The *Lancet* Taskforce on NCDs and economics 1

Investing in non-communicable disease prevention and management to advance the Sustainable Development Goals

Rachel Nugent, Melanie Y Bertram, Stephen Jan, Louis W Niessen, Franco Sassi, Dean T Jamison, Eduardo González Pier, Robert Beaglehole

Reduction of the non-communicable disease (NCD) burden is a global development imperative. Sustainable Development Goal (SDG) 3 includes target 3·4 to reduce premature NCD mortality by a third by 2030. Progress on SDG target 3·4 will have a central role in determining the success of at least nine SDGs. A strengthened effort across multiple sectors with effective economic tools, such as price policies and insurance, is necessary. NCDs are heavily clustered in people with low socioeconomic status and are an important cause of medical impoverishment. They thereby exacerbate economic inequities within societies. As such, NCDs are a barrier to achieving SDG 1, SDG 2, SDG 4, SDG 5, and SDG 10. Productivity gains from preventing and managing NCDs will contribute to SDG 8. SDG 11 and SDG 12 offer clear opportunities to reduce the NCD burden and to create sustainable and healthy cities.

Introduction

This *Lancet* Taskforce about non-communicable diseases (NCDs) and economics explores a common agenda in ministries of health, ministries of finance, and other ministries and outlines the potential of NCD prevention and management efforts to magnify progress on nine Sustainable Development Goals (SDGs). Economic evidence and arguments constitute strong advocacy for more investment in health.[1] The Taskforce reveals how poverty stems from and exacerbates the burden of NCDs, how price policies can be effective tools to control NCDs without harming the poor, how to ameliorate financial hardship from out-of-pocket medical spending on NCDs, and the contribution to gross domestic product (GDP) from cardiovascular disease prevention and control—cementing the case for NCDs to take a central role in country and global development agendas.

The *Lancet* NCD Action Group[2] showed how inaction on NCDs hindered sustainable development. As in previous papers by the NCD Action Group, we use the term NCDs to refer mainly to the four diseases constituting the largest burden worldwide: cardiovascular disease, diabetes, chronic obstructive pulmonary disorder, and cancers. The Millennium Development Goal (MDG) era from 2000–15 was focused on improving child and maternal health and reducing deaths from infectious diseases, and progress was made. In 2015, WHO, UNICEF, and the World Bank announced that childhood mortality had been reduced by half and that maternal mortality had decreased by 44% worldwide between 1990 and 2015.[3]

The SDGs include the specific and ambitious target of reducing premature mortality from NCDs by a third by 2030. NCDs cause 70% of mortality worldwide and 67% of deaths in lower-income and middle-income countries.[4] More than half of these deaths affect people younger than 70 years, 45% of deaths affect people younger than 60 years, and most of these deaths from NCDs are preventable.[4,5] The MDG era saw improvement in global adult NCD mortality (for people aged 50–69 years) but at a much faster rate in high-income countries (HICs) and upper-middle-income countries (UMICs) than in low-income countries (LICs) and low-middle income countries (LMICs). The change between 2015 and 2030 in absolute number of deaths from NCDs, by country income level, for people aged 50–69 years has been projected on the basis of rates of mortality change during the preceding 15 years (figure 1).

SDG target 3.4 is a forceful response to the neglect of NCDs in the MDG era. In this Taskforce paper, we link SDG target 3.4 on NCDs to targets and indicators of SDG 3, the health goal itself, and to eight other SDGs. We also present specific ways in which multisectoral action can help achieve these SDGs, especially through the application of economic tools and policy approaches.

Key messages

- Non-communicable diseases (NCDs) are associated with poverty and create inequity within and across countries; both the poor and non-poor experience financial catastrophe from NCD-related medical care, often despite having insurance coverage
- Investments in prevention and control of NCDs offer a high return for countries at all income levels, contributing to economic growth; in the long term, NCD prevention offers a higher return on investment than NCD control, though both are essential to an effective response strategy
- Fiscal measures should be directed toward incentivising healthy diets and lifestyles, encouraging sustainable consumption and production, and providing the revenue to accelerate scale-up of universal health care; these policies can, and should, be designed to achieve favourable equity impacts
- Mutually reinforcing progress on at least nine Sustainable Development Goals will help achieve target 3.4 of reducing premature mortality from NCDs by a third by 2030

Lancet 2018; 391: 2029–35

Published Online
April 4, 2018
http://dx.doi.org/10.1016/S0140-6736(18)30667-6

This online publication has been corrected. The corrected version first appeared at thelancet.com on April 9, 2018.

See Comment pages 1972, 1973, and 1975

See Series pages 2036, 2047, 2059, and 2071

This is the first in a Series of five papers about non-communicable diseases and economics

Research Triangle Institute International, Seattle, WA, USA (R Nugent PhD); **World Health Organization, Geneva, Switzerland** (M Y Bertram PhD); **The George Institute for Global Health, University of NSW, Sydney, NSW, Australia** (Prof S Jan PhD); **Department of International Public Health and Clinical Sciences, Liverpool School of Tropical Medicine, Liverpool, UK** (Prof L W Niessen PhD); **Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA** (Prof L W Niessen); **Centre for Health Economics and Policy Innovation, Imperial College Business School, London, UK** (Prof F Sassi PhD); **Institute for Global Health Sciences, University of California, San Francisco, CA, USA** (Prof D T Jamison PhD); **Center for Global Development, Washington, DC, USA** (E González Pier); **and University of Auckland, Auckland, New Zealand** (R Beaglehole PhD)

Correspondence to:
Dr Rachel Nugent, Research Triangle Institute International, Seattle, WA 98104, USA
rnugent@rti.org

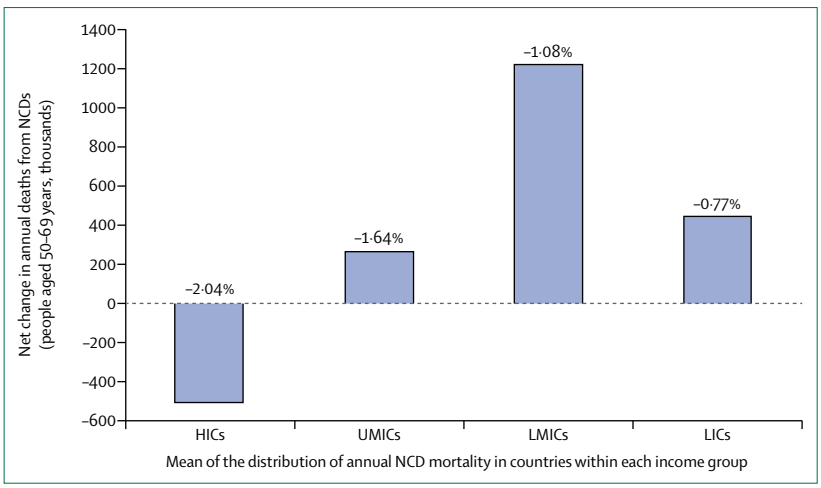

Figure 1: **Projected change in absolute number of deaths from NCDs, by country income level, for people aged 50–69 years in 2015–30**

Countries are grouped by World Bank country income designations. Percentages are the annual changes in premature mortality rate over the period. Calculated using UN Population Division projections for 2015 and 2030, UNPD Death Rates from 2000-2015, and GBD NCD share of deaths in 2015. NCD=non-communicable disease. HIC=high-income countries. UMICs=upper-middle-income countries. LMICs=low-income and middle-income countries. LICs=low-income countries.

The potential contribution of NCDs to achieving other SDGs

The SDG targets and indicators form a web of mutually reinforcing actions for sustainability.[6–8] Identifying and measuring interactions between SDGs and their targets is an essential precursor to building alliances and political will for action across sectors.[6,7] Network analysis offers a method to quantifiably assess which other SDGs and targets within SDG 3 are connected to target 3.4 on NCDs. This method is one of several used to identify which other SDGs are most closely linked to health;[9] it identifies links across SDGs at the target level and in multiple layers called third-party links.[8] Although this system is still abstract, it shows opportunities for policy leverage.

Figure 2 shows the links between nine SDGs and the NCD target 3.4, adapting a methodology developed by UN Department of Economic and Social Affairs.[8] SDGs with particular salience to NCD prevention and control are SDG 1 (reducing poverty), SDG 2 (zero hunger), SDG 3 (health and wellbeing), SDG 4 (education), SDG 5 (gender equality), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities), SDG 11 (sustainable cities and communities), and SDG 12 (sustainable production and consumption). With further explication, links between NCDs and other SDGs can be made. Our focus is on direct ways that target 3.4 could contribute to or be enhanced by other SDGs, or both.

Many SDGs intersect with each other through NCDs. For instance, target 11.6 of SDG 11 aims to reduce adverse environmental effects in cities, indicating the need to improve air quality—an important cause of chronic respiratory disease. This constitutes one link between SDG 11 and SDG 3.[8] A particularly promising way to improve air quality is to incentivise the use of liquified petroleum gas (LPG), as the Government of India does by subsidising use of LPG by the poor.[10] Added benefits from achieving target 11.6 accrue to gender equality (SDG 5) and education (SDG 4) as women's and children's respiratory health improves. The example highlights that the interactions between SDG targets and goals might occur in one or several directions.

SDG 1 on poverty is linked to NCDs in several ways. NCDs are a leading cause of premature mortality, which disproportionately affects the poor and less educated people (SDG 4), as described by Niessen and colleagues in this Taskforce.[11] Furthermore, catastrophic costs from medical expenses associated with NCDs are more likely to be experienced by the poor than by the rich, a finding described and discussed further by Jan and colleagues[12] in this Taskforce.The Taskforce offers clear evidence that financial risk protection addressing NCDs in particular can simultaneously reduce impoverishment and improve health. Poverty is also associated with NCD health risks, such as air pollution, toxic substances, and low access to preventive health care, and is increasingly linked to unhealthy diet and tobacco use, which are all targets within SDG 3 and other SDGs.[13]

WHO[6] has estimated that good nutrition is a necessary condition for meeting 12 of 17 SDGs. An unhealthy diet is an important cause of NCDs[13] and is affected by decisions made at all levels of society (ie, by nations, communities, households, and individuals) and in several sectors such as agriculture, the environment, and industry.[14] NCD target 3.4 can be expected to motivate consumers, governments, and those sectors that respond to them to improve the healthiness of food systems.[15] Industrialised agriculture, processed foods, and the so-called westernised diet are all implicated in the increased prevalence of NCDs worldwide and are all addressable through several SDGs, such as by introducing price policies to prevent NCDs, as discussed further by Sassi and colleagues[16] in this Taskforce. Education, gender, and economy also mediate the connections between nutrition and health outcomes. Malnutrition early in life increases biomarkers for chronic disease and inhibits cognitive development and growth.[17,18] Education builds social and economic capabilities and is associated with a reduced age-specific burden of disease, providing a mutually reinforcing connection between SDG 4 and the NCD target 3.4.[19] More specifically, both general education and health literacy for NCDs have the potential to enable citizens to take control of their own health, recognise and prevent health risks, and effectively manage their diseases.[20,21]

Connections between NCDs and gender (SDG 5) are complex.[22,23] Across the adult lifespan and in countries of all income levels, the health burden from NCDs is higher in women than in men.[2] Women's experience of NCDs is exacerbated by lack of access to and control over income

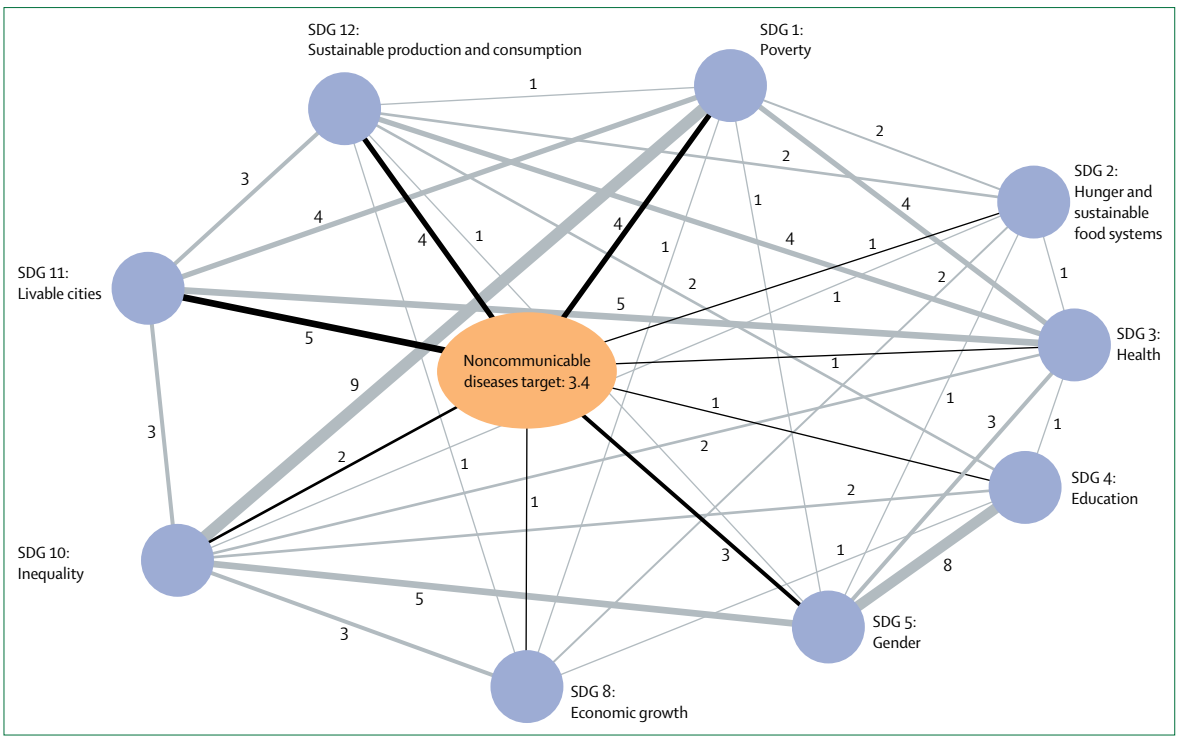

Figure 2: **Links between nine SDGs and NCD target 3·4**
The black lines connecting the SDGs show the strength of relationships between SDGs, based on a count of common key words in each SDG target and indicator. SDG=Sustainable Development Goal. NCD=non-communicable diseases. Adapted from LeBlanc 2015.[8]

For **UN SDG targets and indicators** see https://sustainabledevelopment.un.org/content/documents/11803Official-List-of-Proposed-SDG-Indicators.pdf

to pay for health services, lower autonomy than men (which often translates to having less mobility and lower likelihood of having their own transportation to health facilities), reduced access to education and health-care information, and stigma.[24] Women also often serve as caregivers for family members with NCDs, which reduces their own opportunities and income. These factors cause financial vulnerability in women and exacerbate financial risk.[25] Addressing these causes of ill health in women will reduce their vulnerability and increase their productive contributions to society, thereby contributing to SDG 5.

NCDs threaten economic growth and development (SDG 8). Good evidence suggests the importance of healthy workplaces and well designed wellness programmes to extend healthy working life and improve people's wellbeing, which is an aspect of sustainable economic growth.[26] High mortality and morbidity from NCDs (especially in people younger than 60 years) reduces productivity and income for households, as described by Bertram and colleagues[27] in this Taskforce. Furthermore, if current trends continue, LICs and LMICs can expect to see far less improvement in NCD mortality than UMICs and HICs, which will worsen inequality between countries (SDG 10).[28]

Livable cities (SDG 11) and sustainable production and consumption (SDG 12) are development goals that entail myriad ways to reduce two main NCD risk factors: unhealthy diet and physical inactivity. Livable cities with planned infrastructure to promote walking and other physical activity reduces obesity and chronic disease risk, improves mental health, and strengthens musculoskeletal systems.[29] Fiscal policies can incentivise the use of public transport and other low-emission and low-congestion movability. Reducing and removing agricultural and energy subsidies for producers, along with increasing taxes on unhealthy consumption (eg, tobacco, sugar) are politically challenging but both fiscally attractive and health-promoting.[1] Local and sustainable food production affords access to fresh fruits and vegetables and could advance progress on multiple SDGs.[30] These avenues of multisectoral actions are largely untested and need new evidence from local experience.

Recognising the opportunities presented by the intersections between SDG targets is a first step; creating political coalitions to stimulate action is the next. The policy changes described so far require that several sectors of government set out to alter behaviours at all levels of society, which in turn demands substantial political will and needs support from civil society. Progress has been slow since the 2011 UN high-level meeting on prevention and control of NCDs, even for policies with important health and economic benefits. Sustained effort is needed to avoid back-sliding. Directives from the highest level of government can encourage interaction and cooperation between ministries in the search for feasible and mutually

beneficial policy changes, and this interaction is not easy or even productive if only unidirectional.[31] In the following section, we summarise recommendations from this Taskforce to exploit mutual economic interests that bring together ministries of finance, health, and other sectors.

Using economic and financial tools to achieve the global NCD target

Economic prosperity and health are interdependent, and the use of economic insights and tools to improve health is growing.[32] Jamison and colleagues[1] calculated the full-income value of health and concluded that the world is vastly underinvesting in life-saving research and development for health and preventive policies and health services. Essential policy actions and cost-effective measures that will reduce NCD burden in entire populations and at low cost to countries have been proposed.[1,33–37] In South Africa, for example, sharp increases in cigarette taxes reduced consumption by 50% between 1990 and 2005.[38] Excise tax increases on cigarettes of 114% produced US$1·5 billion in additional revenue in the Philippines. Most of the revenue was used to almost triple the enrolment of poor families in the Philippines National Health Insurance Program between 2013 and 2015.[39] Even with limited real-world experience, these examples establish a strong foundation for using economics and financial tools to achieve many of the multisectoral actions described above.

Poor populations are especially susceptible to economic, social, and health shocks, and NCDs exacerbate those shocks. In the second paper of this Taskforce, Niessen and colleagues[9] describe evidence on the association between five SDGs that address inequality (SDG 1, SDG 3, SDG 4, SDG 5, and SDG 10) and NCDs, including specific risk factors for NCDs such as tobacco, obesity, and diabetes. In their analysis of 283 studies of the temporal association between NCDs and socioeconomic status (defined variably as household and individual income, asset-based and consumption-based wealth measures, educational attainment, and place of residence), Niessen and colleagues found high-quality evidence for a positive association between low socioeconomic status and NCDs.

For the third paper of this Taskforce, Jan and colleagues[10] reviewed 66 studies from a wide range of countries and 13 broad NCD categories and concluded that catastrophic costs of medical care are far more likely to be incurred by poor households than by wealthy households. Recurring and sometimes high treatment costs, the need for long-term care, potential intergenerational burdens, the loss of income from illness, and premature death are all common experiences for people with an NCD. The most financially susceptible people with NCDs are the uninsured and underinsured, yet even people with health insurance incur catastrophic health expenditure when they have low incomes and high copayments or limited coverage. These findings suggest that financial protection through extending insurance coverage or subsidies for user fees is only part of the solution and that such measures need to work in conjunction with broader strategies to promote economic growth, social mobility, and poverty alleviation.

In the fourth paper of this Taskforce, Sassi and colleagues[27] show that taxes and other policies to increase the prices of unhealthy products can be used for important health gains, especially in the poor, without imposing an excessive financial burden on low-income households. Although evidence from developing countries is limited (and fiscal policy effects are very contextual), their findings suggest that concerns about higher taxes on tobacco, alcohol, and sugar-sweetened beverages harming the poor might be overstated. Taking many factors into account (consumption patterns, responsiveness to price changes, potentially averted medical costs, opportunities to use revenue to mitigate unintended effects on the poor, and the overall financial effect of tax increases), there is no reason to believe that price policies will be regressive. However, Sassi and colleagues show that assumptions about the distributional effects of fiscal policies must be tested by considering socioeconomic status of consumers, availability and affordability of health care, and other public policies (including financial risk protection and fiscal policy design).

Finally, in the fifth paper of this Taskforce, Bertram and colleagues[17] show that investments in cardiovascular disease prevention and control provide a very high economic return. Using the Spectrum-based OneHealth tool to estimate the costs and benefits of providing prevention and treatment for ischaemic heart disease and stroke in 20 countries that span all income levels between 2015 and 2030, Bertram and colleagues provide a glimpse at the economic windfall of achieving SDG target 3.4. Packages of WHO Best Buy interventions for cardiovascular disease, with 50% coverage in 20 countries, could both achieve the NCD target of reducing mortality by a third and provide a return on investment ranging from 3.8 in LICs to 10.2 in HICs.

Strengthened effort is needed to achieve the SDG target 3.4 against NCDs

Although regions and countries differ substantially in their prospects for progress, the broad failure to follow through on commitments made at the 2011 UN high-level meeting and subsequent meetings is nothing short of shameful.[2,28] At the second UN high-level meeting on NCDs in 2014, a set of time-bound commitments was agreed on, such as setting national targets and developing national multisectoral plans and policies that take into account WHO's Global Action Plan for the Prevention and Control of NCDs 2013–2020.[40] Meeting these deadlines would have provided important lessons about which multisectoral actions are most feasible and effective in addressing several SDGs and would have saved lives. The UN[41,42] has reported that countries are falling short and emphasised the imperative for multisectoral action and fiscal and financial policies to achieve SDG 3.

Progress against the interim goals has been assessed in preparation for the third UN high-level meeting on NCDs in 2018. The action agenda set out in 2011 is already being referred to as a failure.[43] Many reasons for the insufficiency of actions to control and manage NCDs have been offered, including low government spending on NCDs in LMICs, lack of national capacity for domestic functions to support NCD scale-up (ranging from budgeting to legal and regulatory needs), ineffective advocacy, and industry opposition to the most cost-effective prevention interventions.[44,45] Finally, a notable lack of enthusiasm by global health donors has made it especially difficult for the lowest-income, donor-dependent countries to even assess the size of the health burden and initiate early detection and prevention of NCDs.[46] Yet, despite strong headwinds, progress is happening. The NCD community and others are strengthening and focusing their efforts in response to public criticism. New actors and coalitions are emerging,[47] and existing ones are intensifying their efforts.[48]

Many LMICs have included NCDs in their universal health coverage (UHC) benefit packages or otherwise offer NCD care.[49] Some impressive performers include Rwanda, Malawi, and South Africa, where reductions in NCD mortality has been equal to or better than in HICs.[50] Rwanda, Ethiopia, South Africa, Malaysia, Thailand, Mexico, and Jamaica are among the developing countries that are building and expanding their capacity to screen and treat people with chronic diseases through primary health services. These examples should be used by countries as inspiration to step up action towards the NCD-related SDGs.

Additional research is needed on many of the economic aspects of NCDs discussed in this Taskforce. Confusion remains about the mechanisms through which NCDs contribute to poverty and the extent of such illness-related poverty. The reasons are poor data, non-uniform methods of analysis, and heterogeneity in country and local experiences. Further evaluation of this relationship is needed, especially using uniform measures of poverty and non-self-reported and longitudinal data that capture dynamic processes between people's health and economic wellbeing.

A better understanding of the effects of NCDs on household financial stability and employment will assist in designing UHC packages and other social insurance programmes. Such programmes should be developed with an eye to the shifting needs of ageing populations and health system interactions with other sectors. Benefit and financing incidence analyses that measure who pays for and who benefits from policies can reveal the equity effects of different health financing initiatives along with health and financial impacts.[51] Ongoing collection of data and robust policy evaluation will feed knowledge about which financial mechanisms and levers (including fiscal policies) achieve several aims, such as behavioural risk reduction, revenue enhancement, and equity. Greater country experience with UHC and benefit packages that include NCDs in primary health care will not only inform expectations about return on investment from NCD control but energise the finance ministries to expand NCD prevention and control to achieve both target 3.4 and a broad array of multisectoral SDG targets.[52] Finally, the relationships between several SDGs and their targets to SDG target 3.4 on NCDs is highly complex and requires systems analysis (including economic variables) to fully capture expected effects.[53] An example is the need to address obesity not only through public health but through food and agricultural systems, transport, employment, and other policy and private decision making. Success in this domain will involve and affect all nine SDGs discussed in this paper.

Conclusion

Economic policies to improve health offer strong appeal for both ministries of finance and health. Properly designed fiscal policy can raise needed revenue, eliminate unintended regressive effects of taxes, and alter consumer and producer behaviour, thereby contributing to several SDGs.[34–36] Connections to economic tools are three-fold. First, poverty drives and is driven by NCDs, but financial protection from the high medical costs of treating NCDs can avert impoverishment and encourage adherence to cost-effective preventative treatments.[9,10] Second, price policies are effective, feasible, and cost-effective means to control the biggest NCD risk factors (tobacco and unhealthy diet), encourage sustainable consumption and production, and reduce inequalities.[27] Finally, NCD control enhances worker productivity and economic growth.[28] Priority should be given to the most cost-effective interventions outlined by WHO in the updated appendix 3 of the Global NCD Action Plan 2013–2020 (2016)[54] and Disease Control Priorities, 3rd edition, to fully benefit from those health sector investments.

The connection between economic growth and controlling NCDs is becoming evident as countries assess their shifting and growing health-care needs, ageing populations, and economic development goals. Of equal importance is that household economic wellbeing depends on incentives for healthy behaviour and an environment within communities, workplaces, schools, and homes that allows the healthy behaviour to be realised. Strengthened recognition of the importance of incentivising healthy behavior should pave the way for more concerted political action and faster progress to achieving the SDGs. NCDs are a formidable threat to the achievement of several SDG targets, and as such, efforts to tackle these conditions could help galvanise ministries of health, finance, and other sectors toward common goals.

Contributors

RN conceived and wrote several drafts of the paper. RB guided and contributed to all drafts. LWN contributed to the conceptual approach. MYB, SJ, FS, and LWN provided input related to the Taskforce papers they authored. DTJ and EGP provided review and overall input to this paper and the entire Taskforce at several stages.

Declaration of interests
We declare no competing interests.

Acknowledgments
We thank Dan Chisholm for valuable feedback on the contents of this paper. RN received support from the Bill & Melinda Gates Foundation through the DCPN at the University of Washington until 2016, and from RTI International subsequently. We thank Jinyuan Qi, Salin Sriudomporn, and Ishu Kataria for assistance with research. The Taskforce authors are grateful to the International Development Research Center, Ottawa, Canada, for supporting author meetings.

References

1 Jamison DT, Summers LH, Alleyne G, et al. Global health 2035: a world converging within a generation. *Lancet* 2013; **382:** 1898–955.
2 Alleyne G, Binagwaho A, Haines A, et al. Embedding non-communicable diseases in the post-2015 development agenda. *Lancet* 2013; **381:** 566–74.
3 Dye C. After 2015: infectious diseases in a new era of health and development. *Philos Trans R Soc Lond B Biol Sci* 2014; **369:** 20130426.
4 IHME. GBD results tool. Seattle, WA: Institute for Health Metrics and Evaluation IHME, University of Washington, 2016.
5 Kontis V, Mathers CD, Rehm J, et al. Contribution of six risk factors to achieving the 25×25 non-communicable disease mortality reduction target: a modelling study. *Lancet* 2015; **384:** 427–37.
6 WHO. SDG health and health-related targets. Geneva, Switzerland: World Health Organization, 2016.
7 Nilsson M, Griggs D, Bisbeck M. Policy: map the interactions between Sustainable Development Goals. *Nature* 2016; **534:** 320–22.
8 Le Blanc D. Towards integration at last? The Sustainable Development Goals as a network of targets. *Sustain Dev* 2015; **23:** 176–87.
9 Stenberg K, Hanssen O, Edejer TT-T, et al. Financing transformative health systems towards achievement of the health Sustainable Development Goals: a model for projected resource needs in 67 low-income and middle-income countries. *Lancet Glob Health* 2017; **5:** e875–87.
10 Pillarisetti A, Jamison DT, Smith KR, et al. The impact of household energy interventions on health and finances in Haryana, India: an extended cost-effectiveness analysis. In: Jamison DT, Gelband H, Horton S, et al, eds. Disease control priorities, 3rd edn. Volume 7. Cost-effectiveness of interventions for reproductive, maternal, newborn, and child health. Washington, DC: World Bank, 2017.
11 Niessen LW, Mohan D, Akuoko J, et al. Tackling socioeconomic inequalities and non-communicable diseases in low-income and middle-income countries under the Sustainable Development agenda. *Lancet* 2018; published online April 4. http://dx.doi.org/10.1016/S0140-6736(18)30482-3.
12 Jan S, Laba T-L, Essue B, et al. Action to address the household economic burden of non-communicable diseases. *Lancet* 2018; published online April 4. http://dx.doi.org/10.1016/S0140-6736(18)30323-4.
13 The Lancet. Addressing the vulnerability of the global food system. *Lancet* 2017; **390:** 95.
14 World Cancer Research Fund International. The link between food, nutrition, diet, and non-communicable diseases. In: NCD Alliance, ed. Why NCDs need to be considered when addressing major nutritional challenges. London, UK: World Cancer Research Fund International, 2014.
15 Nugent R, Grafton D. Investments for healthy food systems a framework analysis and review of evidence on food system investments for improving nutrition. UN Standing Committee on Nutrition Discussion Paper. Rome: United Nations, 2016.
16 Sassi F, Belloni A, Mirelman AJ, et al. Equity impacts of price policies to promote healthy behaviours. *Lancet* 2018; published online April 4. http://dx.doi.org/10.1016/S0140-6736(18)30531-2.
17 Boney CM, Verma A, Tucker R, Vohr BR. Metabolic syndrome in childhood: association with birth weight, maternal obesity, and gestational diabetes mellitus. *Pediatrics* 2015; **115:** e290–96.
18 Fall CH, Borja JB, Osmond C, et al. Infant-feeding patterns and cardiovascular risk factors in young adulthood: data from five cohorts in low- and middle-income countries. *Int J Epidemiol* 2011; **40**: 47–62.
19 Sen A. Capability and well-being. In: Nussbaum MS, Sen A, eds. The quality of life. Oxford: Oxford University Press, 1993: 30–53.
20 WHO. Framework on integrated people-centered health services. 2016. http://www.who.int/servicedeliverysafety/areas/people-centred-care/framework/en/ (accessed July 20, 2016).
21 Taggart J, Williams A, Dennis S, et al. A systematic review of interventions in primary care to improve health literacy for chronic disease behavioral risk factors. *BMC Fam Pract* 2012; **13:** 49.
22 Chesler RM, Ho DW, Ramkissoon K. Women and cardiovascular disease: gender-based issues regarding detection and primary prevention. *Health* 2014; **6:** 2790–801.
23 Osamor PE, Grady C. Women's autonomy in health care decision-making in developing countries: a synthesis of the literature. *Int J Womens Health* 2016; **8:** 191–202.
24 WHO WPR. Noncommunicable disease and poverty: the need for pro-poor strategies in the Western Pacific Region: a review. Geneva: WHO, 2006.
25 WHF. Non-communicable diseases: a priority for women's health and development. Geneva: World Heart Federation, International Diabetes Federation, International Union Against Cancer, Framework Convention Alliance, 2011.
26 Goetzel RZ, Henke RM, Tabrizi M, et al. Do workplace health promotion (wellness) programs work? *J Occup Environ Med* 2014; **56:** 927–34.
27 Bertram MY, Sweeny K, Lauer JA, et al. Investing in non-communicable diseases: estimation of the economic and social benefits of scaled-up systems and services. *Lancet* 2018; published online April 4. http://dx.doi.org/10.1016/S0140-6736(18)30665-2.
28 Prabhakaran D, Anand S, Watkins D, et al. Cardiovascular, respiratory, and related disorders: key messages from Disease Control Priorities, 3rd edition. *Lancet* 2017; published online Nov 3. http://dx.doi.org/10.1016/S0140-6736(17)32471-6.
29 Reis RS, Pedro C, Parra DC, et al. Promoting physical activity through community-wide policies and planning: findings from Curitiba, Brazil. *J Phys Act Health* 2010; **7** (suppl 2)**:** S137–45.
30 Siegel KR, Ali MK, Srinivasiah A, Nugent RA, Narayan KMV. Do we produce enough fruits and vegetables to meet global health need? *PLoS One* 2014; **9:** e104059.
31 Spinaci S, Currat L, Shetty P, Crowell V, Kehler J. Tough choices: investing in health for development: experiences from national follow-up to the Commission on Macroeconomics and Health. Delhi, India: World Health Organization, 2006.
32 Summers LH, ed. Keynote address: the future of aid for health. World Innovation Summit For Health; Doha, Qatar; Nov 29, 2016.
33 Briggs A, Nugent R. Editorial. *Health Economics* 2016; **25:** 6–8.
34 Neumann PJ, Anderson JE, Panzer AD, et al. Comparing the cost-per-QALYs gained and cost-per-DALYs averted literatures. *Gates Open Research* 2018; **2:** 5.
35 Watkins DAJ, Dean T, Mills A, et al. Universal health coverage and essential packages of care. In: Jamison DT, Gelband H, Horton S, et al, eds. Disease control priorities, 3rd edn. Volume 9. Improving health and reducing poverty. Washington, DC: World Bank, 2017.
36 Watkins DAN, Rachel A, Yamey G, et al. Intersectoral policy priorities for health. In: Jamison DT, Gellband H, Horton S, et al, editor. Disease control priorities, 3rd edn. Volume 9. Improving health and reducing poverty. Washington, DC: World Bank, 2017.
37 WHO. 'Best Buys' and other recommended interventions for the prevention and control of noncommunicable diseases. Updated (2017) appendix 3 of the global action plan for the prevention and control of noncommunicable diseases 2013–2020. Geneva: World Health Organization, 2017.
38 Jha P. Avoidable global cancer deaths and total deaths from smoking. *Nat Rev Cancer* 2009; **9:** 655–64.
39 Goodchild M, Perucic AM, Zheng R, Blecher E, Paul J. The health impact of raising tobacco taxes in developing countries. In: Marquez PV, Moreno-Dodson B, eds. Tobacco tax reform: at the crossroads of health and development. Washington, DC: World Bank, 2017.
40 UN General Assembly. Political declaration of the high-level meeting of the General Assembly on the prevention and control of non-communicable diseases. New York, NY: United Nations, 2011: 13.

41 UN. 2017 HLPF Thematic Review of SDG3: Ensure healthy lives and promote well-being for all at all ages. New York, NY: United Nations, 2017: 10.

42 UN. ECOSOC President's summary of 2017 high-level political forum on sustainable development. New York, NY: United Nations, 2017: 13.

43 Horton R. Offline: NCDs—why are we failing? *Lancet* 2017; **390:** 346.

44 Bollyky TJ, Templin T, Cohen M, Dieleman JL. Lower-income countries that face the most rapid shift in noncommunicable disease burden are also the least prepared. *Health Affairs* 2017; **36:** 1866–75.

45 Collins T, Mikkelsen B, Adams J, et al. Addressing NCDs: A unifying agenda for sustainable development. *Global Public Health* 2017; **28:** 1–6.

46 Nugent R. A chronology of global assistance funding for NCD. *Global Heart* 2016; **11:** 371–74.

47 Task Force on Fiscal Policies for Health. New global coalition will boost access to medicines and products for chronic diseases. Sept 18, 2017. http://www.path.org/news/press-room/841/ (accessed Feb 14, 2018).

48 WHO. Global coordination mechanisms on NCDs. WHO global dialogue on sustainable financing for NCDs. http://www.who.int/ncds/gcm/en/ (accessed Feb 14, 2018).

49 Watkins DA, Nugent RA. Setting priorities to address cardiovascular diseases through universal health coverage in low- and middle-income countries. *Heart Asia* 2017; **9:** 54–58.

50 Verguet S, Norheim OF, Olson ZD, Yamey G, Jamison DT. Annual rates of decline in child, maternal, HIV, and tuberculosis mortality across 109 countries of low and middle income from 1990 to 2013: an assessment of the feasibility of post-2015 goals. *Lancet Glob Health* 2014; **2:** e698–709.

51 Asante A, Price J, Hayen A, Jan S, Wiseman V. Equity in health care financing in low- and middle-income countries: a systematic review of evidence from studies using benefit and financing incidence analyses. *PLoS One* 2016; **11:** e0152866.

52 Rutter H. The need for a complex systems model of evidence for public health. *Lancet* 2017; **390:** 2602–04.

53 Aso T. Crucial role of finance ministry in achieving universal health coverage. *Lancet* 2017; **390:** 2415–17.

54 WHO. Draft updated appendix 3 of the WHO Global NCD Action Plan 2013–2020. WHO discussion paper (version dated 25 July 2016). Geneva: World Health Organization, 2016.