs, particularly premature mortality to NCDs, challenges the basic conceptions of how we live, eat, work and play. The amount of oversight private and public sectors should portend in these realms is also brought into question. We are facing a future of 'manufactured' epidemics, with global commodity producers driving increased consumption of processed foods, alcohol and tobacco. If current projections hold, the consumption of unhealthy foods in developing countries will reach that of developed countries in the next three decades.<sup>22</sup> What is more, proposed interventions on food policy – bans on food high in saturated fats, taxes on fizzy drinks and so on – are often shunned as the path towards a nanny state that infringes on civil liberties. How, then, do we set priorities, particularly with our limited resources?

We can begin by further understanding where money and resources currently flow. Data from Sridhar et al. (Figure 61.3) mapped the bulk of overseas donor assistance for health to the burden of disease in terms of DALYs. The mapping shows that, in the twenty-first century, major resources are locked into specific disease categories – programmes, rather than systems. Further, they are locked into *particular* diseases and programmes. The data were provocative in showing two outliers: HIV/AIDS and NCDs. The calculation, roughly, was that \$1030 was spent on every HIV/AIDS death and \$3 for every death to NCDs.<sup>23</sup> The other 'investment portfolios' of malaria, child health, clean water, tuberculosis, on the other hand, appeared to linearly correlate dollar to DALY.

Why do NCDs receive so little funding when they account for such high disease burden? A report from the Center for Global Development, entitled 'Where have all the donors gone?' demonstrated that NCDs received only 2.3% of overseas development assistance, while driving the most DALYs globally.<sup>24</sup> The report showed that all NCDs together were receiving only 78 cents per DALY compared with 22 dollars per DALY for HIV, tuberculosis and malaria combined.<sup>24,25</sup> These reports have helped animate the paucity of support for NCD control and care, particularly in development programmes. Studies from the World Economic Forum showed that, if no action is taken soon, NCDs would cost \$47 trillion by 2030 in terms of lost productivity and economic toll globally.<sup>26</sup> Studies by the WHO showed that just \$11.4 billion annually was required for effective primary and secondary prevention for NCDs.<sup>27</sup> Additionally, cost-effective analyses and the Disease Control Priorities Project (DCPP) highlighted that interventions for NCDs at a population level – for instance, enacting a tobacco tax of 33% – only cost \$22 year<sup>27</sup> and were among the most cost-effective interventions a country could take.<sup>28</sup>

The question of whether NCDs should be perceived as a development issue by public and private donors is central to this debate. The perception is often that NCDs are diseases of the rich, diseases of the old and, critically, diseases that are



**Figure 61.3** How are global health dollars spent? Distribution of the total disbursements of overseas development assistance with respect to the burden of disease (in DALYs). (Adapted from Sridhar D, Batniji R. *Misfinancing global health: a case for transparency in disbursements and decision making*. *Lancet* 2008;372(9644):1185–1191.)

self-indulgent. Many people assert that it is the ‘fault’ of the individual for living a lifestyle that resulted in an NCD. Others may simply not know that NCDs are leading causes of death in developing countries. This was shown by one study of US surveys of people’s perceptions of the leading causes of death against measures of the actual disease burden from the WHO, in which little correlation between the US public’s perception and the actual disease burden was found.<sup>29</sup>

### A Social Movement Takes Root: NCDs Affirmed as a Social Justice Issue

These perceptions came to a head with the rise of a new, recently unified social movement. The vision of the movement was modelled after the HIV community’s movement wherein members sought to raise the issue of HIV in the global consciousness. Further, this historical group demanded that world leaders devote attention, resources and political capital to their cause. Their effort resulted in the first-ever UN General Assembly Special Session (UNGASS) on HIV/AIDS in 2001. This meeting, the first UN meeting on any health issue, led directly to the establishment of a global fund, initially only for HIV/AIDS efforts – but which was later tapped for TB and malaria as well.

The initial NCD movement had its roots in patients’ rights, with a strong constituency from the Caribbean. These patients drew the spotlight to their foot amputations, which were secondary to unchecked diabetes. By asserting that freedom from this chronic disease was a rights issue, they argued that needless suffering was resulting from global neglect of diabetes. Countries in the Caribbean, including Trinidad and Tobago, affirmed that they were spending nearly 10% of their GDP on diabetes care, with little to no improvements. This patient movement took their concerns to the ministers of a group of Caribbean countries (known as CARICOM in the UN system), to petition for greater support at the global level. The CARICOM leadership then raised the issue of diabetes and related NCDs to the UN. To the surprise of many, there was broad support from the floor, including from delegates of South-east Asia and the African Union, who cited the negative impact of NCDs on the population level. Crucially, social and economic parameters, not just health, were demonstrated to suffer with a high NCD

burden. Thus, NCDs were affirmed to be a political, social and economic topic – not just a health topic. Moreover, NCDs took on a human rights angle, becoming linked to discussions of injustice and inequity.

Quickly, a proposal gained momentum to hold an UNGASS on NCDs with heads of state, a meeting analogous to the 10-year session on HIV/AIDS, was circulated and approved. The meeting, coined a ‘High-Level Meeting’, would position NCDs as indicators beyond just health – but social and economic processes. Further, heads of state would, for the first time, acknowledge that strategic, systems-based approaches beyond just the health sector would be required to address the global increase of NCDs. A series of consultations were held with the UN’s health lead (the WHO) at six regions feeding into the first-ever WHO Global Forum in Moscow on NCDs and the first ministerial meeting on healthy lifestyles in April, 2011.<sup>30</sup> A series of other consultations followed, including a civil society hearing at the United Nations, and followed by the release of a zero draft on the political declaration on NCDs. This draft, initially called an ‘outcomes document’, was intended to provide a set of key commitments for countries to agree on so that the global attack on NCDs would be a concerted effort. Unsurprisingly, negotiation of the political declaration was mediated through a tense process with a group of 77 countries (actually representing 132), led by Suriname, accompanied by China; these countries often went head to head with developed countries for provisions on access to medicines, fighting for food/beverage policies and financing commitments. Youth, students, HIV+ patients, cancer survivors, tobacco advocates and access-to-medicine leaders converged at the UN High Level Meeting for the first-ever rally on NCDs at the UN Headquarters. Their goal was to frame NCDs as a social justice issue – they sought to petition world leaders to commit to equity promotion, action and targets (Figure 61.4). Over 300 non-governmental organizations were allowed into the UN General Assembly for this historic meeting and several representatives were allowed to make interventions from the floor. Following from the demands from people living with HIV/AIDS for access to therapies and the right to health, a newer movement has now surfaced on the rights of people living with NCDs for access to the appropriate interventions. The topic of access to medicines for NCDs, in particular, serves as a useful case study of the tensions at play that span human rights, trade policy and clinical medicine in the modern era.





**Figure 61.4** A Rally for Non-communicable Diseases: An Issue of Social Justice. A youth rally by the Young Professionals Chronic Disease Network (YP-CDN) on the date of the UN High Level Meeting on NCDs promoting Equity, Action and Targets with NCD survivors, advocates, HIV+ leaders and youth from across the globe. (Photo Credit: Rajesh Vedanthan.)

## The Policy Tensions around NCDs: Equity, Action and Targets

Successive versions of the negotiation proceedings for the political declaration on NCDs revealed that high-income countries at one time threatened to delete any mention of access to medicines and trade-related aspects of intellectual property rights (TRIPS). This inflexibility around intellectual property restrictions prevents countries from making drugs cheaply, in generic forms, which was a major step forward for antiretrovirals in the past decade.<sup>31,32</sup> In fact, the previously sanctioned 2001 Doha Declaration that affirms the right of countries to except pharmaceuticals from typical trade regulations, and which allowed flexibility on intellectual property, was omitted from the draft entirely. Even the use of the word 'epidemic' to describe NCDs was viewed as a 'trigger' that would invoke the necessity of flexibility on intellectual property, construed as being relevant only to infectious diseases, and was therefore deleted.<sup>33</sup>

The stark contrast between the political acknowledgements of NCDs compared with communicable diseases was even more poignant to watch in the shadow of the 10-year anniversary meeting of the HIV/AIDS 2001 UNGASS session, held just months prior. Following on from the original meeting, the 2011 HIV/AIDS UNGASS included a political declaration of key commitments that Member States agreed on: while the reference to the Doha Declaration in the access to medicines section was clear, in June, 2011, for the political declaration on HIV, this same reference was conspicuously missing for the political declaration on NCDs by September, 2011. This fundamental difference in political language between HIV and NCDs reflects not just the future policy changes that must be made before appropriate resources can be allocated to tackle NCDs; it also demands that the entire global population must agree, and define, what constitutes their right to health.<sup>33</sup>

The final political declaration ended by calling for a set of targets to be drafted by the WHO, with a potential partnership (para. 64 of the UN declaration) proposed by the UN to help oversee a global response to NCDs.<sup>33,34</sup> This would lead the

essential global monitoring of NCDs. At the World Health Assembly in 2012, there was an agreement to reduce mortality to NCDs by 25% by 2025 in the 30–70-year-old population of each country (an initiative with the buzzword '25×25'). As of this writing, the UN is deciding on their role in an NCD partnership and the WHO is solidifying targets and indicators to be articulated at the 2013 World Health Assembly. This UN/WHO partnership is critical to ensure that the NCD movement is globally institutionalized – a critical step towards sustaining political commitment to the issue. Will this be a strong and sustainable platform to ensure ongoing, collective, action? Indicators and targets on diabetes reduction, tobacco smoking, alcohol, dietary salt intake and obesity and cancer prevention in primary care are being considered as of this writing. The tensions on trade and health are no more salient than in the context of NCD policy.

## What Happens Next?

The revision of the Millennium Development Goals (MDGs) will occur in 2015, making it an important year for the global tropical medicine community to assess development progress. At start of the last decade, NCDs were omitted from the MDGs because of the common belief that NCDs do not affect the poor at a disproportionate rate compared with tropical, communicable diseases. This decision has influenced how and why resources are spent globally today. Since then, series of meetings in Rio de Janeiro, Brazil, including the Rio+20 meeting on sustainable development, has highlighted NCDs, as a key focus. Additional support from the United Nations Development Programme has also made it clear that NCDs are a barrier to sustainable development and critical to the social determinants of health.

In the USA, data have shown that of the 30 years gained in life expectancy in the past century, only 5 of these years are directly attributable to medical care.<sup>35</sup> The rest followed from addressing the 'causes of the causes': the social, behavioural and economic determinants (sanitation, nutrition, hygiene) that unlocked gains in health. For addressing NCDs in the twenty-first century, medical interventions alone will not substantially decrease morbidity and mortality. Creating incentives to change how we live, how we eat and how we play are globally crucial for lifespan extension. This naturally builds upon the long legacy of public health over hundreds of years. Perhaps, particularly in light of the access to medicines, a holistic strategy of prevention (causes of the causes) and treatment will win the day. Readers of this text, whether students, teachers or field workers, must have an interdisciplinary mindset: they must seek to tackle both social and biomedical determinants of health to gain ground in global health. Re-thinking NCDs in the context of communicable diseases will require a different model of care than that used for tropical communicable diseases alone. This model will challenge the social decisions that govern our sick societies. The modern efforts observed in New York City, such as tobacco taxation, tobacco bans and soda size restrictions, may signal a new global health movement centred on regulation.

Finally, the past decade has seen the rise of social movements that are disease-orientated such as the HIV/AIDS UNGASS in 2001, the associated TB and malaria movements, the movement on neglected tropical diseases (NTDs) and the movement on maternal and child health (MCH). Now, the UN High Level

Meeting on NCDs, and the affiliated movement on global mental health, is starting to coalesce at the cusp of this new decade. We must critically ask whether these 'disease movements' are suitable for the twenty-first century – or whether such categorical campaigns result in disease 'wars' that create isolated silos for financing, political and social attention.

Importantly, does advocating for specific diseases distract from the hard work of strengthening health systems and improving social determinants that would better treat, or even prevent, a variety of diseases from all categories? For readers of this text, the challenges of transforming sick societies into

healthy ones are firming up. The right to health in the tropics can, should and must be affirmed in order to address all disease categories. Indeed, to suffer is human; to suffer needlessly is not – to tackle human suffering, we must decrease morbidity across the span of human life. As we close our discussion, the final question is posed to the reader: where would you place your priorities as a Director General of the WHO or as a Head of State? How and where would you spend your 100 cents in an era of two epidemics that are equally treatable: one brought on as a by-product of modernization, the other still being waged against infectious microorganisms?

## REFERENCES

2. Mathers C, Fat DM, Boerma JT, the World Health Organization. The Global Burden of Disease: 2004 update. Geneva: World Health Organization; 2008.
22. Stuckler D, McKee M, Ebrahim S, et al. Manufacturing epidemics: the role of global producers in increased consumption of unhealthy commodities including processed foods, alcohol, and tobacco. *PLoS Med* 2012; 9(6):e1001235.
26. Bloom DE, Cafiero ET, Jané-Llopis E, et al. The Global Economic Burden of Noncommunicable Diseases. Geneva: World Economic Forum; 2011. Online. Available: <http://www.weforum.org/EconomicsofNCD> (Accessed 1 Oct 2012).
27. World Health Organization and World Economic Forum From Burden to 'Best Buys'. Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries. Geneva: WHO; September 2011.
34. UN. Document A/66/L1 Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases United Nations General Assembly, 66th session. Online. Available: <http://www.un.org/en/ga/ncdmeeting2011/>.

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## REFERENCES

1. Stuckler D, King L, Robinson H, et al. WHO's budgetary allocations and burden of disease: a comparative analysis. *Lancet* 2008;372(9649):1563–9.
2. Mathers C, Fat DM, Boerma JT; the World Health Organization. The Global Burden of Disease: 2004 update. Geneva: World Health Organization; 2008.
3. Murray CJL, Lopez AD; Harvard School of Public Health, World Health Organization, World Bank. The Global Burden of Disease: a Comprehensive Assessment of Mortality and Disability from Diseases, Injuries, and Risk Factors in 1990 and Projected to 2020. Cambridge, MA: Harvard School of Public Health, on behalf of the World Health Organization and the World Bank; 1996.
4. Lopez AD, Mathers CD, Ezzati M, et al. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. *Lancet* 2006;367(9524):1747–57.
5. Squires DA. Explaining High Health Care Spending in the United States: An International Comparison of Supply, Utilization, Prices, and Quality. The Commonwealth Fund; May 2012.
6. Jeon CY, Murray MB. Diabetes mellitus increases the risk of active tuberculosis: a systematic review of 13 observational studies. *PLoS Med* 2008;5(7):e152.
7. Leung CC, Lam TH, Chan WM, et al. Diabetic control and risk of tuberculosis: a cohort study. *Am J Epidemiol* 2008;167(12):1486–94.
8. Sullivan T, Ben Amor Y. The co-management of tuberculosis and diabetes: challenges and opportunities in the developing world. *PLoS Med* 2012;9(7):e1001269.
9. Hotez PJ, Daar AS. The CNCDs and the NTDs: blurring the lines dividing noncommunicable and communicable chronic diseases. *PLoS Negl Trop Dis* 2008;2(10):e312.
10. Moolani Y, Bukhman G, Hotez PJ. Neglected tropical diseases as hidden causes of cardiovascular disease. *PLoS Negl Trop Dis* 2012;6(6):e1499.
11. Tobacco use among youth: a cross country comparison. *Tobacco Control* 2002;11(3):252–70.
12. Leon DA, Saburova L, Tomkins S, et al. Hazardous alcohol drinking and premature mortality in Russia: a population based case-control study. *Lancet* 2007;369(9578):2001–9.
13. Sorensen G, Gupta PC, Pednekar MS. Social disparities in tobacco use in Mumbai, India: the roles of occupation, education, and gender. *Am J Public Health* 2005;95(6):1003–8.
14. Aitsi-Selmi A, Chandola T, Friel S, et al. Interaction between education and household wealth on the risk of obesity in women in Egypt. *PLoS One* 2012;7(6):e39507.
15. Basu S, Stuckler D, McKee M, et al. Nutritional determinants of worldwide diabetes: an econometric study of food markets and diabetes prevalence in 173 countries. *Public Health Nutr* 2012;13:1–8.
16. Siegel KR, Echouffo-Tcheugui JB, Ali MK, et al. Societal correlates of diabetes prevalence: An analysis across 94 countries. *Diabet Res Clin Pract* 2012;96(1):76–83.
17. World Health Organization. Global Status Report on Non-Communicable Diseases 2010. Geneva: WHO; April 2011.
18. Chiolerio A, Madeleine G, Gabriel A, et al. Prevalence of elevated blood pressure and association with overweight in children of a rapidly developing country. *J Hum Hypertens* 2007;21(2):120–7.
19. Olshansky SJ, Passaro DJ, Hershow RC, et al. A potential decline in life expectancy in the United States in the 21st century. *N Engl J Med* 2005;352(11):1138–45.
20. Novak DA, Desai M, Ross MG. Gestational programming of offspring obesity/hypertension. *J Matern Fetal Neonatal Med* 2006;19(10):591–9.
21. Desai M, Babu J, Ross MG. Programmed metabolic syndrome: prenatal undernutrition and postweaning overnutrition. *Am J Physiol Regul Integr Comp Physiol* 2007;293(6):R2306–R2314.
22. Stuckler D, McKee M, Ebrahim S, et al. Manufacturing epidemics: the role of global producers in increased consumption of unhealthy commodities including processed foods, alcohol, and tobacco. *PLoS Med* 2012;9(6):e1001235.
23. Sridhar D, Batniji R. Misfinancing global health: a case for transparency in disbursements and decision making. *Lancet* 2008;372(9644):1185–91.
24. Nugent, RA, Feigl AB. Scarce Donor Funding for Non-Communicable Diseases: Will it Contribute to a Health Crisis? Washington: Center for Global Development. 2010. Online. Available: <http://www.cgdev.org/content/publications/detail/1424546>. (Accessed 4 Dec 2010).
25. Nugent R, Feigl A. Where Have All the Donors Gone? Scarce Donor Funding for Non-Communicable Diseases. Working Paper 228. Center for Global Development, 2010. Online. Available: <http://www.cgdev.org/content/publications/detail/1424546> (Accessed 5 Oct 2012).
26. Bloom DE, Cafiero ET, Jané-Llopis E, et al. The Global Economic Burden of Noncommunicable Diseases. Geneva: World Economic Forum; 2011. Online. Available: <http://www.weforum.org/EconomicsofNCD> (Accessed 1 Oct 2012).
27. World Health Organization and World Economic Forum From Burden to 'Best Buys'. Reducing the Economic Impact of Non-Communicable Diseases in Low- and Middle-Income Countries. Geneva: WHO; September 2011.
28. Lopez AD, the Disease Control Priorities Project. Global Burden of Disease and Risk Factors. Washington: Oxford University Press; World Bank, New York; 2006.
29. Siegel KR, Feigl AB, Kishore SP, et al. Misalignment between perceptions and actual global burden of disease: evidence from the US population. *Glob Health Action* 2011;4.
30. WHO Global Forum: Addressing the Challenge of Noncommunicable Diseases. Moscow; 27 April, 2011. Online. Available: [http://www.who.int/nmh/events/global\\_forum\\_ncd/en/](http://www.who.int/nmh/events/global_forum_ncd/en/).
31. Cohen D. Will industry influence derail UN summit? *BMJ* 2011;343:d5328.
32. Harris G. China and India making inroads in biotech drugs. *New York Times* 2011;19 September 2011.
33. Knowledge Ecology International Obama Administration Wants to Eliminate References to Doha Declaration in UN Political Declaration on Non-communicable Diseases. Online. Available: <http://keionline.org/node/1252> (Accessed 2 Oct 2012).
34. UN. Document A/66/L1 Political Declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases United Nations General Assembly, 66th session. Online. Available: <http://www.un.org/en/ga/ncdmeeting2011/>.
35. Department of Health and Human Services. For a Healthy Nation: Returns on Investments in Public Health. Office USGP. Washington: Department of Health and Human Services; 1994.