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ORIGINAL PAPER

Why have Non-communicable Diseases been Left Behind?

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Abstract

Non-communicable diseases are no longer largely limited to high-income countries and the elderly. The burden of non-communicable diseases is rising across all country income categories, in part because these diseases have been relatively overlooked on the global health agenda. Historically, communicable diseases have been prioritized in many countries as they were perceived to constitute the greatest disease burden, especially among vulnerable and poor populations, and strategies for prevention and treatment, which had been successful in high-income settings, were considered feasible and often affordable in low-income settings. This prioritization has reduced the communicable diseases burden globally but has left non-communicable diseases largely neglected. A new approach is urgently needed to tackle non-communicable diseases. Based on an analysis of potential features which may have underlain the different approaches to non-communicable diseases and communicable diseases until now, including acuity of disease, potential for control or cure, cost, infectiousness, blaming of individuals and logistical barriers, little ethical or rational justification can be found to support continued neglect of non-communicable diseases. Justice demands access to quality and affordable care for all. An equitable approach to non-communicable diseases is therefore strongly mandated on medical, ethical, economic, and public health grounds. Funding must not however be diverted away from communicable diseases, which continue to require attention—but concomitantly, funding for non-communicable diseases must be increased. International and multi-sectoral action is required to accelerate progress towards true universal health coverage and towards achievement of all of the sustainable development goals, such that prevention and access to care for non-communicable disease can become a global reality.

Keywords Non-communicable diseases · Public health · Ethics · Equity · Justice

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Background

In 2000, the urgent problem of HIV/AIDS was raised at the United Nations General Assembly (UNGA). There were 2 million deaths at that time. The United Nations (UN) political declaration with commitment from head of states at that time catalyzed a global response by the UN, governments, and non-governmental organizations (NGOs) which resulted in a unique cooperation of partners, and the allocation of substantial resources without precedent (United Nations General Assembly 2001). The international consensus was that the gaps in access to prevention and care were unethical and would need to be overcome no matter where people lived and regardless of cost implications. Other communicable diseases including tuberculosis, malaria, and Ebola have also received high-profile attention over the last decade and many lives have been saved.

In 2011, another high-level UN resolution on health raised the issue of non-communicable diseases (NCDs) calling attention to the high numbers of global deaths (36 million in 2008) (United Nations General Assembly 2011). Possible linkages with communicable diseases (CDs) such as HIV were also noted. Despite this, however, a comparable response to that seen for the HIV epidemic in 2000, in terms of resource allocation and partnership development, has not yet occurred for NCDs. Indeed, in 2014, only 2% of international health aid funding was directed towards NCDs which constituted around half of the global disease burden, in contrast to 29% which was allocated to HIV, which constituted 4% of the global disease burden (Allen 2017). The expectation has been that national governments, and not external donors, should finance the response to NCDs as this requires a long-term sustainable horizontal and multi-sectoral approach, as opposed to vertical approaches which are easier to implement and can be successful for communicable diseases (Collins et al. 2018).

As outlined in Table 1, there is increasing knowledge about the global burden of NCDs, the trends, and the underlying behavioral and resulting biological risks across the globe. The global inequities in early NCD deaths are stark (Alleyne et al. 2013). Data from the Global Burden of Disease (GBD) study do indicate that infections remain the leading causes of disability and mortality in low-income regions (GBD 2017 Causes of Death Collaborators 2018), but given the clear data that NCDs comprise the major global cause of death especially among more vulnerable populations, and that risk factors are highly prevalent globally, the disproportion in resources allocated to combating NCDs compared with CDs is striking. How then have we come to the point where NCDs have been relatively neglected?

This paper sets forth an analysis of the underlying ethical, social, epidemiologic, and economic factors which might contribute to the difference in the global response to CDs and NCDs. First, we ask if there is a morally relevant distinction between CDs and NCDs to justify this approach. We examine various characteristics of CD and NCDs and analyze whether there are ethical justifications for the prioritization of one over the other. Then, we present some of the challenges raised by the inherent complexities and external factors impacting the current perceptions and approaches to NCDs. Overall, we find little ethical or rational justification to support continued neglect of NCDs.

Table 1 Facts about non-communicable diseases

- NCDs were collectively responsible for 71% of global deaths (41 million) in 2016.
- 38% of NCD deaths occur "prematurely" in people aged 30–70 years.
- NCDs are the major cause of death among those over age 70 but this does not mean some of these deaths may not also be "premature"
- 78% of all NCD deaths, and 85% of premature deaths occur in LMICs.
- 48% of NCD deaths in LMIC occur between ages 30 and 70.
- 4% of NCD deaths occur in people under age 30.
- NCDs are a major killer of women.
- NCD risk factors are disproportionately prevalent in disadvantaged and indigenous populations globally.
- High blood pressure, high fasting glucose, and high body mass index are the leading risk factors for death among men and women globally.
- The NCD epidemic is being driven primarily by tobacco use, physical inactivity, harmful use of alcohol, unhealthy diets, and air pollution.
- NCD risk begins in fetal life and accumulates throughout the life course.
- 1 in 5 babies are born low birth weight or preterm and are therefore at risk.
- Prevention of NCDs is highly cost-effective and good for the economy.
- 2% of development aid has been directed to NCDs over the past two decades.
- The budget of the Global Fund (to fight AIDS, tuberculosis and malaria) is 10 times greater than that of the World Health Organization

Data compiled from various references (NCD Countdown 2030 collaborators 2018; GBD 2017 Risk Factor Collaborators 2018; World Health Organization Regional Office for Europe 2016; Lee et al. 2017; Lee et al. 2013; Allen 2017; World Health Organization 2013, 2018e, 2018j)

Is there a Morally Relevant Distinction between Communicable Diseases and Non-Communicable Diseases?

In this section, we will examine a set of arguments regarding potentially different features of CDs and NCDs or their treatment and will discuss whether these features are relevant ethical grounds to justify a differential approach to NDCs and CDs (Nishtar et al.). We conclude on the basis of an argument of justice that NCDs deserve equal consideration.

Acuity and Reversibility of Disease

Acute symptoms such as shortness of breath, pain, and fever are dramatic and common in CDs, but they are not limited to these diseases. Some NCDs have similarly distressing symptoms such as asthma, ischemic heart disease, or cancer. In addition, some NCDs, such as strokes or gastrointestinal bleeding, may also be acutely reversible as are CDs. If we think acute symptomatology is an important reason to act, it can be argued that acute situations present a moral demand for treatment regardless of the cause (Lübbe 2018). Similarly, if reversibility is a justification for treatment, this should apply to both reversible CDs and NCDs. In practice, following the justice principle of prioritizing the worst off, acutely ill individuals are indeed often prioritized for care over the chronically ill in triage algorithms (Aacharya et al. 2011). Equity therefore

would demand that all patients should receive equal access to treatment irrespective of the cause of disease. Thus, in terms of acuity and reversibility, it is not clear that a different approach is justifiable for acute and reversible CDs and NCDs.

Curability and Requirement for Long-Term Treatment

Most NCDs reflect irreversible cumulative organ damage and are therefore not curable. Appropriate, early, and effective diagnosis and treatment (many highlighted in the WHO's Best Buys,[1] Table 2) (World Health Organization 2013, 2017b) for NCDs, such as control of hypertension, diabetes, obesity, and tobacco consumption, can delay progression of many NCDs, prevent complications, and can permit an individual to live relatively well on treatment (Mendis and Chestnov 2013). These strategies have been shown to be highly cost-effective in low- and lower-middle-income countries (LLMIC) where, for a little as US$1.27 per person, total premature mortality from NCDs could be reduced by 15% (World Health Organization 2018e). There is therefore no justification not to engage in such strategies.

Curability may however be an important motivator for treatment. Indeed, since the treatment for Hepatitis C has become possible, screening is being advocated for early diagnosis and treatment globally (World Health Organization 2016). Similarly, some NCDs, such as some forms of cancer, may also be curable. In contrast, some CDs, such as HIV, are not curable, or others such as tuberculosis may require long courses of treatment. These circumstances have not prevented treatment efforts for these infections. Therapeutic nihilism leads to under-diagnosis and under-treatment of conditions because of perceived difficulty or futility and may extend from preventive to therapeutic approaches to NCDs given their chronicity and the frequent impossibility of cure. Even in high-income countries where resources are readily available, therapeutic nihilism is illustrated by observations that interventions for cardiac or neurological disorders, for example, despite known effectiveness, may be used less among the elderly, children, or those perceived to have poorer prognoses (Sedney et al. 2019; Gupta 2016; Schranz and Voelkel 2016). In lower-income settings, when treatments for NCDs such as dialysis for example are not available, diagnosis and referral of patients with kidney disease may seem pointless, but this approach disregards the value of the opportunity to initiate early treatment (Nugent et al. 2011). It is hard to envisage that a CD would not be diagnosed or treated purely because of a patient's age or high severity of illness if treatment was available. Certainly, treating chronic diseases is more complex than treating diseases of short duration and requires access to long-term holistic care. NCDs are also potentially more heterogeneous than CDs and therefore require a level of flexibility for appropriate diagnosis and treatment. Such factors are not insurmountable barriers.

Importantly also, disadvantage and vulnerability are exacerbated by chronic illness, and chronic illness itself may also impede access to care for varying reasons even under universal health coverage (UHC), which perpetuates a vicious cycle of suboptimal care (Stutzin Donoso 2018). The relative success in managing HIV for example, even in low resource settings, highlights the possibility of effectively tackling a chronic disease

[1] WHO Best Buys are a set of highly cost-effective policy options for NCDs as outlines in the Global Action Plan for the prevention and control of NCDs

Table 2 World Health Organization best buys for non-communicable diseases

Best buy	Intervention	Return on investment of $1 spent in 2018 by 2030:
Reduce unhealthy diet	• Reformulation of food • Supportive environments • Education • Packaging	$12.82
Reduce harmful alcohol use	• Tax • Advertising • Availability	$9.13
Reduce tobacco use	• Tax • Packaging • Advertising • Smoke-free public spaces • Education	$7.43
Manage cardiovascular disease and diabetes	• Early diagnosis of risk factors and disease • Early treatment of risk factors and disease • Counseling • UHC	$3.29
Reduce physical inactivity	• Education • Safe spaces for exercise, commuting	$2.80
Prevent and manage cancer	• Vaccination • Screening	$2.74

Adapted from Saving Lives, Spending Less (World Health Organization 2018e)

when resources are deployed (Granich et al. 2015). Successful management of HIV has not relied only on administration of medication but has also required provision of social support, nutrition etc. for optimal success (Melvin and Gipson 2019). If such a chronic disease arising from a CD can be effectively managed, this provides proof of principle that chronic disease management is possible in other cases, irrespective of the source of the disease, i.e. also for NCDs. There is therefore little justification not to prioritize other chronic diseases that may be more prevalent and even less resource-intensive to treat. Thus, being chronic or not curable are not justifiable reasons not to treat NCDS.

Preventability of Disease

A common argument hinges on successful prevention possibilities for CDs (World Health Organization 2017a). Vaccination, vector control, and mass drug administration are highly effective strategies to prevent CDs that can be implemented periodically and vertically during time-bound public health campaigns. Indeed, progressive eradication of several neglected tropical diseases is testament to the success of these strategies, although progress is still required (Krentel et al. 2018). In most cases, these prevention efforts are complied with, although recent resistance to vaccination has demonstrated how easily CDs can re-emerge if prevention efforts are hindered (Bester 2016). However, preventability does not only apply to CDs. Prevention of many NCDs is also possible: through appropriate education, public health strategies, and measures to improve healthy lifestyles and reduce unhealthy diets (World Health Organization

2013; Nishtar et al. 2018; Thomas and Gostin 2013). For example, implementation of the Framework Convention on Tobacco Control in Uruguay has reduced cardiovascular deaths (Grainger Gasser et al. 2015). Furthermore, recent analyses project that implementation of the Best Buys for prevention of NCDs in LLMIC would save 8.2 million lives and generate US$350 billion in economic growth by 2030 (World Health Organization 2018e). Prevention of CDs with focused campaigns is the low-hanging fruit and should continue; however, prevention of NCDs should not be deferred, or delayed, by outside interests, or by perceptions that it is too hard (Thomas and Gostin 2013).

Tackling risk factors such as those fostered by the tobacco or food industry and developing policies to facilitate healthy life-style choices is less circumscribed and less immediately deliverable than introducing a vertical program to control malaria for example. However, the difficulty of the task of preventing the spread of NCDs cannot be a justification not to attempt to tackle these systemic and pervasive risk factors. Given the scale of NCDs, and the projected well-being and economic benefits resulting from implementation of prevention policies, prevention and early treatment strategies for NCDs should be prioritized (World Health Organization 2018e). Furthermore, given the relative complexity of tackling NCDs compared with CDs, the argument for multisectoral action to facilitate healthy lives, as exemplified by the Sustainable Development Goals (SDGs), may be stronger in relation to the NCDs given the need for long-term and sustainable reduction in structural risk factors and the development of robust social and environmental infrastructure (Nishtar et al. 2018).

Individual versus Social Responsibility for Disease

Another argument stresses individual responsibility for disease. Despite the fact that some CDs such as HIV or Hepatitis C may result from an individual's choices (Davidovich et al. 2016), the great majority of CDs are considered to result from external causes (vectors) and socio-economic disadvantage (insufficient access to clean water, overcrowding) over which individuals have little power (Lim et al. 2019). In contrast, the contention is that most NCDs are related to unhealthy lifestyles resulting from individual choice. Indeed, the rise of NCDs has been driven primarily by tobacco use, physical inactivity, harmful use of alcohol, and unhealthy diets (World Health Organization 2013), which reflect individual choices, but many structural factors, such as poverty, air pollution, lack of education and gender inequity, and others, as highlighted by the SDGs (United Nations 2017) act synergistically to amplify this rise (Niessen et al. 2018). Such NCD risk factors are disproportionately prevalent among disadvantaged populations and may have important cultural variability (Basu et al. 2018). Although it may be true, therefore, that unhealthy choices contribute to the NCD burden, the actual choices available to an individual are often restricted by structural injustices such as their socioeconomic status (food prices), education, environmental factors, advertising, and the lack of prevention policies and treatment programs in their communities (Warren Andersen et al. 2016; Luna 2018; Young 2003). A vicious cycle therefore arises with NCDs where risk factors are more prevalent and making healthy choices and gaining access to care are more difficult among disadvantaged populations (Stutzin Donoso 2018; Norton et al. 2016; Allen et al. 2017; Marmot 2018b; Willen et al. 2017; Basu et al. 2018). NCDs contribute to three quarters of deaths in women

(Collins et al. 2018). One in 25 NCD deaths occurs in children (NCD Countdown 2030 collaborators 2018). Women and children are vulnerable and disenfranchised in many parts of the world and may not have as many choices as adolescent and adult males. Blaming the individual therefore seeks unfairly to transfer responsibility, instead of supporting already vulnerable people to improve their health (Marmot 2018b; Stutzin Donoso 2018; Thomas and Gostin 2013; Luna 2018; Young 2003). Individual responsibility cannot however be fully abdicated in the quest to reduce the NCD burden. The ethical principle of autonomy dictates that people must be educated about the consequences of life-style choices, through public health campaigns and individual education, but the principle of justice dictates as well that being able to exercise autonomous choices must be possible, facilitated by public health policies and achievement of socioeconomic and social reform to improve equity. Such a concept of shared political and individual responsibility (Young 2003) can be applied to both CDs or NCDs, but is arguably more complex with respect to NCDs where it may be harder for an individual to make healthful choices every day.

Contagiousness of Disease

The risk of infecting others may be one of the strongest justifications for prioritization of CDs over NCDs. Certainly, CDs are by definition contagious. In contrast, most NCDs are not directly physically contagious from one individual to another; however, the contagiousness of NCDs should be further examined. Many NCDs can be considered socially or environmentally contagious. Unhealthy lifestyles are propagated in families and in low-income communities. In addition and as a result of lack of appropriate policies, this may have greater long-term consequences for an individual than the transmission of an acute infection. In the current context of rapid globalization, and "Macdonaldization," commercial determinants and social determinants of NCDs are spreading rapidly and contributing to the increasing prevalence of NCDs globally (Mendenhall et al. 2017). At the local level, urbanization is associated with poverty, food deserts, and consumption of highly processed food, as daily access to affordable healthy food is challenging and thus obesity and diabetes are on the rise (Ghosh-Dastidar et al. 2014). Rates of risk factors such as smoking are often highest among those of lowest socioeconomic status because of poor health literacy, prevailing pressures to conform, stress, addiction, exposure in the home, and cheap tobacco in many countries (Di Cesare et al. 2013; Cappelen and Norheim 2005). Lobbyists and advertising push for increasing tobacco, alcohol, salt, sugar, and fat consumption, which all could be considered vectors for NCDs (Whitaker et al. 2018; Kickbusch et al. 2016). A common argument emphasizes that despite these "vectors," individuals with NCDs are in control of the "contagiousness" (Gostin 2014). An individual for example can simply choose not to smoke. This may be true in theory, but in practice, peer pressure, social conditioning, social stresses, and subsequent addiction may make smoking very hard to avoid in certain environments (Cappelen and Norheim 2005). Similarly, individuals can reduce their risks of developing CDs by being vaccinated, washing their hands, or not engaging in high-risk activities. As these activities are generally supported by public health measures, they may be easier for an individual to achieve than personal choices required to reduce NCD risk.

If being contagious is an ethically relevant feature mandating prevention or treatment of disease, this should hold similarly for social, environmental, or physical contagiousness. The concept of contagiousness should therefore be equally relevant, to CDs and NCDs.

Perceived Cost of Treatment

Another strong argument points out that treatment of an acute infection with a single short course of a generic antibiotic is generally cheap and cost-effective. On one hand, most acute infections do not require long-term treatment and most individuals who survive return to their previous state of health. Access to medicines for infections is therefore only required intermittently and weaknesses in the health system may be less evident when treatment is required. Vertical programs directed at individual high burden infections, e.g., malaria, have circumvented the weaknesses in health systems and have successfully reduced disease burdens[2] (World Health Organization 2015, 2018b, 2018i). However, the long-term success of treatment for acute infections also requires universal access to essential and good quality medicines and requires good medication stewardship to curb antimicrobial resistance (Morehead and Scarbrough 2018). Better infrastructure such as access to safe water, sanitation, vector control, and improved health literacy are needed if CDs are to be prevented. Thus, tackling CDs comprehensively may not be as simple as it appears.

On the other hand, treatment for NCDs is highly dependent on UHC, consistent availability of essential medicines, evidence-based clinical algorithms being in place, and access to ongoing quality primary care. Many NCDs arise as complications of other untreated NCDs, e.g., kidney disease may be a consequence of uncontrolled high blood pressure, and is in turn a strong risk factor for hypertension and cardiovascular disease. Kidney disease and cardiovascular disease are more complex and more costly to treat than hypertension alone. NCDs therefore often belong to a vicious cycle of augmentation of disease burden and resource requirements if early windows of opportunity for diagnosis and intervention are missed (Luyckx et al. 2018; Tonelli et al. 2012). NCDs such as rheumatic heart disease, cervical cancer, and cirrhosis also arise from untreated infections, illustrating the necessity to address CDs and NCDs simultaneously. Besides strengthening prevention of NCDs, most NCDs are manageable even in low resource settings, as many can be diagnosed early with simple tests, and generic treatments are effective and cheap (Maher et al. 2009; Mani 2006; Lin et al. 2019). Strategies such as the WHO Hearts Packages (World Health Organization 2018a) highlight simple resource-adapted approaches to comprehensive care for cardiovascular disease for example. The knowledge therefore exists. There is no justification, even in low resource settings not to embark on systematic implementation of simple strategies to detect and treat NCDs early (World Health Organization 2018f; 2017b; Nishtar et al. 2018).

Both CDs and NCDs present challenges—even if at first glance it appears CDs are simpler and cheaper to tackle—and both need systematic strengthening of health systems. Prioritization of one over the other on the single basis of cost-effectiveness is not

[2] Since 2000, global malaria deaths have fallen by 48%; HIV infections and HIV deaths have fallen by 36% and 38%, respectively; 53 million lives have been saved in people treated for tuberculosis(www.who.int)

justifiable and is to the detriment of the whole. An implicit nihilistic argument is that treatment of NCDs requires sustainability and weak health systems cannot provide this, and also that medication is too expensive. Sustainable chronic treatment for HIV for example is possible in low-income settings (World Health Organization 2018b; UNAIDS 2016). Pressure is mounting for improved access to treatment for Hepatitis C (Douglass et al. 2018). This can and should therefore be possible for NCDs, building upon the infrastructure and lessons learned from scaling-up treatment for HIV (Garrib et al. 2018).

Hence, following this first set of arguments, it can be concluded that the characteristics of CDs which appear to have led to their prioritization over NCDs are not ethically acceptable or conclusive: NCDs may be acute and reversible, CDs may be chronic, both may be preventable and contagious, and both may not be simple or cheap to treat. Prevention and treatment of NCDs has recently been demonstrated to be highly cost-effective, and even cost-saving in the long run, especially when the current costs of no action are considered (Table 2) (World Health Organization 2018e). We therefore conclude that there are no morally relevant factors supporting the differential approaches to CDs and NCDs. We now turn to examine whether there may be other arguments supporting lack of prioritization of NCDs.

Do Barriers Lead to the Relative Neglect of NCDS?

This section will highlight other factors, ranging from intrinsic to external challenges, which may hamper adequate consideration of NCDs.

The Global Burden of Non-Communicable Diseases is High

NCDs were traditionally considered problems of HICs and the elderly and therefore not deserving of global attention (Thomas and Gostin 2013). In fact, NCDs have posed a greater global burden of disease than CDs since the mid-1990s (Roser and Ritchie 2018), but only recently has this global shift in epidemiology been widely acknowledged (Nishtar et al. 2018). To objectively assess the NCD burden, the global distribution of disease must be considered (Table 3). In countries with a low socio-demographic index (SDI)[3], the leading cause of death is now ischemic heart disease (Kassebaum et al. 2017), although lower respiratory infections (LRTIs) and diarrheal diseases remain the major contributors to disability-adjusted life-years (DALYs) (Institute for Health Metrics and Evaluation 2018; World Health Organization 2018h). In lower-middle-income countries (LMICs), heart disease and stroke are the first and second leading causes of death, with LRTI ranking 3rd (World Health Organization 2018h). In upper-middle-income and HIC, NCDs account for the top 5 causes of death (World Health Organization 2018h). Gradients of NCD burden also occur within countries across the socio-economic spectrum (Beydoun et al. 2016; Norton et al. 2016). If we simply base prioritization of diseases on cause of death and DALYs, it may therefore be justifiable to prioritize LRTI and diarrheal diseases over IHD in LIC, but in all other countries, IHD and strokes should receive priority. In

[3] SDI is a composite average of the rankings of the incomes per capita, average educational attainment, and fertility rates of all areas in the Global Burden of Disease study

terms of coverage required, it must be acknowledged that the numbers of people affected by diarrheal illness outstrip all others (Table 4), especially in children under age 2 and the elderly. The numbers of people living with NCDs and their risk factors are also high however, and these diseases tend to impact the economically active population, and individuals often supporting multiple dependents. Most premature NCD deaths occur in LMICs, highlighting the urgent need for prevention and treatment in these settings (World Health Organization 2018c).

Good health system governance calls for consideration of the short-, medium-, and long-term consequences of not tackling some diseases, which are not only economic but also exacerbate inequities (Thomas and Gostin 2013; World Health Organization 2018e; Allen 2017). Loss of a breadwinner to a treatable NCD, or out-of-pocket spending to treat NCDs, has a devastating impact on their family members (Kumara and Samaratunge 2017; Jaspers et al. 2015).

Awareness of NCDs is Low

Historically, CDs comprised the biggest disease burden, especially among the poor and disenfranchised and solutions for prevention and treatment for many CDs were straightforward and had been successfully implemented in HIC. Following a sense of obligation and compassion, humanitarian activity evolved to tackle these diseases largely occurring in low-income settings. In addition, less altruistic motives such as fear of the spread of certain viruses (i.e., Ebola) periodically motivated action.

As highlighted above, until recently, awareness and acknowledgement of the burden of NCDs has been insufficient.[4] In contrast, campaigns for CDs have been high profile and patient advocates such as those fighting for the rights of patients with HIV/AIDs have inspired stakeholders and the world to act. Fundraising drives, epidemics, and outbreaks bring the faces of adults and children suffering from CDs into our homes and onto our screens. Simple solutions are offered, e.g., $100 will help to vaccinate 50 children or build a water faucet in a remote village. It is easy to imagine the plight of the infected person far away and to feel reassured that one has indeed helped. Many NCDs are not as visible and support for their treatment may feel less "heroic." People suffering from NCDs often remain statistics despite the fact that most people in the world today will know someone with an NCD. Activism has been successful in raising the profile of some cancers such as breast cancer, which affects active women beyond their control, and therefore has a powerful emotional value (Osuch et al. 2012). The current global focus on five NCDs (cardiovascular disease, cancer, chronic respiratory disease, diabetes, and mental health) also risks neglecting many other NCDs (Nishtar et al. 2018). Lack of awareness or lack of publicity, however, does not mean that other NCDs are not relevant. In the era of globalization, we cannot deny knowledge of the pervasive nature of many social and structural determinants of all NCDs which need urgent attention.

Inherent Challenges of NCDs

Acute symptoms trigger response. NCDs frequently remain asymptomatic until advanced stages; therefore, a priority of the response to NCDs must be to target

[4] The first UN High Level Meeting on NCDs was held in 2011, followed by on in 2014 and one in 2018

Table 3 Distribution of global burden of disease in 2017

% Global and low SDI deaths/DALY/YLDs (2016 GBD study)	Communicable diseases					Non-communicable diseases	
	LRTI	Diarrhea	TB	HIV	Malaria	IHD	Stroke
Global deaths (%)	*4.57* (4.38–4.74)	2.81 (2.11–2.39)	2.12 (2.02 -2.22)	1.71 (1.62–1.8)	1.11 (0.78–1.5)	*15.96* (15.73–16.31)	*11.02* (10.84–11.29)
Low SDI Deaths (%)	*7.62* (7.05–8.04)	*7.77* (6.07–10.87)	5.24 (4.92–5.61)	2.89 (2.69–3.16)	3.91 (2.73–5.36)	*8.55* (8.15–9.02)	*6.17* (5.88–6.48)
Global DALYs (%)	*4.27* (3.85–4.73)	3.25 (2.82–3.86)	1.8 (1.65–1.96)	2.18 (2.0–2.39)	1.8 (1.26–2.46)	*6.83* (6.26–7.38)	*5.29* (4.89–5.65)
Low SDI DALYS (%)	*7.52* (6.85–8.18)	*6.93* (6.01–8.26)	*3.42* (3.14–3.72)	2.97 (2.73–3.28)	*4.71* (3.3–6.45)	*3.46* (3.22–3.73)	2.53 (2.35–2.71)
Global YLD (%)	0.076 (0.062–0.091)	*1.22* (1.07–1.39)	0.37 (0.28–0.45)	0.46 (0.4–0.56)	0.17 (0.14–0.21)	0.62 (0.54–0.7)	*2.2* (1.74–2.64)
Low SDI YLD (%)	0.12 (0.1–0.15)	*2.22* (1.92–2.55)	0.61 (0.46–0.76)	*0.75* (0.66–0.89)	0.63 (0.53–0.76)	0.37 (0.32–0.44)	*0.82* (0.65–0.99)

% Global and low SDI deaths/DALY/YLDs (2016 GBD study)	Non-communicable diseases					
	COPD	Asthma	Cancer^	DM	CKD*	Alzheimer/dementia[a]
Global deaths (%)	*5.72* (5.43–5.97)	0.88 (0.6–1.14)	*9.53*	2.45 (2.4–2.5)	2.2 (2.13 – 2.24)	4.49 (4.42–4.55)
Low SDI Deaths (%)	*6.02* (4.68–6.92)	2.05 (1.06–2.99)	3.65	1.94 (1.86–2.04)	1.43 (1.36–1.63)	1.32 (1.21–1.42)
Global DALYs (%)	*3.27* (2.96–3.56)	0.91 (0.76–1.09)	*5.03*	2.71 (2.4–3.04)	1.43 (1.35–1.51)	1.22 (1.14–1.3)
Low SDI DALYS (%)	2.7 (2.24–3.08)	1.18 (0.81–1.56)	1.74	1.48 (1.32–1.66)	0.89 (0.84–0.98)	0.32 (0.29–0.34)
Global YLD (%)	*3.64* (2.81–4.55)	*1.24* (0.97–1.56)	0.42	*4.5* (3.92–4.1)	0.86 (0.75–0.99)	0.77 (0.62–0.94)
Low SDI YLD (%)	*3.58* (2.72–4.56)	*1.27* (0.97–1.63)	0.13	3.04 (2.63–3.5)	0.66 (0.57–0.76)	0.24 (0.19–0.3)

The top 5 diseases in each category are indicated in italics. Table compiled from GBD Compare/Viz Hub: https://vizhub.healthdata.org/gbd-compare/^. Data included for the following cancers: lung, liver, stomach, colon, breast, cervix

SDI socio-demographic index, *DALYs* disability-adjusted life-years, *YKD* years of life lost to disability, *LRTI* lower respiratory tract infection, *HIV* human immunodeficiency virus, *TB* tuberculosis, *IHD* ischemic heart disease, *COPD* chronic obstructive pulmonary disease, *DM* diabetes mellitus, *CKD* chronic kidney disease

[a] CKD and dementias have been included as these are projected to become leading global causes of death by 2040.(Foreman et al. 2018)

prevention. In addition, many NCDs arise from a complex interplay of multiple compounding risks; therefore, in most cases, there is no single vector or virus that can be addressed. Indeed, risk factors for NCDs are pervasive, insidious, and often silent or ignored. Prevention may require hard-to-achieve changes in life-style (e.g., diet, exercising, tobacco cessation), whereas it is far easier to take a medication to address a symptom once manifest, although it may be too late for substantial NCD control. Tackling NCDs is therefore complex, requiring a health-system-wide and multi-sectoral approach; public awareness; access to reliable diagnostics; consistent access to a variety of medication; is highly dependent on an individual's level of health, literacy, and socio-economic and cultural circumstances; and requires long-term follow up. Special attention must be given to vulnerable groups affected by NCDs, including women, children, the elderly, and indigenous communities where additional risks prevail (Norton et al. 2016; Luna 2018; Marmot 2018a; Bonita et al. 2013). This complexity, however, does not mean that nothing can be done.

NCDs present a battlefield on at least three fronts: (1) individual awareness must be raised, (2) lobbies and industry manipulation must be contained, and (3) public health decision makers must commit to policy development with a view to long-term success in conjunction with the overall strengthening of health systems and UHC.

Options to treat NCDs are Available

Another factor that may hamper NCD advocacy is that despite the relative neglect of NCDs in terms of development funding and disease management programs, the drug-development pipeline is dominated by compounds being developed to treat NCDs (Fisher et al. 2015; Allen 2017). There is therefore a perception that NCDs are being addressed. Taking the cynical view, the industry focus is on developing drugs for HIC markets where NCDs have long predominated and where chronic treatment of NCDs is possible and affordable. This situation creates demand through development of new medications that may add small incremental benefits but generate high profits. Ironically, cheap, effective, generic medications for NCDs are not consistently available or affordable in most lower income settings (Khatib et al. 2016). Many industry investments do not seriously impact the most vulnerable in LMICs, as their target is HICs. Drug development, pricing, and distribution for both CDs and NCDs must be re-examined to improve equitable access to affordable medicines. Lobbies have successfully mobilized to reduce costs of therapies for high-profile infections in LMICs. It should be equally possible to introduce negotiation and/or regulation for fair pricing, with fair profits, for other prevalent and serious diseases, including NCDs (Sibbald 2017).

Challenging Lobbies

Another important factor driving the NCD epidemic is the global context: commercial determinants of health are pervasive and powerful (Kickbusch et al. 2016). Industries continue to push to increase the markets for tobacco, fast foods, and carbonated drinks in LMICs, especially among the young (Yang et al. 2017; Gilmore et al. 2015; Baker and Friel 2016). In many countries, industry interference has hindered development and implementation of public health policies for NCD prevention, including tobacco control and reduction in salt, sugar, and alcohol consumption (Kickbusch et al.

Table 4 Numbers of people affected by major diseases and risk factors

Numbers global (WHO fact sheets)	Communicable diseases					Non-communicable diseases			Risk factors for non-communicable diseases				
	LRTI	Diarrhea	TB	HIV	Malaria	CVD	COPD	Cancer	High blood pressure	High fasting plasma glucose	Impaired kidney function	Tobacco	Obesity
Deaths (million)	2.74 (2015)	1.7 (2016)	1.6 (2017)	0.94 (2017)	435 (2017)	17.9 (2017)	3.17 (2015)	9.6 (2018)	10.4 (2017)	6.5 (2017)	2.6 (2017)	8.1 (2017)	4.7 (2017)
Number living with disease/ episodes (millions)	291 (2015)	2.4 billion (2015)	10.4 (new cases 2017)	36.9 (2017)	219 (2017)	423 (2015)	251 (2015)	43.8 (5-year prevalence 2018)	1.13 billion (2015)	435 (2015)	750 (2016)	1.1 billion (2017)	650 (2016)

Data compiled from various references (GBD 2016 Diarrhoeal Disease Collaborators 2018; GBD 2015 LRI Collaborators 2017; GBD 2015 Disease and Injury Incidence and Prevalence Collaborators 2016; Bikbov et al. 2018; GBD 2017 Risk Factor Collaborators 2018; World Health Organization 2017c, 2017d, 2017e, 2018b, 2018d, 2018g, 2018i; The Global Cancer Observatory 2018; Roth et al. 2017)

2016). These are strong lobbies that exert pressure not only locally (including on individuals and communities) but also globally. Until recently, the public debate has been influenced by the arguments that regulation of food content and tobacco and alcohol sales are manipulative and paternalistic, and that taxation on unhealthy products is regressive (Thomas and Gostin 2013; Gostin 2014; Bayer et al. 1988; Upshur 2013). However, public health should be viewed as a common good and governments have the responsibility to create contexts in which all members of society, including the most vulnerable, have the opportunity to make healthy choices (Hansen et al. 2016). Primary prevention of NCDs through reductions in salt, tobacco, alcohol, and sugar consumption is cost-effective (Table 2) (Nishtar et al. 2018; World Health Organization 2018e; Sassi et al. 2018; Bertram et al. 2018). These goals can be achieved in a number of ways (Thomas and Gostin 2013; Buse et al. 2017). Contrary to the expectation, taxation of tobacco products has been shown to be pro-poor (Schmidt 2009; Verguet et al. 2015). Proactive policies can therefore make healthy choices easier and unhealthy choices more difficult, but importantly, this does not abrogate an individual's responsibility for their own health (Schmidt 2009). It could even be argued that the possibility of better choices increases an individual's responsibility (Young 2003). There are few remaining excuses: "it is time for the political class to be held accountable for failing to act" (Gostin 2014) on NCDs.

Lack of Rapid Returns in NCDs

Finally, outcomes in the case of CDs are easily measurable: incidence and prevalence can be documented and rates of treatment and cure can be tracked over relatively short time-lines. Returns on investment are therefore relatively easy to show over the short term, which generates more funding. Outcomes for NCDs, in contrast, are measurable over years and decades and not weeks or months. This fact makes NCDs less attractive to donors, governments, health agencies, and stakeholders (Nugent 2016; Allen 2017). However, ease of measurement or short-term wins (though tempting) should not guide funding agencies, public health policies, or governments. Objectively, despite the relative neglect, there has been some, albeit slow, progress in reducing mortality from NCDs (Collins et al. 2018). However, "overall" progress hides the fact that many NCDs are left behind with the current disease targets being focused on the 5 priority NCDs (World Health Organization 2013). Disease burdens and effectiveness of all NCD interventions must be measured. Funding should be driven by transparent priority setting and determination of need, free from coercion, and in consultation with local decision makers.

Conclusions

Examination of potential features which may underlie a differential approach to CDs compared to NCDs reveals that this distinction is largely not justifiable from an ethics standpoint. Many CDs share features with NCDs and vice versa (Table 5). The message is not to stop or divert funding away from CDs—but in parallel to increase funding for NCDs—to accelerate progress towards UHC and achievement of the SDGs, such that

access to appropriate care becomes more equitable across disease groups, countries, and population strata.

History may have shaped the current focus on CDs, but the global burden of disease has changed. We cannot continue to overlook this changing epidemiology. A new approach is required to identify and address intrinsic and external factors currently inhibiting progress against NCDs. Prevention and early treatment of NCDs in disadvantaged communities promises to reduce poverty and improve health and can have a beneficial impact on the health of subsequent generations, as babies are born healthier, to healthier mothers, and children learn to make better choices (Woods-Townsend et al. 2018; Baird et al. 2017; Yu et al. 2015). Society and governments have a responsibility to create environments where individuals are aware of, and can practically make, life choices which protect their health (Hansen et al. 2016). To tackle NCDs effectively, robust health systems and a multi-sectoral, health-in-all-policies approach are required (Collins et al. 2018). Such approaches will simultaneously address the many structural risk factors for NCDs, as well as improve truly equitable access to care through achievement of UHC and access to quality essential medicines and diagnostics. Strengthening health systems will also strengthen the capacity to diagnose and treat CDs. Strong and long-term public health policies are needed, which encompass primary prevention of NCDs, limit commercial influences on health, and ensure safe and nurturing living and work environments, gender equality, access to education, to achieve UHC and build strong health systems. Implementation of the best buys to reduce NCDs is a smart cost-effective investment in the health of future generations.

Table 5 Justification for prioritization of communicable and non-communicable diseases

Potential justification	Communicable diseases	Non-communicable diseases
✓Preventable	✓	✓with WHO Best Buys, HPV vaccination e.g. Hypertension, cervical cancer
✓Acute reversible disease	✓	✓with early diagnosis and treatment e.g. myocardial infarction, acute stroke
✓Curable	✓	✓with early diagnosis and treatment e.g. cervical cancer
✓Chronically controllable	✓	✓with UHC and access to essential diagnostics and medicines e.g. hypertension, diabetes
✓Contagious	✓	✓socially and environmentally e.g. obesity, diabetes, chronic lung disease
✓Cost-effective	✓	✓e.g., WHO Best Buys save money and lives
✓Affects most vulnerable	✓	✓highest premature mortality in LLMIC, children largely overlooked
✓Individuals are not considered to blame	✓	✓healthy choices are limited for the most vulnerable e.g. food deserts in poor urban areas
✓Amenable to vertical programs	✓	✗requires health-system-wide approach of access to good quality care across the life course
✓Quick win for donors	✓	✗requires long-term view

WHOBest (https://www.who.int/nmh/publications/best_buys_summary.pdf)

✓ applicable, ✗ not applicable, *WHO* World Health Organization, *HPV* human papilloma virus, *UHC* universal health coverage, *LLMIC* low- and lower-middle-income countries

Based on the arguments presented above, there appears to be little ethical or rational justification to support the myths that have led to the neglect of NCDs. Equity demands good access to affordable and quality care for all. Ethically, medically, economically, and from a public health perspective the grounds are strong to demand an equitable focus on NCDs globally. It is time to connect the dots and harness our altruism and solidarity in the fight against NCDs and their risk factors. Complacency is not justifiable.

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Compliance with Ethical Standards

Competing Interests The authors declare that they have no competing interests.

References

Aacharya, R.P., C. Gastmans, and Y. Denier. 2011. Emergency department triage: an ethical analysis. *BMC Emergency Medicine* 11: 16. https://doi.org/10.1186/1471-227x-11-16.

Allen, L.N. 2017. Financing national non-communicable disease responses. *Global Health Action* 10 (1): 1326687. https://doi.org/10.1080/16549716.2017.1326687.

Allen, L., J. Williams, N. Townsend, B. Mikkelsen, N. Roberts, C. Foster, and K. Wickramasinghe. 2017. Socioeconomic status and non-communicable disease behavioural risk factors in low-income and lower-middle-income countries: a systematic review. *Lancet Global Health* 5 (3): e277–e289. https://doi.org/10.1016/s2214-109x(17)30058-x.

Alleyne, G., A. Binagwaho, A. Haines, S. Jahan, R. Nugent, A. Rojhani, and D. Stuckler. 2013. Embedding non-communicable diseases in the post-2015 development agenda. *Lancet* 381 (9866): 566–574. https://doi.org/10.1016/S0140-6736(12)61806-6.

Baird, Janis, Chandni Jacob, Mary Barker, Caroline H.D. Fall, Mark Hanson, Nicholas C. Harvey, Hazel M. Inskip, Kalyanaraman Kumaran, and Cyrus Cooper. 2017. Developmental Origins of Health and Disease: A Lifecourse Approach to the Prevention of Non-Communicable Diseases. *Healthcare* 5 (1): 14. https://doi.org/10.3390/healthcare5010014.

Baker, P., and S. Friel. 2016. Food systems transformations, ultra-processed food markets and the nutrition transition in Asia. *Globalization and Health* 12 (1): 80. https://doi.org/10.1186/s12992-016-0223-3.

Basu, Sanjay, Ryan G. Wagner, Ronel Sewpaul, Priscilla Reddy, and Justine Davies. 2018. Implications of scaling up cardiovascular disease treatment in South Africa: A microsimulation and cost-effectiveness analysis. *Lancet Global Health* 7 (2): e270–e280. https://doi.org/10.1016/s2214-109x(18)30450-9.

Bayer, R., D. Callahan, A.L. Caplan, and B. Jennings. 1988. Toward justice in health care. *American Journal of Public Health* 78 (5): 583–588.

Bertram, M.Y., K. Sweeny, J.A. Lauer, D. Chisholm, P. Sheehan, B. Rasmussen, S.R. Upreti, L.P. Dixit, K. George, and S. Deane. 2018. Investing in non-communicable diseases: an estimation of the return on investment for prevention and treatment services. *Lancet* 391 (10134): 2071–2078. https://doi.org/10.1016/S0140-6736(18)30665-2.

Bester, J.C. 2016. Measles and Measles Vaccination: A Review. *JAMA Pediatrics* 170 (12): 1209–1215. https://doi.org/10.1001/jamapediatrics.2016.1787.

Beydoun, M.A., H.A. Beydoun, N. Mode, G.A. Dore, J.A. Canas, S.M. Eid, and A.B. Zonderman. 2016. Racial disparities in adult all-cause and cause-specific mortality among us adults: mediating and moderating factors. *BMC Public Health* 16 (1): 1113. https://doi.org/10.1186/s12889-016-3744-z.

Bikbov, B., N. Perico, and G. Remuzzi, on behalf of the GBD Genitourinary Diseases Expert Group. 2018. Disparities in chronic kidney disease prevalence among males and females in 195 countries: analysis of the global burden of disease 2016 study. *Nephron* 139 (4): 313–318. https://doi.org/10.1159/000489897.

Bonita, R., R. Magnusson, P. Bovet, D. Zhao, D.C. Malta, R. Geneau, I. Suh, et al. 2013. Country actions to meet UN commitments on non-communicable diseases: a stepwise approach. *Lancet* 381 (9866): 575–584. https://doi.org/10.1016/S0140-6736(12)61993-X.

Buse, K., S. Tanaka, and S. Hawkes. 2017. Healthy people and healthy profits? Elaborating a conceptual framework for governing the commercial determinants of non-communicable diseases and identifying options for reducing risk exposure. *Globalization and Health* 13 (1): 34. https://doi.org/10.1186/s12992-017-0255-3.

Cappelen, A.W., and O.F. Norheim. 2005. Responsibility in health care: a liberal egalitarian approach. *Journal of Medical Ethics* 31 (8): 476–480. https://doi.org/10.1136/jme.2004.010421.

Collins, T., B. Mikkelsen, J. Adams, O. Chestnov, T. Evans, A. Feigl, R. Nugent, A. Pablos-Mendez, S. Srivanichakorn, and D. Webb. 2018. Addressing NCDs: A unifying agenda for sustainable development. *Global Public Health* 13 (9): 1152–1157. https://doi.org/10.1080/17441692.2017.1394481.

Davidovich, U., K. Jonas, J. Catalan, L. Cluver, R. Harding, B. Hedge, B. Prince, et al. 2016. "We are our choices"–AIDS impact special issue Amsterdam 2015. *AIDS Care* 28 (Suppl 1): 1–2. https://doi.org/10.1080/09540121.2016.1153597.

Di Cesare, M., Y.H. Khang, P. Asaria, T. Blakely, M.J. Cowan, F. Farzadfar, R. Guerrero, et al. 2013. Inequalities in non-communicable diseases and effective responses. *Lancet* 381 (9866): 585–597. https://doi.org/10.1016/S0140-6736(12)61851-0.

Douglass, C.H., A. Pedrana, J.V. Lazarus, E.F.M.T. Hoen, R. Hammad, R.B. Leite, A. Hill, and M. Hellard. 2018. Pathways to ensure universal and affordable access to hepatitis C treatment. *BMC Medicine* 16 (1): 175. https://doi.org/10.1186/s12916-018-1162-z.

Fisher, J.A., M.D. Cottingham, and C.A. Kalbaugh. 2015. Peering into the pharmaceutical "pipeline": investigational drugs, clinical trials, and industry priorities. *Social Science & Medicine* 131: 322–330. https://doi.org/10.1016/j.socscimed.2014.08.023.

Foreman, K.J., N. Marquez, A. Dolgert, K. Fukutaki, N. Fullman, M. McGaughey, M.A. Pletcher, et al. 2018. Forecasting life expectancy, years of life lost, and all-cause and cause-specific mortality for 250 causes of death: reference and alternative scenarios for 2016-40 for 195 countries and territories. *Lancet* 392 (10159): 2052–2090. https://doi.org/10.1016/s0140-6736(18)31694-5.

Garrib, A., J. Birungi, S. Lesikari, I. Namakoola, T. Njim, L. Cuevas, L. Niessen, et al. 2018. Integrated care for human immunodeficiency virus, diabetes and hypertension in Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. https://doi.org/10.1093/trstmh/try098.

Grainger Gasser, Alice, Cassandra Welch, Monika Arora, Rohan Greenland, Lubna Bhatti, Luminita Sanda, Rob Moodie, and Eduardo Bianco. 2015. Reducing cardiovascular mortality through tobacco control: a world heart federation roadmap. *Global Heart* 10 (2): 123–133. https://doi.org/10.1016/j.gheart.2015.04.007.

GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. 2016. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet* 388 (10053): 1545–1602. https://doi.org/10.1016/s0140-6736(16)31678-6.

GBD 2015 LRI Collaborators. 2017. Estimates of the global, regional, and national morbidity, mortality, and aetiologies of lower respiratory tract infections in 195 countries: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet Infectious Diseases* 17 (11): 1133–1161. https://doi.org/10.1016/s1473-3099(17)30396-1.

GBD 2016 Diarrhoeal Disease Collaborators. 2018. Estimates of the global, regional, and national morbidity, mortality, and aetiologies of diarrhoea in 195 countries: A systematic analysis for the Global Burden of Disease Study 2016. *Lancet Infectious Diseases* 18 (11): 1211–1228. https://doi.org/10.1016/s1473-3099(18)30362-1.

GBD 2017 Causes of Death Collaborators. 2018. Global, regional, and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 392 (10159): 1736–1788. https://doi.org/10.1016/s0140-6736(18)32203-7.

GBD 2017 Risk Factor Collaborators. 2018. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries

and territories, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet* 392 (10159): 1923–1994. https://doi.org/10.1016/s0140-6736(18)32225-6.

Ghosh-Dastidar, B., D. Cohen, G. Hunter, S.N. Zenk, C. Huang, R. Beckman, and T. Dubowitz. 2014. Distance to store, food prices, and obesity in urban food deserts. *American Journal of Preventive Medicine* 47 (5): 587–595. https://doi.org/10.1016/j.amepre.2014.07.005.

Gilmore, A.B., G. Fooks, J. Drope, S.A. Bialous, and R.R. Jackson. 2015. Exposing and addressing tobacco industry conduct in low-income and middle-income countries. *Lancet* 385 (9972): 1029–1043. https://doi.org/10.1016/s0140-6736(15)60312-9.

Gostin, L.O. 2014. Limiting what we can eat: a bridge too far? *Milbank Quarterly* 92 (2): 173–176. https://doi.org/10.1111/1468-0009.12047.

Granich, R., S. Gupta, B. Hersh, B. Williams, J. Montaner, B. Young, and J.M. Zuniga. 2015. Trends in AIDS Deaths, New Infections and ART Coverage in the Top 30 Countries with the Highest AIDS Mortality Burden; 1990-2013. *PLoS One* 10 (7): e0131353. https://doi.org/10.1371/journal.pone.0131353.

Gupta, T. 2016. STEMI care in the elderly: Does under-treatment reflect appropriate clinical judgment or therapeutic nihilism? *Indian Heart Journal* 68 (6): 753–755. https://doi.org/10.1016/j.ihj.2016.03.019.

Hansen, P.G., L.R. Skov, and K.L. Skov. 2016. Making Healthy Choices Easier: Regulation versus Nudging. *Annual Review of Public Health* 37: 237–251. https://doi.org/10.1146/annurev-publhealth-032315-021537.

Institute for Health Metrics and Evaluation. 2018. GBD Compare / Viz Hub. https://vizhub.healthdata.org/gbd-compare/.

Jaspers, L., V. Colpani, L. Chaker, S.J. van der Lee, T. Muka, D. Imo, S. Mendis, et al. 2015. The global impact of non-communicable diseases on households and impoverishment: a systematic review. *European Journal of Epidemiology* 30 (3): 163–188. https://doi.org/10.1007/s10654-014-9983-3.

Kassebaum, N., H.H. Kyu, L. Zoeckler, H.E. Olsen, K. Thomas, C. Pinho, Z.A. Bhutta, et al. 2017. Child and Adolescent Health From 1990 to 2015: Findings From the Global Burden of Diseases, Injuries, and Risk Factors 2015 Study. *JAMA Pediatrics* 171 (6): 573–592. https://doi.org/10.1001/jamapediatrics.2017.0250.

Khatib, R., M. McKee, H. Shannon, C. Chow, S. Rangarajan, K. Teo, L. Wei, et al. 2016. Availability and affordability of cardiovascular disease medicines and their effect on use in high-income, middle-income, and low-income countries: an analysis of the PURE study data. *Lancet* 387 (10013): 61–69. https://doi.org/10.1016/S0140-6736(15)00469-9.

Kickbusch, I., L. Allen, and C. Franz. 2016. The commercial determinants of health. *Lancet Global Health* 4 (12): e895–e896. https://doi.org/10.1016/S2214-109X(16)30217-0.

Krentel, A., M. Gyapong, O. Ogundahunsi, M. Amuyunzu-Nyamongo, and D.A. McFarland. 2018. Ensuring no one is left behind: Urgent action required to address implementation challenges for NTD control and elimination. *PLoS Neglected Tropical Diseases* 12 (6): e0006426. https://doi.org/10.1371/journal.pntd.0006426.

Kumara, A.S., and R. Samaratunge. 2017. Impact of ill-health on household consumption in Sri Lanka: Evidence from household survey data. *Social Science & Medicine* 195: 68–76. https://doi.org/10.1016/j.socscimed.2017.11.015.

Lee, A.C.C., J. Katz, H. Blencowe, S. Cousens, N. Kozuki, J.P. Vogel, L. Adair, et al. 2013. National and regional estimates of term and preterm babies born small for gestational age in 138 low-income and middle-income countries in 2010. *Lancet Global Health* 1 (July): e26–e36.

Lee, A.C., N. Kozuki, S. Cousens, G.A. Stevens, H. Blencowe, M.F. Silveira, A. Sania, et al. 2017. Estimates of burden and consequences of infants born small for gestational age in low and middle income countries with INTERGROWTH-21(st) standard: analysis of CHERG datasets. *BMJ* 358: j3677. https://doi.org/10.1136/bmj.j3677.

Lim, S., J.N. Park, D.L. Kerrigan, and S.G. Sherman. 2019. Severe Food Insecurity, Gender-Based Violence, Homelessness, and HIV Risk among Street-based Female Sex Workers in Baltimore, Maryland. *AIDS and Behavior* 23 (11): 3058–3063. https://doi.org/10.1007/s10461-019-02643-0.

Lin, J.K., A.E. Moran, K. Bibbins-Domingo, B. Falase, A. Pedroza Tobias, C.N. Mandke, and D.S. Kazi. 2019. Cost-effectiveness of a fixed-dose combination pill for secondary prevention of cardiovascular disease in China, India, Mexico, Nigeria, and South Africa: A modelling study. *Lancet Global Health* 7 (10): e1346–e1358. https://doi.org/10.1016/s2214-109x(19)30339-0.

Lübbe, Weyma. 2018. Appeal to the Rule of Rescue in health care: discriminating and not benevolent? *Medicine, Health Care, and Philosophy* 22: 53–58. https://doi.org/10.1007/s11019-018-9839-9.

Luna, Florencia. 2018. Identifying and evaluating layers of vulnerability - a way forward. *Developing World Bioethics* 19 (2): 86–95. https://doi.org/10.1111/dewb.12206.

Luyckx, Valerie A., Marcello Tonelli, and John W. Stanifer. 2018. The global burden of kidney disease and the sustainable development goals. *Bulletin of the World Health Organization* 96 (6): 414–422D. https://doi.org/10.2471/BLT.17.206441.

Maher, D., A.D. Harries, R. Zachariah, and D. Enarson. 2009. A global framework for action to improve the primary care response to chronic non-communicable diseases: a solution to a neglected problem. *BMC Public Health* 9: 355. https://doi.org/10.1186/1471-2458-9-355.

Mani, M.K. 2006. Nephrologists sans frontieres: preventing chronic kidney disease on a shoestring. *Kidney International* 70 (5): 821–823. https://doi.org/10.1038/sj.ki.5001793.

Marmot, M. 2018a. Inclusion health: addressing the causes of the causes. *Lancet* 391 (10117): 186–188. https://doi.org/10.1016/s0140-6736(17)32848-9.

Marmot, M. 2018b. Just societies, health equity, and dignified lives: the PAHO Equity Commission. *Lancet* 392 (10161): 2247–2250. https://doi.org/10.1016/s0140-6736(18)32349-3.

Melvin, S.C., and J. Gipson. 2019. The Open Arms Healthcare Center's Integrated HIV Care Services Model. *Preventing Chronic Disease* 16: E135. https://doi.org/10.5888/pcd16.180633.

Mendenhall, E., B.A. Kohrt, S.A. Norris, D. Ndetei, and D. Prabhakaran. 2017. Non-communicable disease syndemics: poverty, depression, and diabetes among low-income populations. *Lancet* 389 (10072): 951–963. https://doi.org/10.1016/s0140-6736(17)30402-6.

Mendis, S., and O. Chestnov. 2013. Policy reform to realize the commitments of the Political Declaration on noncommunicable diseases. *British Medical Bulletin* 105: 7–27. https://doi.org/10.1093/bmb/ldt001.

Morehead, M.S., and C. Scarbrough. 2018. Emergence of Global Antibiotic Resistance. *Primary Care* 45 (3): 467–484. https://doi.org/10.1016/j.pop.2018.05.006.

NCD Countdown 2030 Collaborators. 2018. NCD Countdown 2030: Worldwide trends in non-communicable disease mortality and progress towards Sustainable Development Goal target 3.4. *Lancet* 392 (10152): 1072–1088. https://doi.org/10.1016/s0140-6736(18)31992-5.

Niessen, L.W., D. Mohan, J.K. Akuoku, A.J. Mirelman, S. Ahmed, T.P. Koehlmoos, A. Trujillo, J. Khan, and D.H. Peters. 2018. Tackling socioeconomic inequalities and non-communicable diseases in low-income and middle-income countries under the Sustainable Development agenda. *Lancet* 391 (10134): 2036–2046. https://doi.org/10.1016/s0140-6736(18)30482-3.

Nishtar, S., S. Niinisto, M. Sirisena, T. Vazquez, V. Skvortsova, A. Rubinstein, F.G. Mogae, et al. 2018. Time to deliver: report of the WHO Independent High-Level Commission on NCDs. *Lancet* 392 (10143): 245–252. https://doi.org/10.1016/S0140-6736(18)31258-3.

Norton, J.M., M.M. Moxey-Mims, P.W. Eggers, A.S. Narva, R.A. Star, P.L. Kimmel, and G.P. Rodgers. 2016. Social Determinants of Racial Disparities in CKD. *Journal of the American Society of Nephrology* 27 (9): 2576–2595. https://doi.org/10.1681/asn.2016010027.

Nugent, Rachel A. 2016. A Chronology of Global Assistance Funding for NCD. *Global Heart* 11 (4): 371–374. https://doi.org/10.1016/j.gheart.2016.10.027.

Nugent, Rachel A., S.F. Fathima, A.B. Feigl, and D. Chyung. 2011. The burden of chronic kidney disease on developing nations: a 21st century challenge in global health. *Nephron. Clinical Practice* 118 (3): c269–c277. https://doi.org/10.1159/000321382.

Osuch, J.R., K. Silk, C. Price, J. Barlow, K. Miller, A. Hernick, and A. Fonfa. 2012. A historical perspective on breast cancer activism in the United States: from education and support to partnership in scientific research. *Journal of Women's Health (2002)* 21 (3): 355–362. https://doi.org/10.1089/jwh.2011.2862.

Roser, M., and H. Ritchie. 2018. Burden of disease. https://ourworldindata.org/burden-of-disease.

Roth, G.A., C. Johnson, A. Abajobir, F. Abd-Allah, S.F. Abera, G. Abyu, M. Ahmed, et al. 2017. Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. *Journal of the American College of Cardiology* 70 (1): 1–25. https://doi.org/10.1016/j.jacc.2017.04.052.

Sassi, F., A. Belloni, A.J. Mirelman, M. Suhrcke, A. Thomas, N. Salti, S. Vellakkal, C. Visaruthvong, B.M. Popkin, and R. Nugent. 2018. Equity impacts of price policies to promote healthy behaviours. *Lancet* 391 (10134): 2059–2070. https://doi.org/10.1016/S0140-6736(18)30531-2.

Schmidt, H. 2009. Personal responsibility in the NHS Constitution and the social determinants of health approach: competitive or complementary? *Health Economics, Policy, and Law* 4 (Pt 2): 129–138. https://doi.org/10.1017/s1744133109004976.

Schranz, D., and N.F. Voelkel. 2016. "Nihilism" of chronic heart failure therapy in children and why effective therapy is withheld. *European Journal of Pediatrics* 175 (4): 445–455. https://doi.org/10.1007/s00431-016-2700-3.

Sedney, C., A. Kurowski-Burt, M. Smith, P. Dekeseredy, C. Grey, and S. Boo. 2019. Therapeutic nihilism of neurological diseases: A comparative qualitative study. *Journal of Clinical Neuroscience* 69: 124–131. https://doi.org/10.1016/j.jocn.2019.08.013.

Sibbald, Barbara. 2017. Fair pricing or pricing for profit? *CMAJ* 189 (20): E733–e734. https://doi.org/10.1503/cmaj.1095429.

Stutzin Donoso, F. 2018. Chronic disease as risk multiplier for disadvantage. *Journal of Medical Ethics* 44 (6): 371–375. https://doi.org/10.1136/medethics-2017-104321.

The Global Cancer Observatory. 2018. All cancers fact sheet. http://gco.iarc.fr/today/data/factsheets/cancers/39-All-cancers-fact-sheet.pdf.

Thomas, B., and L.O. Gostin. 2013. Tackling the global NCD crisis: innovations in law and governance. *Journal of Law, Medicine & Ethics* 41 (1): 16–27. https://doi.org/10.1111/jlme.12002.

Tonelli, M., P. Muntner, A. Lloyd, B.J. Manns, S. Klarenbach, N. Pannu, M.T. James, B.R. Hemmelgarn, and Network Alberta Kidney Disease. 2012. Risk of coronary events in people with chronic kidney disease compared with those with diabetes: a population-level cohort study. *Lancet* 380 (9844): 807–814. https://doi.org/10.1016/S0140-6736(12)60572-8.

UNAIDS. 2016. Global AIDS update 2016. http://www.unaids.org/sites/default/files/media_asset/global-AIDS-update-2016_en.pdf. Accessed 1 Sept 2016.

United Nations. 2017. Sustainable development goals. http://www.un.org/sustainabledevelopment/sustainable-development-goals/. Accessed 5 Jan 2017.

United Nations General Assembly. 2001. *Resolution adopted by the General Assembly*. Declaration of Commitment on HIV/AIDS. 26th special session. Agenda Item 8. http://www.un.org/ga/aids/coverage/FinalDeclarationHIVAIDS.html.

United Nations General Assembly. 2011. *Political declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Noncommunicable Diseases*. 66th Session. Agenda item 117. https://undocs.org/en/A/66/L.1.

Upshur, R. 2013. What does public health ethics tell (or not tell) us about intervening in non-communicable diseases? *Journal of Bioethical Inquiry* 10 (1): 19–28. https://doi.org/10.1007/s11673-012-9422-7.

Verguet, S., C.L. Gauvreau, S. Mishra, M. MacLennan, S.M. Murphy, E.D. Brouwer, R.A. Nugent, K. Zhao, P. Jha, and D.T. Jamison. 2015. The consequences of tobacco tax on household health and finances in rich and poor smokers in China: an extended cost-effectiveness analysis. *Lancet Global Health* 3 (4): e206–e216. https://doi.org/10.1016/S2214-109X(15)70095-1.

Warren Andersen, S., W. Zheng, J. Sonderman, X.O. Shu, C.E. Matthews, D. Yu, M. Steinwandel, J.K. McLaughlin, M.K. Hargreaves, and W.J. Blot. 2016. Combined Impact of Health Behaviors on Mortality in Low-Income Americans. *American Journal of Preventive Medicine* 51 (3): 344–355. https://doi.org/10.1016/j.amepre.2016.03.018.

Whitaker, K., D. Webb, and N. Linou. 2018. Commercial influence in control of non-communicable diseases. *BMJ* 360: k110. https://doi.org/10.1136/bmj.k110.

Willen, S.S., M. Knipper, C.E. Abadia-Barrero, and N. Davidovitch. 2017. Syndemic vulnerability and the right to health. *Lancet* 389 (10072): 964–977. https://doi.org/10.1016/s0140-6736(17)30261-1.

Woods-Townsend, K., H. Leat, J. Bay, L. Bagust, H. Davey, D. Lovelock, A. Christodoulou, et al. 2018. LifeLab Southampton: a programme to engage adolescents with DOHaD concepts as a tool for increasing health literacy in teenagers -a pilot cluster-randomized control trial. *Journal of Developmental Origins of Health and Disease* 9 (5): 475–480. https://doi.org/10.1017/s2040174418000429.

World Health Organization. 2016. *Guidelines for the screening care and treatment of persons with chronic hepatitis C infection*. Updated Version April 2016. Geneva: World Health Organization. https://www.who.int/hepatitis/publications/hepatitis-c-guidelines-2016/en/.

World Health Organization. 2013. *Global Action Plan for the prevention and control of noncommunicable diseases. 2013–2020.* Geneva: World Health Organization http://www.who.int/nmh/events/ncd_action_plan/en/.

World Health Organization. 2015. Global Health Observatory (GHO) data: number of malaria deaths. https://www.who.int/gho/malaria/epidemic/deaths/en/. Accessed 10 Dec 2018.

World Health Organization. 2017a. *Advancing the right to health: The vital role of law*. Geneva: World Health Organization. https://www.who.int/healthsystems/topics/health-law/health_law-report/en/.

World Health Organization. 2017b. *Tackling NCDs: "Best buys" and other recommended interventions for the prevention and control of noncommunicable diseases*. Geneva: World Health Organization. http://www.who.int/ncds/management/best-buys/en/.

World Health Organization. 2017c. Cardiovascular diseases (CVD): Key facts. https://www.who.int/news-room/factsheets/detail/cardiovascular-diseases-(cvds). Accessed 10 Dec 2018.

World Health Organization. 2017d. Chronic obstructive pulmonary disease (COPD): Key facts. https://www.who.int/en/newsroom/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd). Accessed 10 Dec 2018.

World Health Organization. 2017e. Diarrhoeal disease: key facts. https://www.who.int/news-room/fact-sheets/detail/diarrhoealdisease. Accessed 10 Dec 2018.
World Health Organization. 2018a. Cardiovascular disease: HEARTS Technical Package. http://www.who.int/cardiovascular_diseases/hearts/en/. Accessed 10 Dec 2018.
World Health Organization. 2018b. HIV/AIDS: Key facts. https://www.who.int/en/news-room/fact-sheets/detail/hiv-aids. Accessed 10 Dec 2018.
World Health Organization. 2018c. Noncommunicable diseases: Key facts. https://www.who.int/news-room/factsheets/detail/noncommunicable-diseases. Accessed 10 Dec 2018.
World Health Organization. 2018d. Obesity and overweight: Key facts. https://www.who.int/en/news-room/factsheets/detail/obesity-and-overweight. Accessed 10 Dec 2018.
World Health Organization. 2018e. *Saving lives, spending less: a strategic response to noncommunicable diseases*. Geneva: World Health Organization. https://www.who.int/ncds/management/ncds-strategic-response/en/.
World Health Organization. 2018f. *Time to deliver: Report of the WHO Independent High-level Commission on Noncommunicable Diseases*. Geneva: World Health Organization. http://apps.who.int/iris/bitstream/handle/10665/272710/9789241514163-eng.pdf?ua=1.
World Health Organization. 2018g. Tobacco: Key facts. https://www.who.int/news-room/fact-sheets/detail/tobacco. Accessed 10 Dec 2018.
World Health Organization. 2018h. The top 10 causes of death. https://www.who.int/en/news-room/fact-sheets/detail/the-top-10-causes-of-death. Accessed 10 Dec 2018.
World Health Organization. 2018i. Tuberculosis: Key facts. https://www.who.int/en/news-room/fact-sheets/detail/tuberculosis. Accessed 10 Dec 2018.
World Health Organization. 2018j. *World health statistics 2018: monitoring health for the SDGs, sustainable development goals*. Geneva: World Health Organization. http://apps.who.int/iris/bitstream/handle/10665/272596/9789241565585-eng.pdf?ua=1.
World Health Organization Regional Office for Europe. 2016. *Good maternal nutrition: the best start in life*. Copenhagen: WHO Regional Office for Europe. http://www.euro.who.int/__data/assets/pdf_file/0008/313667/Good-maternal-nutrition-The-best-start-in-life.pdf?ua=1.
Yang, L., P. Bovet, Y. Liu, M. Zhao, C. Ma, Y. Liang, and B. Xi. 2017. Consumption of Carbonated Soft Drinks Among Young Adolescents Aged 12 to 15 Years in 53 Low- and Middle-Income Countries. *American Journal of Public Health* 107 (7): 1095–1100. https://doi.org/10.2105/ajph.2017.303762.
Young, I.M. 2003. *Political responsibility and structural injustice*. Paper presented at the The Lindley Lecture, University of Kansas, 5 May 2003.
Yu, Danxia, Jennifer Sonderman, Maciej S. Buchowski, Joseph K. McLaughlin, Xiao-Ou Shu, Mark Steinwandel, Lisa B. Signorello, Xianglan Zhang, Margaret K. Hargreaves, William J. Blot, and Wei Zheng. 2015. Healthy eating and risks of total and cause-specific death among low-income populations of African-Americans and other adults in the Southeastern United States: A prospective cohort study. *PLoS Medicine* 12 (5): e1001830. https://doi.org/10.1371/journal.pmed.1001830.

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