



Increasing Social and Economic Benefits Globally

Rates of Return on Health Investments

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 **VICTORIA
UNIVERSITY**
MELBOURNE AUSTRALIA

The Victoria Institute of Strategic Economic Studies (VISES) was established as the Centre for Strategic Economic Studies (CSES) at Victoria University, Melbourne, in 1993, and is now one of the leading applied economic research groups in Australia. Its research output is of high quality and is influential at both national and international levels.

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Global Initiative on Health and the Economy (GIHE)

is a U.S. Chamber of Commerce initiative aimed at promoting stronger partnerships and smarter investments in health as a strategy for economic growth and development. The U.S. Chamber of Commerce is the world's largest business organization representing the interests of over 3 million businesses of all sizes, sectors, and regions, as well as state and local chambers and industry associations.

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Introduction

In most countries of the world, the greatest contributors to ill health are chronic or non-communicable diseases (NCDs). Cardiovascular diseases (CVD)—heart disease and stroke—are the largest causes of premature death followed closely by cancer. There is also a considerable burden of disease from largely non-fatal conditions, such as lung disease (i.e. asthma and chronic obstructive pulmonary disease, or COPD), diabetes, and musculoskeletal conditions, such as arthritis. Mental health conditions, such as depression and anxiety, are also widespread. Addressing the causes of NCDs will not only save lives and improve the health of society, but it will contribute to a greater level of economic activity as more people can be active in the workforce resulting from a reduction in absenteeism and presenteeism.

This study provides insights into the social and economic returns that countries can achieve by investing in the prevention and treatment of specific disease categories to improve health outcomes. It is a continuation of work undertaken by the Victoria Institute of Strategic Economic Studies (VISES) at Victoria University for the U.S. Chamber of Commerce's Global Initiative on Health and the Economy (GIHE), the APEC Business Advisory Council, and the APEC Life Science Information Forum on the impact of ill health on productivity and economic output.

In 2016, GIHE released a report estimating the loss in GDP arising from NCDs that affect workforce productivity (Rasmussen, Sweeny and Sheehan 2016). These NCDs include stroke, heart disease, diabetes, COPD, asthma, migraines, depression, anxiety, arthritis, and cancer. The report covered 18 countries and examined the economic cost of absenteeism, presenteeism, and early retirement due to ill health.

Despite very different circumstances, most countries face three common challenges:

- Their populations are ageing in different ways and to different degrees.
- There is an existing high prevalence of NCDs, particularly for older age groups.
- Many risk factors for the future incidence of NCDs are high and in some cases continuing to rise.

Taken together, these factors impose heavy costs on businesses, governments and individuals, and

threaten much greater costs in the future. People may be sick and absent from work (absenteeism), present at work but not working at full capacity due to illness (presenteeism), or retired prematurely, say from ages 50–64 due to ill-health (early retirement due to ill-health). The earlier report (Rasmussen, Sweeny and Sheehan 2016) showed that ill-health has a severe impact on economic growth for all countries included in the study, ranging from 5.3% (Mexico) to 8.2% (United States) in 2015 and rising to be between 5.7% (Singapore) and 8.4% (Poland) by 2030.

This report estimates the economic and social returns to investing in specific disease categories to improve health outcomes in 27 countries around the world. In doing so, it demonstrates that there is a powerful economic argument for investing more in NCD prevention and treatment so that people can work more productively, thereby reducing social and economic exclusion, and improving the health resilience of the populations.

Increasing rates of chronic disease around the world are having an alarming impact on workforce productivity, global development, and economic opportunity, and the business community has responded by enacting measures to promote the health and wellness of their employees. As governments implement strategies to address NCDs and strengthen health systems nationwide, it will be important to maximize innovation and sustainability through collaboration with the private sector.

NCDs and COVID-19

COVID-19 has highlighted the relationship between health and the effects on the economy, markets, businesses and employment. It has also exposed the fragile nature of the health care system in its inability to respond to both pandemic threats and chronic illness. The spread and severity of COVID-19 has been exacerbated for populations living with comorbidities, further emphasizing the need to prioritize NCD prevention and treatment in order to limit the spread of future diseases among this vulnerable population.

Emerging research suggests a strong link between the severity of COVID-19 and patients who suffer from NCDs (Wang et al. 2020; Yang et al. 2020; Guan et al. 2020; Zhang et al. 2020). The U.S. Centers for Disease Control and Prevention (CDC 2020a) has warned that people of any age with serious heart conditions, cancer, chronic kidney disease, COPD, diabetes and other chronic diseases are at an increased risk of severe illness from COVID-19 (CDC 2020b). In addition, 22% of the global population, 1.7 billion people, are at a greater risk of experiencing fatal, life-threatening symptoms due to pre-existing health conditions (Clark et al. 2020).

International studies have documented the ways in which COVID-19 outcomes are linked to NCDs globally. Researchers in Spain (Instituto de Salud Carlos III 2020), Brazil (Pinto and Bertolucci 2020), and China (Novel Coronavirus Pneumonia Emergency Response Epidemiology Team 2020) all note that heart conditions, diabetes and COPD are major factors for the severity of COVID-19. An Italian study revealed that 96% of patients who have died in the hospital from COVID-19 had at least one comorbidity (Palmieri et al. 2020).

The COVID-19 response has also severely disrupted access to essential services, further increasing the burden of disease on the global population. A World Health Organization (WHO) survey conducted in June 2020 identified widespread health service disruptions, as resources were reassigned from mental health, cardiovascular disease, cancer, diabetes, and chronic respiratory disease screenings, treatments and services to respond to COVID-19. The WHO noted that populations with NCDs are not only more vulnerable to becoming seriously ill with the virus, but many are also unable to access the needed treatments to manage their illness.

The unpredictability and uncertainty of the COVID-19 pandemic and the associated containment measures, such as social distancing and the resulting economic breakdown, have increased the risk of mental health problems and augmented health inequalities. Surveys conducted by employers, public health agencies, and non-governmental organizations have shown increased symptoms of depression, anxiety and stress related to COVID-19 (Moreno et al. 2020). Social factors unique to the pandemic have contributed to mental health challenges facing COVID-19 survivors, and recent studies have identified a substantially greater risk among minority communities (Johnson et al. 2020).

The COVID-19 pandemic has claimed countless lives, disrupted global economies, and changed the way in which society interacts. To achieve long-term success in the fight against COVID-19 and build resiliency going forward, policymakers, clinicians and employers must remain steadfast in their pursuit in addressing the NCD crisis.

Global Health Policy on NCDs

3.1 TACKLING THE GLOBAL NCD CRISIS

The NCD crisis has been a focus of international efforts to reduce the burden of disease since the publication of the 1990 Burden of Disease study (Murray and Lopez 1996). The report identified the health burden of NCDs through morbidity rather than death, and it developed a measurement methodology that combined the impact of both morbidity and death in the form of Disability Adjusted Life Years (DALYs).

Recognizing the increasing incidence of NCDs in low-and middle-income countries, the World Health Assembly (WHA) endorsed the Global Strategy for the Prevention and Control of Non-communicable Diseases in May 2000 (WHO 2000). Eight years later, the WHO further refined the global strategy with the *2008–2013 Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases*. The Action Plan required the Director-General to report progress in implementing the action plan to the WHA every two years and brought visibility to the NCD crisis as a threat to health and development that is preventable (WHO 2008).

In the years that followed, several NCD-focused organizations were formed to support coordination and education efforts. The WHO established the Global NCD Network (NCDNET) in 2009 as a voluntary collaborative arrangement composed of UN agencies, government, private and public organizations, academia, and NGOs (WHO n.d.). Similarly, the NCD Alliance Partners was formed with a mission to “unite and strengthen civil society to stimulate collaborative advocacy, action and accountability for NCD prevention and control”. The organization partnered with *The Lancet’s NCD Action Group* and has grown to include 2,000 organizations in more than 170 countries (NCD Alliance 2020).

At the 66th United Nations General Assembly (UNGA) meetings in 2011, world leaders participated in the

inaugural High-level Meeting on the Prevention and Control of Non-communicable Diseases. The goal of this meeting was to mobilize a commitment on the prevention of NCDs—only the second time a health issue was addressed at this level other than for HIV/AIDS in 2001. NCDs were proclaimed a challenge of “epidemic proportions”, and government leaders pledged to work to adopt policies and reach specific targets on NCD prevention (UN 2011).

With the next iteration of the *Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013–2020* (WHO 2013), the WHO set a plan to implement commitments of the 2011 UNGA High-Level Meeting. The Plan provided nine global voluntary targets to “reduce the preventable and avoidable burden of morbidity, mortality, and disability due to non-communicable diseases” and engaged a wide range of UN agencies to support the effort (WHO 2013, pp. 24, 73).

3.2 ACHIEVING THE UN SUSTAINABLE DEVELOPMENT GOALS

In September 2015, the UN and world leaders adopted the 2030 Agenda for Sustainable Development, announcing 17 sustainable development goals (SDGs) and 169 targets (UN 2015). They recognized NCDs as a major challenge for sustainable development and committed to develop ambitious national responses by 2030. Target 3.4 challenges countries by 2030 to “reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and wellbeing” (p. 16).

The Sustainable Development Goals are interlinked and indivisible with improved health outcomes. According to *The Lancet*, progress on the SDG’s NCD goal will have a central role in determining the success of at least nine other SDG goals (Nugent 2018).

The Director-General of the WHO established an Independent High-level Commission on NCDs to

provide independent advice on how countries can accelerate progress toward SDG target 3.4 at the second UNGA High-Level Meeting in 2018 (WHO 2018).

A year later in 2019, WHO reported on the Country Capacity Global Survey results. WHO Assistant General Director Ren Minghui reported that while the rate of the risk of dying from NCDs had declined from 22% in 2000 to 18% in 2016 (WHO 2020, p. vii), this was insufficient to meet target 3.4. The report concludes—

Despite considerable improvement across income groups since 2010, the 2019 survey revealed persistent disparities, demonstrating the need for action in a number of areas. Integrated NCD policies were more prevalent, yet many were inadequate in breadth.

To achieve the SDG target 3.4, the report finds that countries need to adopt robust surveillance systems that can maximize data, develop clinical guidelines for NCD areas, and promote access to NCD technologies and medicines to ensure the best care (WHO 2020, p. ix).

Health Investment Globally

Health expenditure is highly correlated with income per capita. As countries develop, the level and composition of their health expenditure changes. First, health expenditure per capita rises. Second, the proportion of health expenditure by government increases in response to the increased demand, while the proportion of expenditure from international aid and private out-of-pocket purchases declines.

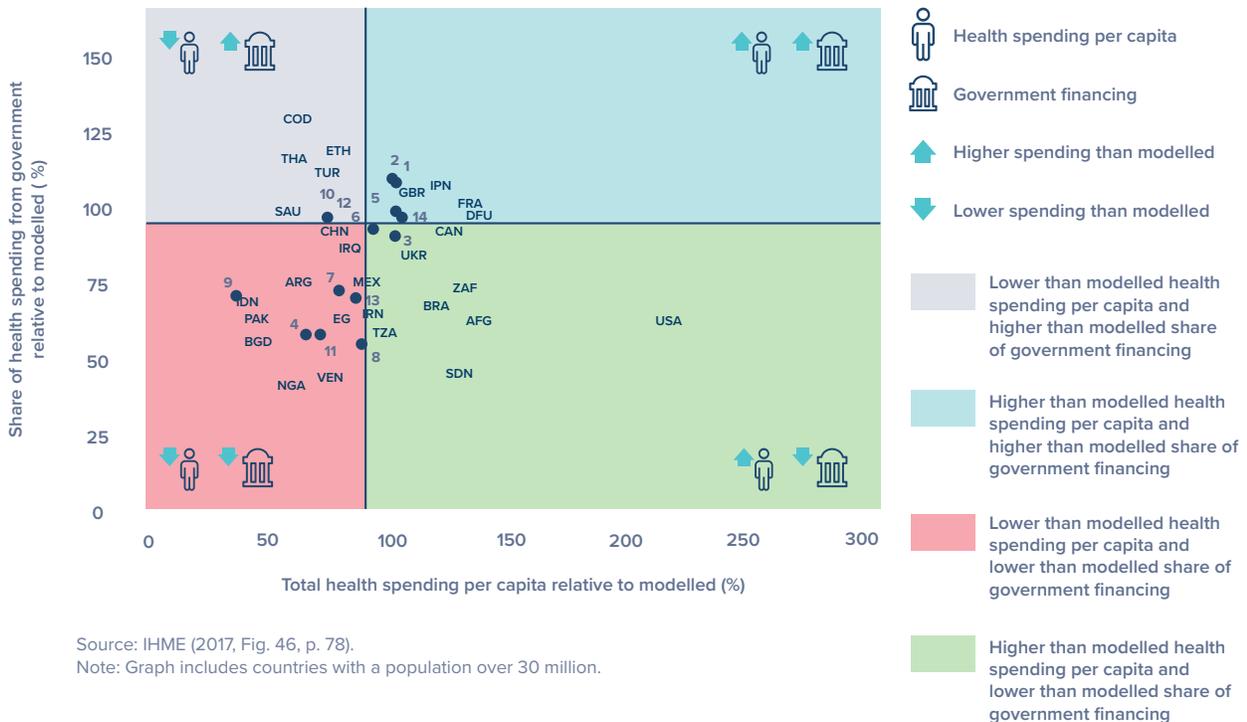
The Institute for Health Metrics and Evaluation (IHME) at Washington University has undertaken an analysis of country health expenditure compared with its level of economic development. This shows that a number

of countries included in this survey, Egypt, Indonesia, Mexico, and Pakistan, have underspent on health both in terms of total health expenditure and the expenditure of the government on health compared with the level expected of a country at its stage of development (see Figure 1).

As countries consider the next steps of chronic disease management and preventive health services, they will need to examine interventions that will maximize the social and economic returns on investment and consider public-private partnerships to support financing and maximize impact.

FIGURE 1

Share of health spending from government and total health spending per capita, relative to expected value, 2014



Source: IHME (2017, Fig. 46, p. 78).
 Note: Graph includes countries with a population over 30 million.

NCD Disease Burden Globally

For the working population 15–64, the vast majority of the disease burden as measured by disability-adjusted life years (DALYs) arises from NCDs (Figure 2). However, South Africa and Kenya, as well as India, still have a relatively high burden of communicable diseases. South Africa has 22,986 communicable disease DALYs per 100,000 for the 15–64 age cohort compared with an average of 3,229 for the 27 countries. This is substantially due to HIV/AIDS. For Kenya, HIV/AIDS was also the largest communicable disease burden for both males and females, particularly the 30–34 to 45–49 age cohort. Respiratory diseases and TB were also a very high burden for 55–64 males.

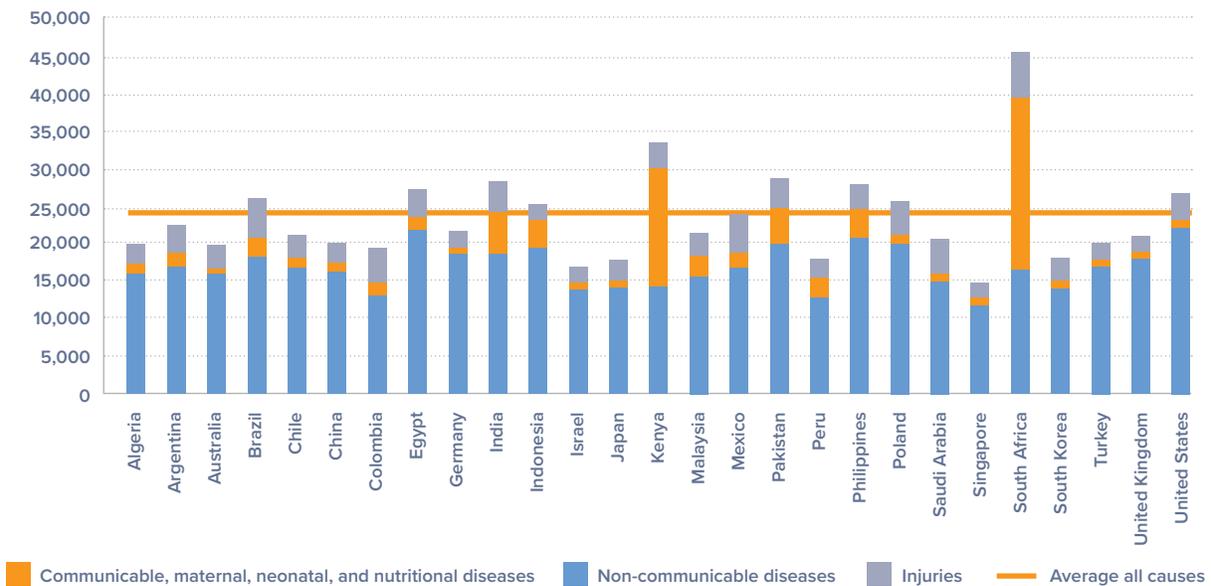
One aspect of the theory of the epidemiological transition of diseases (Omran 2005) suggests that as countries become richer, the burden of disease shifts from communicable diseases, which are eliminated or brought under control through vaccinations or better treatment methods, to non-communicable diseases.

The increase in the latter is the product of such factors as increased life expectancy, Western diets, and other lifestyle practices. Some of these are the outcome of global sociodemographic trends while others have country-specific origins (Murray et al. 2015).

Figures 3 and 4 show the relationship between the disease burden for communicable and non-communicable diseases and GNI per capita for the cross-section of selected low-, middle- and high-income countries included in this study. For those countries with especially low per capita incomes, the burden from communicable diseases falls rapidly with increased GNI per capita to about \$13,000, after which it shows little decline. In contrast, there is little relationship between per capita income and NCD disease burden. There is a cluster of low-income countries with particularly high NCD burdens. Most of these countries, for example, India, Indonesia, Pakistan, and the Philippines, also have high communicable disease burdens.

FIGURE 2

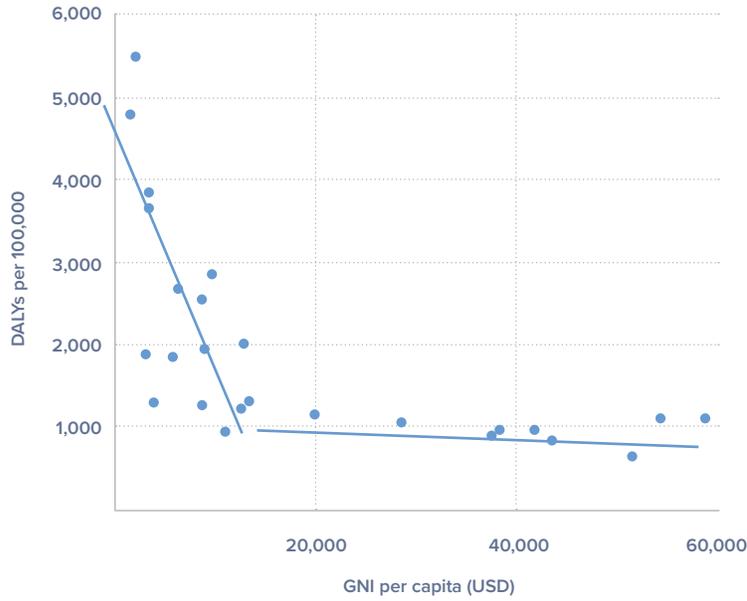
Burden of disease, by cause, 15–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000.
Source: IHME (2020).

FIGURE 3

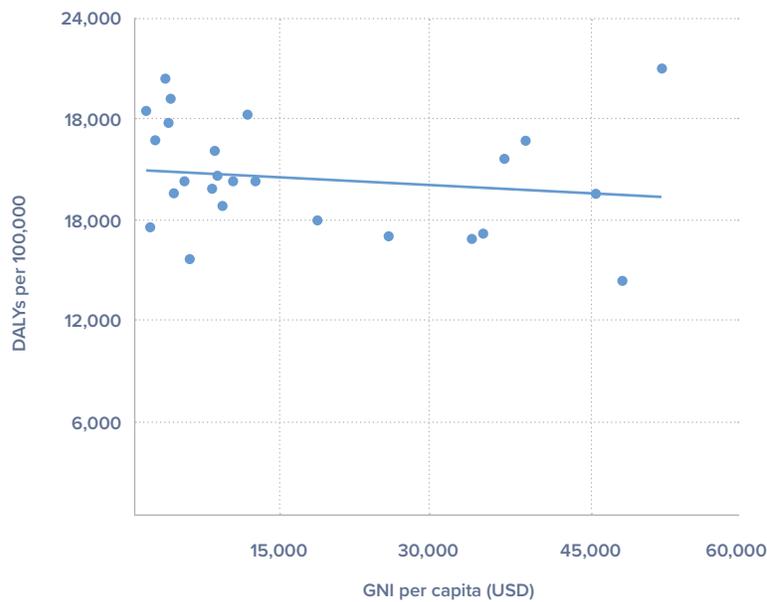
Communicable, maternal, neonatal, and nutritional diseases* versus GNI per capita,# 2017



Source: IHME, World Bank, VISES analysis.
 Note: *DALYs per 100,000. #Atlas method (current US\$).

FIGURE 4

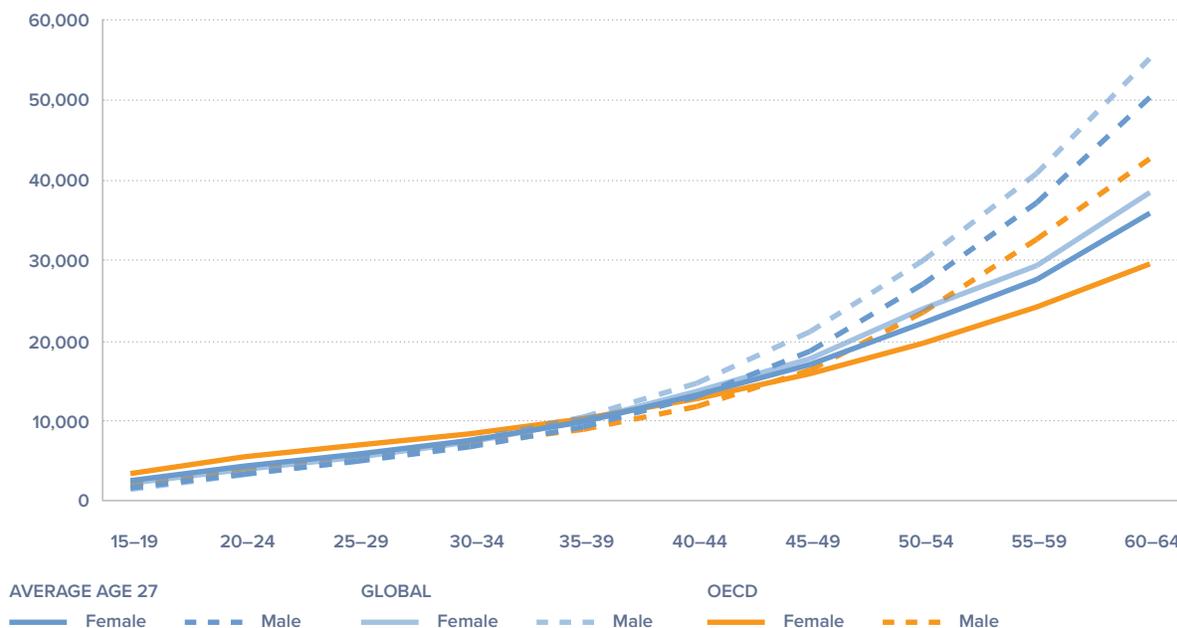
Non-communicable diseases* versus GNI per capita,# 2017



Source: IHME, World Bank, VISES analysis.
 Note: *DALYs per 100,000. #Atlas method (current US\$).

FIGURE 5

NCDs, burden of disease, by age, by gender, 15–64 years, average 27 countries, OECD and World, 2017*



Note: *DALY rate per 100,000.
Source: IHME (2020).

The impact of NCDs rises very rapidly with age. The disease burden for those aged 60–64 is more than twice that for those aged 40–44. As seen in Figure 5, the disease burden for the 27 countries as measured in DALYs is lower for the older working age groups than the world average, but higher than the OECD average. The burden of NCDs is higher for males than females in low-, middle- and high-income countries.

Figure 6 shows the 2017 burden of NCDs per 100,000 for each of the countries and an average across all countries in this study for those aged 40–64 years (age weighted). The average NCD DALYs per 100,000 is 27,285. Egypt has the highest rate of DALYs with 41,082 per 100,000, followed by Pakistan, 39,226; Philippines, 38,034; and India, 35,634. Three East Asian countries, Singapore, Japan, and South Korea, as well as Peru, have the least burden of NCDs with 17,333, 18,789, 19,200, and 19,833, respectively, per 100,000.

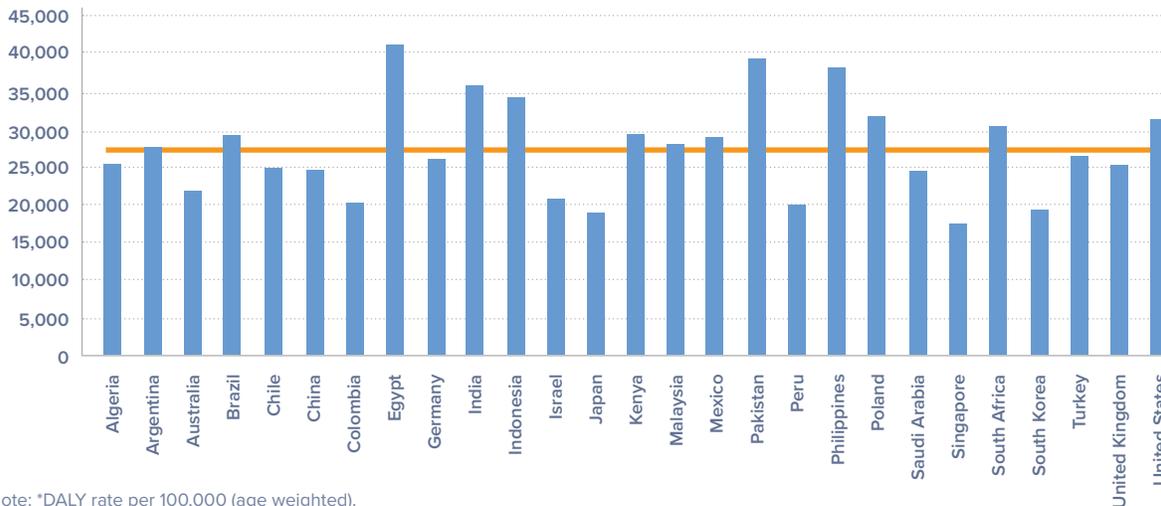
The remainder of the report analyses three disease categories, CVD and diabetes (modelled together) and mental illness. The modelling for treatment and outcome for other NCD disease categories has not yet been developed in the WHO's OneHealth Tool (OHT). Additional analysis for these disease areas should be done if the modelling becomes available.

5.1 CARDIOVASCULAR DISEASE AND DIABETES

Figure 7 shows the 2017 burden of cardiovascular disease per 100,000 for each of the countries, and an average across all countries in this study for those aged 40–64 years (age weighted). The average CVD DALYs per 100,000 is 5,948. Egypt has the highest rate of CVD DALYs with 16,010 per 100,000, followed by: Pakistan with 12,510; Philippines, 12,039; Indonesia, 10,620; and India, 10,279. South Korea, Israel, Australia, and Peru have the least burden of CVD with 1,914, 1,972, 2,392, 2,430, respectively, per 100,000.

FIGURE 6

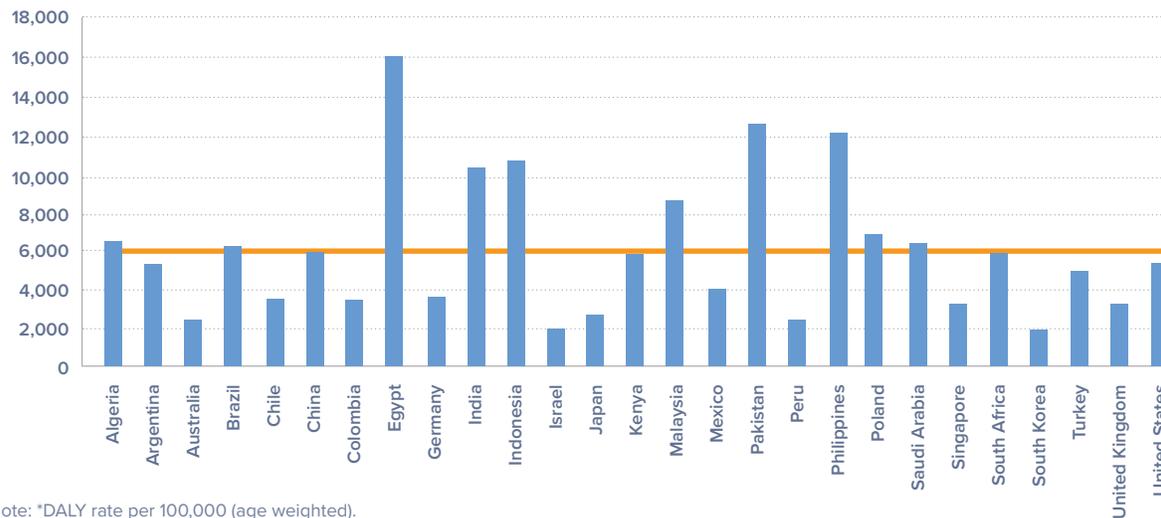
NCDs, burden of disease, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

FIGURE 7

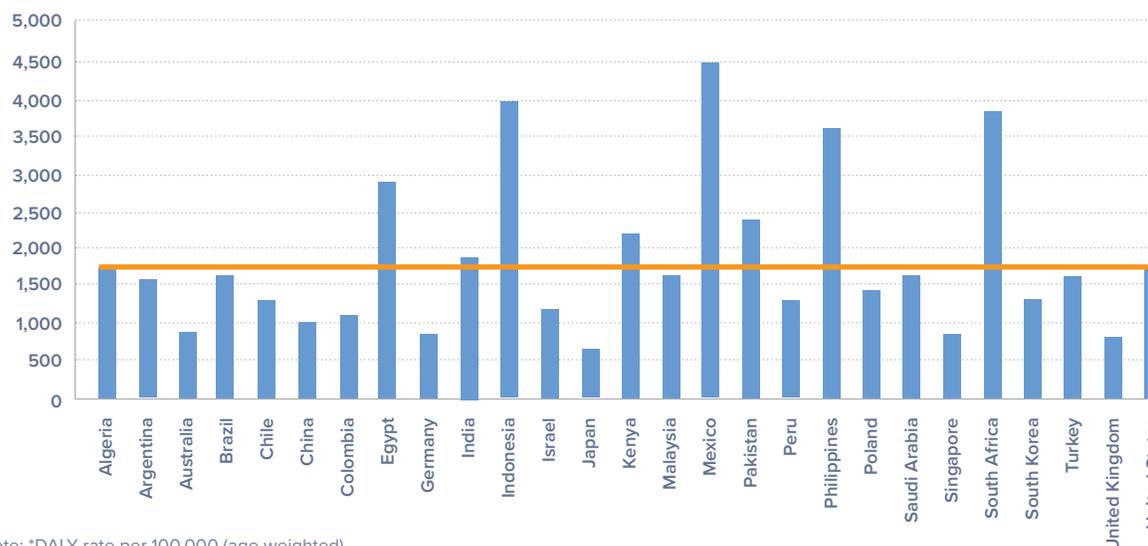
CVD, burden of disease, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

FIGURE 8

Diabetes, burden of disease, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

Figure 8 shows the 2017 burden of diabetes disease per 100,000 for each of the countries and an average across all countries in this study for those aged 40–64 years (age weighted). The average diabetes DALYs per 100,000 is 1,773. Mexico has the highest rate of diabetes DALYs with 16,010 per 100,000, followed by: Indonesia, 4,008; South Africa, 3,363; and Philippines, 3,120. Japan, Australia, Singapore, and the United Kingdom have the least burden of diabetes with 626, 794, 799, and 812, respectively, per 100,000.

Cardiovascular disease (CVD) and diabetes are related. Diabetes is a disease with adverse health outcomes of its own (i.e., kidney disease, limb amputation, depression, anxiety, and blindness), but it is also a risk factor for CVD. This is illustrated in Figure 9, which shows the risks bearing on ischemic heart disease. Diabetes is one of the risk factors for ischemic heart disease. The figure shows some of the risk factor pathways, such as being overweight, fat intake, and physical activity, shared by both ischemic heart disease and diabetes.

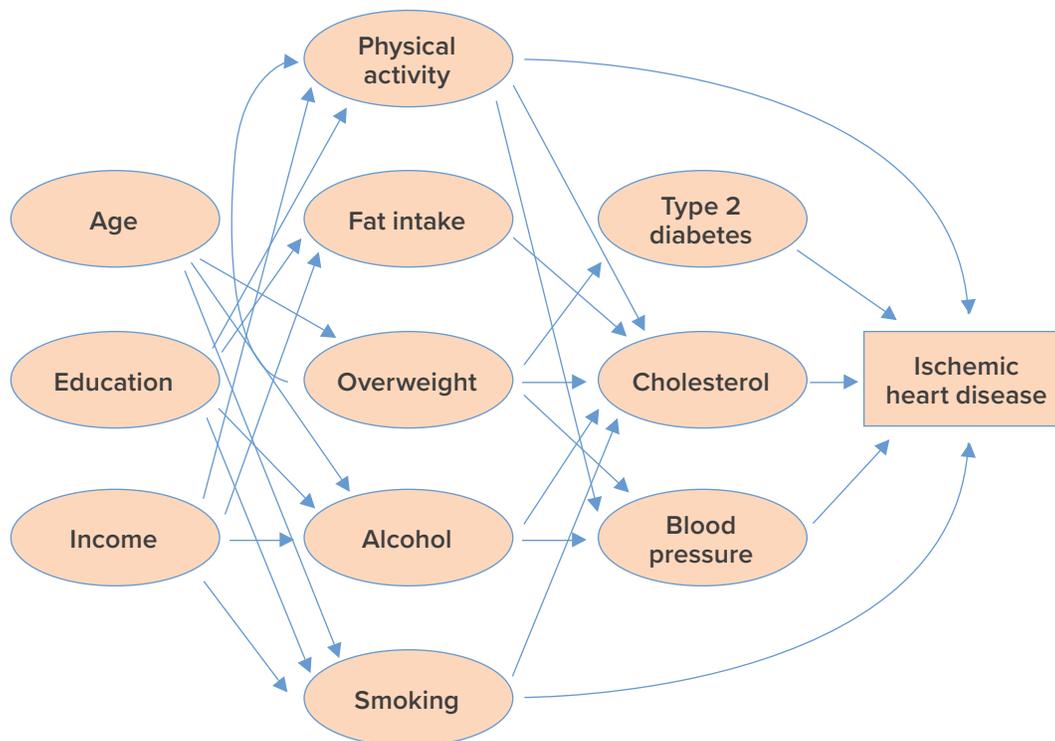
IHME has undertaken an increasingly sophisticated analysis of the relationship between specific diseases and their risk factors. As risks are generally factors that are subject to control, identifying the proportion of attributable risk raises the prospects of controlling the disease.

Of the metabolic risk factors, high systolic blood pressure has the highest impact on the burden of disease, followed by high LDL cholesterol and BMI as measured by DALYs per 100,000. Figure 10 shows high systolic blood pressure as a risk factor for cardiovascular disease for males and females aged 40–64 (age weighted). Males have a higher average risk than females 4,576 versus 2,501 per 100,000 DALYs in 2017. Males in Egypt have the highest rate per 100,000 (12,502), nearly three times the average. Similarly, Philippines, Pakistan, Indonesia, Malaysia, and India have very high risk DALYs for high systolic blood pressure. Males in South Korea, Peru, Israel, and Australia have lower levels of risk DALYs than the average. Females in Egypt also have the highest rate (7,466), nearly three times the female average. South Korea, Israel, and Australia have the least DALYs risk for high systolic blood pressure for CVD.

Figure 11 shows high LDL cholesterol as a risk factor for cardiovascular disease for males and females aged 40–64 (age weighted). The average risk for males is more than twice that of females—3,078 versus 1,395 per 100,000 DALYs in 2017. Males in Egypt have the highest rate per 100,000 (10,263), more than three times the average. Similarly, Pakistan, Malaysia, Philippines, India, Indonesia, Poland, and Saudi Arabia have very high risk DALYs for high LDL cholesterol. Males in South Korea, Peru, Japan, and Israel have lower levels of risk

FIGURE 9

The causal chain, major causes of ischemic heart disease



Note: Arrows indicate some (but not all) of the pathways by which these causes interact.
Source: From Mathers et al. (2009, Figure 1, p. 2).

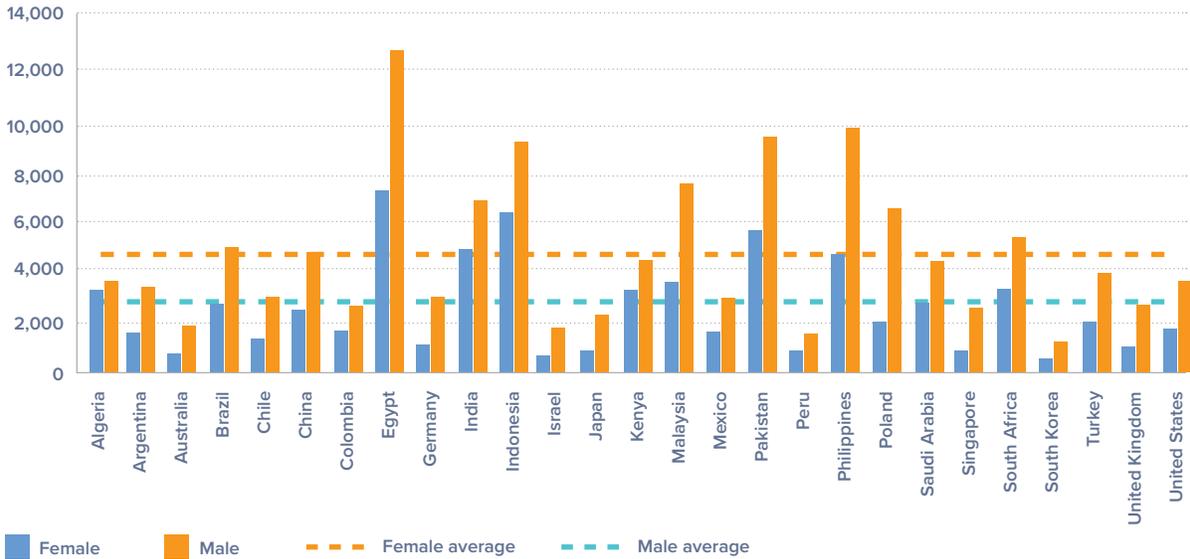
DALYs than the average. Females in Egypt also have the highest rate (5,373), nearly four times the female average. South Korea, Israel, Japan, and Australia have the least DALYs risk for high LDL cholesterol for CVD.

Figure 12 shows high body mass index as a risk factor for cardiovascular disease for males and females aged 40–64 (age weighted). Males have a higher average risk than females, 2,598 versus 1,695 per 100,000 DALYs in 2017. Males in Egypt have the highest rate per 100,000 (8,843), more than three times the male average. Similarly, Philippines, Malaysia, Pakistan, Poland, Saudi Arabia, Indonesia, and the United States have very high risk DALYs for high body mass index. Males in South Korea, Japan, Israel, and Peru have lower levels of risk DALYs than the average. Females in Egypt also have the highest rate (6,616), nearly three times the female average. South Korea, Japan, Israel, Singapore, and Australia have the least DALYs risk for high body mass index for CVD.

Of the metabolic risk factors for diabetes, high fasting plasma glucose and BMI have the highest impact on the burden of disease as measured by DALYs per 100,000. Figure 13 shows high fasting plasma glucose as a risk factor for diabetes for males and females aged 40–64 (age weighted). Males have a higher average risk than females—1,945 versus 1,640 per 100,000 DALYs in 2017. Males in Mexico have the highest rate per 100,000 (5,218), more than two times the male average. Similarly, Indonesia, South Africa, Philippines, Egypt, and Kenya have very high risk DALYs for high fasting plasma glucose. Males in Japan, Singapore, Australia, and United Kingdom have lower levels of risk DALYs than the average. Females in Indonesia have the highest rate (4,078), twice the female average. Females in Japan, Germany, Australia, and the United Kingdom have the least DALYs risk for high fasting plasma glucose for diabetes.

FIGURE 10

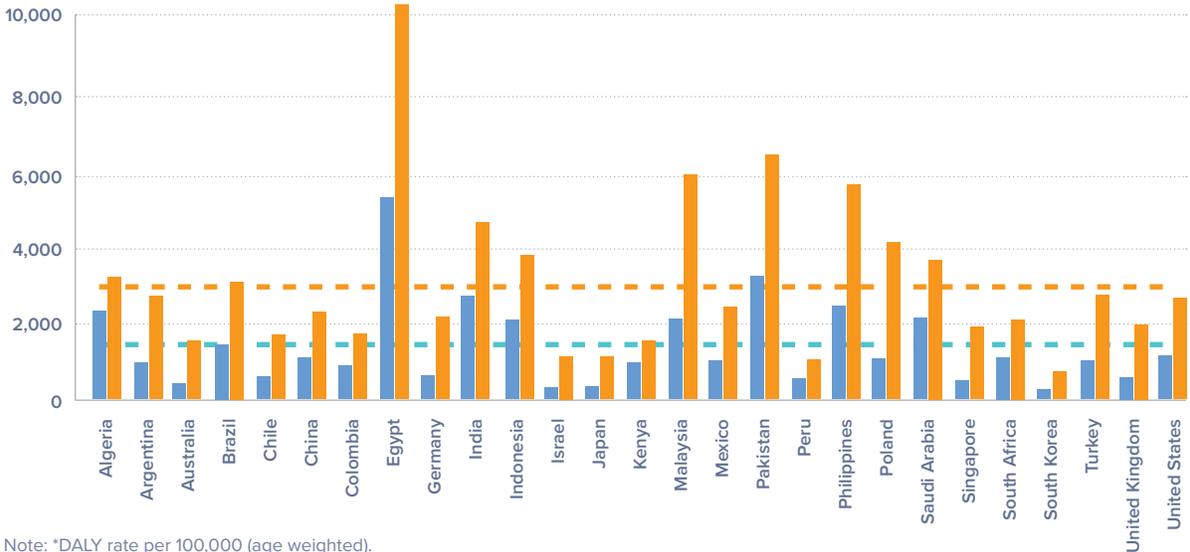
High systolic blood pressure risk factor for CVD, by gender, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

FIGURE 11

High LDL cholesterol risk factor for CVD, by gender, 40–64 years, 27 countries, 2017*

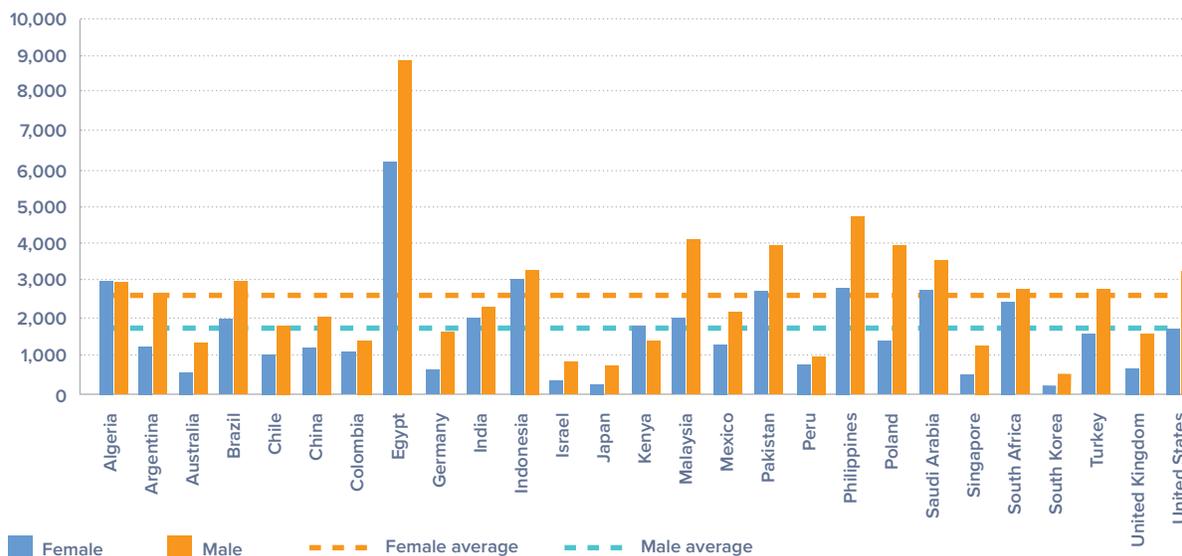


Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

Legend: Female (Blue), Male (Orange), Female average (Dashed Orange), Male average (Dashed Teal)

FIGURE 12

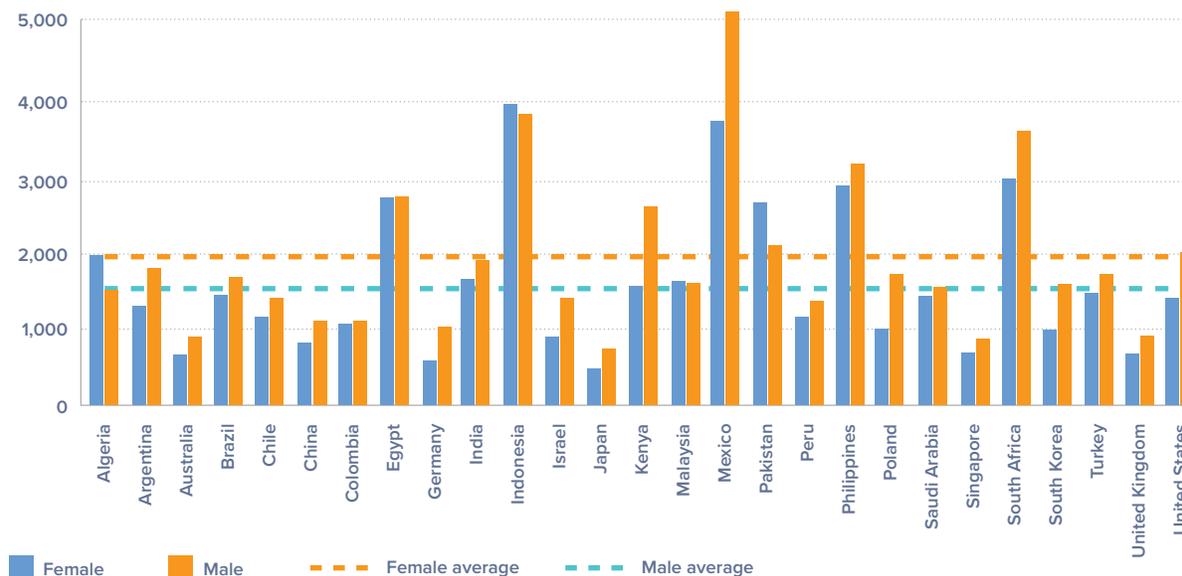
High body mass index risk factor for CVD, by gender, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

FIGURE 13

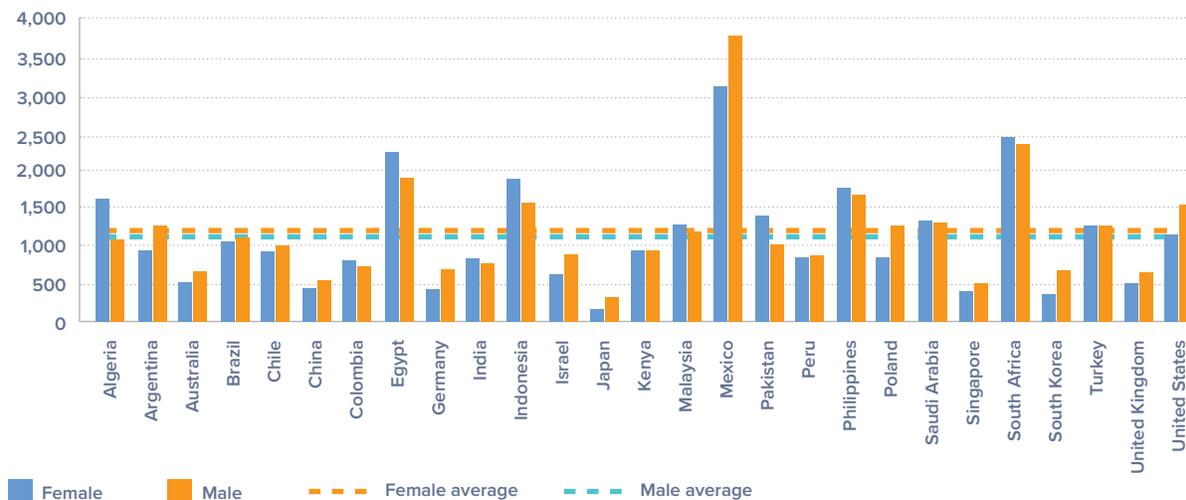
High fasting plasma glucose risk factor for diabetes, by gender, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

FIGURE 14

BMI risk factor for diabetes, by gender, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).

Source: IHME (2020).

Figure 14 shows high BMI as a risk factor for diabetes for males and females aged 40–64 (age weighted). Males have a slightly higher average risk than females, 1,136 versus 1,084 per 100,000 DALYs in 2017. Males in Mexico have the highest rate per 100,000 (3,666), more than three times the male average. Similarly, Egypt, South Africa, Philippines, and Indonesia have a higher than average risk DALYs for high BMI. Males in Japan, Singapore, China, and the United Kingdom have lower levels of risk DALYs than the average. Females in Mexico have the highest rate (3,014), nearly three times the female average. Like males, females in Egypt, South Africa, Philippines, and Indonesia have a higher than average risk DALYs for high BMI, while females in Japan, South Korea, Germany, and China have the least DALYs risk for high BMI for diabetes.

5.2 MENTAL HEALTH

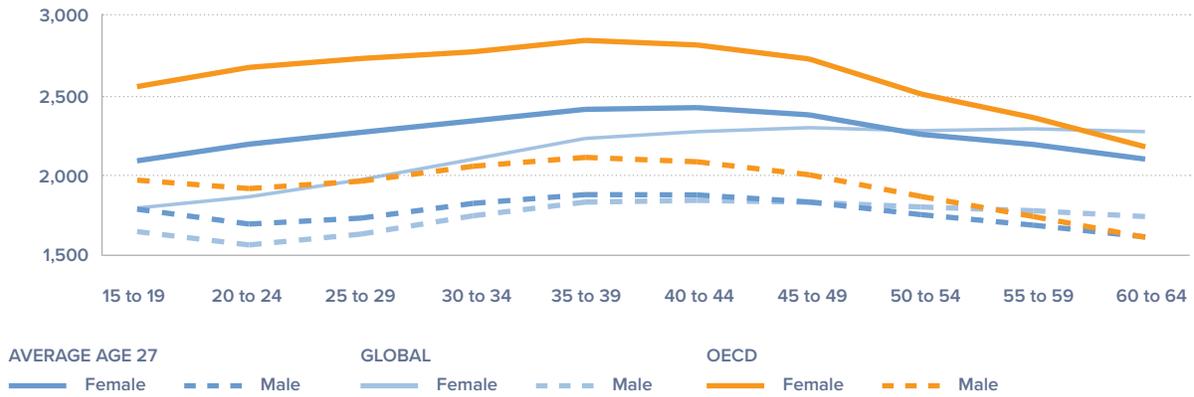
In contrast to most NCDs, mental illness equally affects the young and the older working age populations. The burden for the 27 countries, compared with rates for the rest of the world and the OECD, is lower than the OECD but higher than the global rate (Figure 15). The burden of mental illness is higher for women than men, unlike CVD and diabetes, in low-, middle- and high-income countries. The burden is reasonably high even for the 15–19 cohort and peaks around 35–39 years for both men and women.

Figure 16 shows the 2017 burden of mental illness per 100,000 for each of the countries and an average of all the countries by gender, aged 40–64 years (age weighted). The average mental illness DALYs per 100,000 is 2,325 for females and 1,811 for males. Females in the United States have the highest burden (2,958) closely followed by Australia. Colombia, Poland, and Indonesia have the lowest burden of mental illness. Males in Australia have the highest burden of mental illness (2,252), followed closely by the United States, India, and Saudi Arabia, while Poland, Indonesia, and South Korea have lower levels of burden associated with mental illness.

The major risk factors for mental disorders are behavioral, which includes childhood maltreatment (e.g., bullying and sexual assault) and intimate partner violence for woman. The largest environment/ occupational risk is lead exposure. While the risk of childhood maltreatment decreases as the female becomes an adult, the risk of intimate partner violence increases. In contrast to CVD and diabetes, the identified risk factors represent only a small proportion of the explanation for mental disorders, meaning that most of the causes of disease are unattributed, either because of yet to be discovered links with risk factors or individual predispositions. However, the identified risk factors are relatively important for several of the selected countries.

FIGURE 15

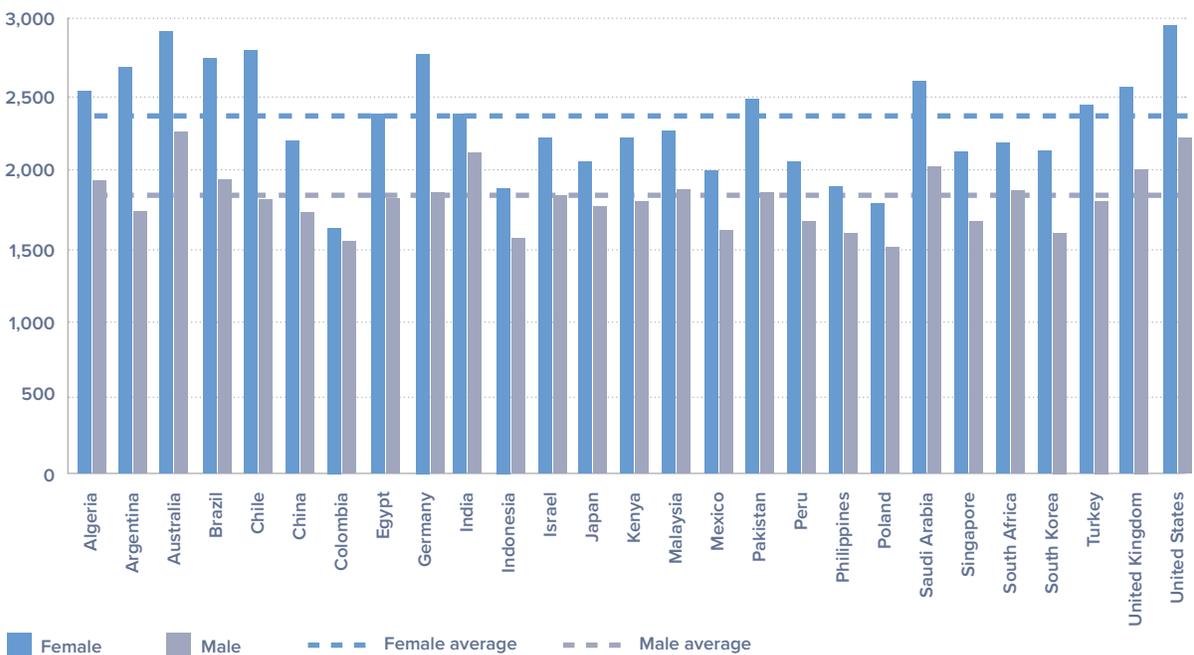
Mental illness, burden of disease, 15–64 years, average 27 countries, OECD and World, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

FIGURE 16

Mental illness, burden of disease, by gender, 40–64 years, 27 countries, 2017*



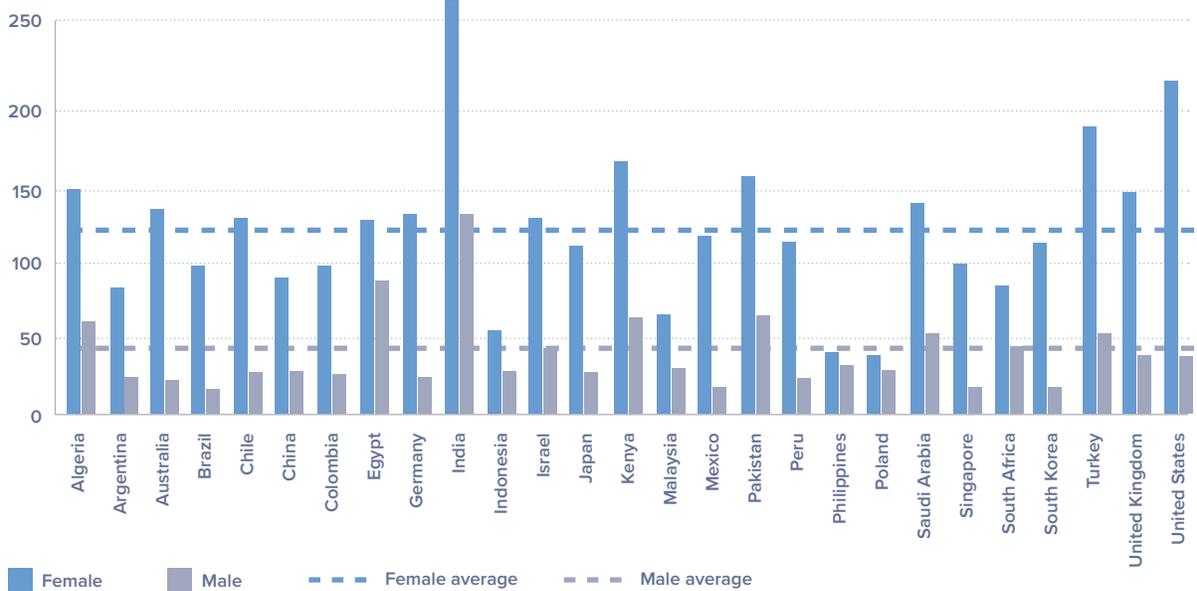
Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

Figure 17 shows all causes of the risk factors for mental illness for males and females aged 40–64 (age weighted). Females have a higher average risk than males, 126 versus 41 per 100,000 DALYs in 2017. Females in India have the highest rate per 100,000 (270), more than twice the female average. This is associated with high levels of intimate partner violence experienced by women in India and presents as depression and anxiety especially for those in middle age. In the United States, Turkey, Kenya, Pakistan, Saudi

Arabia, Algeria, and Australia, women also have a higher than average risk DALYs for mental illness. Females in Poland, Philippines, and Indonesia have lower levels of risk DALYs than the average. Males in India have the highest rate (137), three times the male average. Like females, males in Egypt, Kenya, Algeria, and Pakistan have a higher than average risk DALYs for mental illness, while males in Brazil, South Korea, Singapore, and Mexico have the least DALYs risk for mental illness.

FIGURE 17

All causes of risk factors for mental illness, by gender, 40–64 years, 27 countries, 2017*



Note: *DALY rate per 100,000 (age weighted).
Source: IHME (2020).

Study Methodology and Results

6.1 STUDY METHODOLOGY

This report uses a benefit-cost framework to estimate the costs of the interventions needed to treat the key illnesses that adversely affect people's ability to work, determine the improved health outcomes of those interventions, and place an economic value on those health benefits.

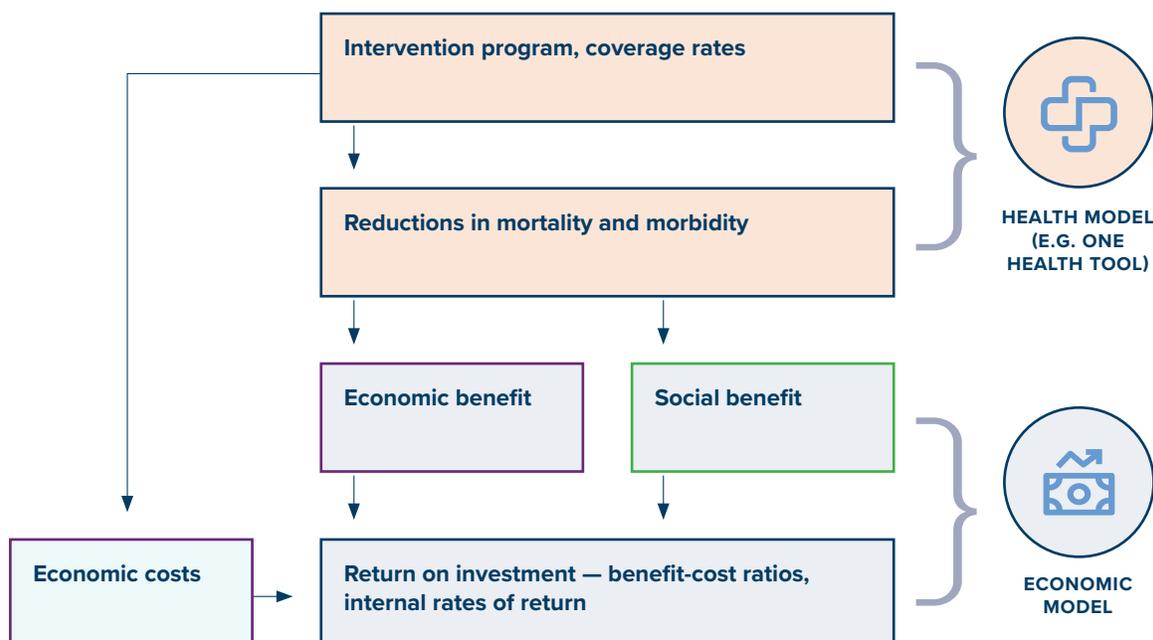
Comparing the costs of the intervention programs with the economic benefits provides a benefit-cost ratio, the size of which indicates the economic value of undertaking the intervention program. A benefit-cost ratio of 10, for instance, means that 1 dollar invested now returns 10 dollars in future benefits. As with the conventional investment problem, the costs are mostly

up front, whereas the benefits occur over a long period of time. Figures presented later in the report illustrate these timing differences. To make them comparable with the costs of the interventions, the benefits are discounted to present day values to generate an investment rate of return.

Figure 18 provides a schematic outline of the modelling methodology. The relevant intervention programs for the specific disease area are identified, and their impact on mortality and morbidity is measured in the health model. Typically, this is the OneHealth Tool (OHT), an international health planning model developed by a UN interagency committee that incorporates global epidemiological data and evidence for each disease cause and intervention outcome

FIGURE 18

Schematic outline of modelling methodology



from a vast array of published studies, data, and other information. In addition to health outcomes, OHT generates intervention costs based on unit costs of the intervention programs. To reduce the adverse impact of each disease, the population treatment levels for each intervention are increased over time by increasing the current coverage rate (% of population treated) to a target level to be achieved by 2030.

The health benefits, in terms of reduced mortality and morbidity, are fed into an economic model that values the productivity gains arising from increased work attendance and performance. We use the average gross domestic product (GDP) per worker as the productivity measure and project that over the duration of each working life. While these economic benefits are more difficult to identify than the costs of treating disease, they are no less real. While the costs of health expenditure may appear as line items in government budget documents, the economic benefits are reflected in higher GDP and in the incomes of those who can work or work more productively because of the treatment they have received.

We also calculate a social benefit for lives saved based on the social value of an additional life. In this study,

the social benefit is calculated based on the intrinsic value of simply being alive and healthy. While a much-debated point (Friedman 2020), the same social or intrinsic value was placed on a worker's life irrespective of their country of residence, and the average global GDP per capita was used instead of the country GDP per capita. While other approaches, such as Stenberg et al. (2014), value a human life in a country using the country's GDP per capita which causes a higher social value of being alive and healthy in a high-income country compared with a low-income country, our approach values all life the same regardless of a country's economic output. This is added to the economic benefits. Comparing the benefits with the costs gives the benefit-cost ratio.

The modelling methodology was first developed for studies conducted in collaboration with colleagues at the WHO and applied to reproductive, maternal, newborn, and child health (RMNCH) (Stenberg et al. 2014; Sheehan, Rasmussen, Sweeny 2014); mental illness (Chisholm, Sweeny et al. 2016); cardiovascular disease (Bertram, Sweeny, Sheehan, Rasmussen et al. 2018); and adolescent health (Sheehan, Sweeny, Rasmussen et al. 2017). The results of these earlier studies are set out in Table 1.

TABLE 1

Returns to health, selected VISES studies

	Benefit-cost ratio		
	To 2030	To 2035	To 2050
Child and maternal health (75 countries) (1)		8.7	38.7
Mental health (36 economies) (2)			
Depression	5.3		
Anxiety disorders	4.0		
Cardiovascular disease (20 countries) (3)	10.9		
Adolescent health (40 countries) (4)	10.2		

Source: (1) Stenberg, Axelson, Sheehan et al. (2014). (2) Chisholm, Sweeny, Sheehan, Rasmussen et al. (2016). (3) Bertram, Sweeny, Lauer, Chisholm, sheehan, Rasmussen et al. (2018). (4) Sheehan, Sweeny, Rasmussen et al. (2017).

These previous studies illustrate that the returns to investment in a range of health interventions are very high, generally above 5 and for cardiovascular disease above 10, meaning that for every U.S. dollar invested, more than US\$10 in future economic benefit are returned.

6.2 CVD AND DIABETES INTERVENTIONS

In this study, CVD and the interrelated disease of diabetes are modelled together in the OHT, and the results are jointly presented. The OHT models the standard interventions for CVD and diabetes.

- CVD treatment for those with very high cholesterol, but low absolute risk of CVD/diabetes (< 20%).
- High blood pressure, but low absolute risk of CVD/diabetes (< 20%).
- High absolute risk of CVD/diabetes (>30%).

CVD treatment of:

- New cases of acute myocardial infarction (AMI) with aspirin.
- Cases with established ischemic heart disease (IHD).
- Those with established cerebrovascular disease and post stroke.

Diabetes treatment:

- Standard glycaemic control
- Intensive glycaemic control

6.3 GLOBAL CVD AND DIABETES RESULTS

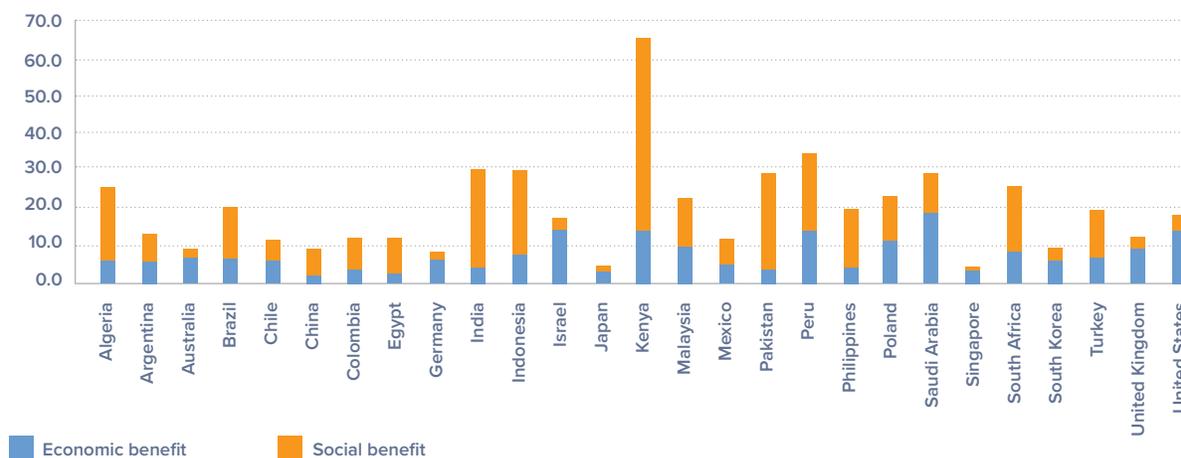
Figure 19 shows the results for CVD and diabetes. The median benefit-cost ratio is 20, including both economic and social benefits of which the economic component is 8 for costs and benefits estimated to 2030.

There is a large variation in the country benefit-cost ratios reflecting the complexity of the interaction in the modelling between costs and benefits.

As discussed in the Methodology section, to determine the social benefits (or the intrinsic value of being alive and healthy), the life of each worker is valued equally at the average global GDP per capita irrespective of his or her country of residence. This resulted in higher social benefits of low-income countries compared with their economic benefits. For some low-income countries, such as Kenya, India, Indonesia, Pakistan, and Peru, this resulted in an overall benefit-cost ratio in excess of 30. For Kenya, the benefit-cost ratio exceeded 60. This very high outcome for Kenya was the result of several factors. The economic benefit-cost ratio was already high at 14 owing to a combination of relatively high benefits for Kenya’s income level and its especially low health costs, the lowest in per capita terms. Moreover, Kenya is one of the poorest countries of those studied, with an average per capita income of 15% of average global GDP per capita. Consequently, there is a large adjustment to convert its social health benefits valued at Kenyan GDP per capita to the global average.

FIGURE 19

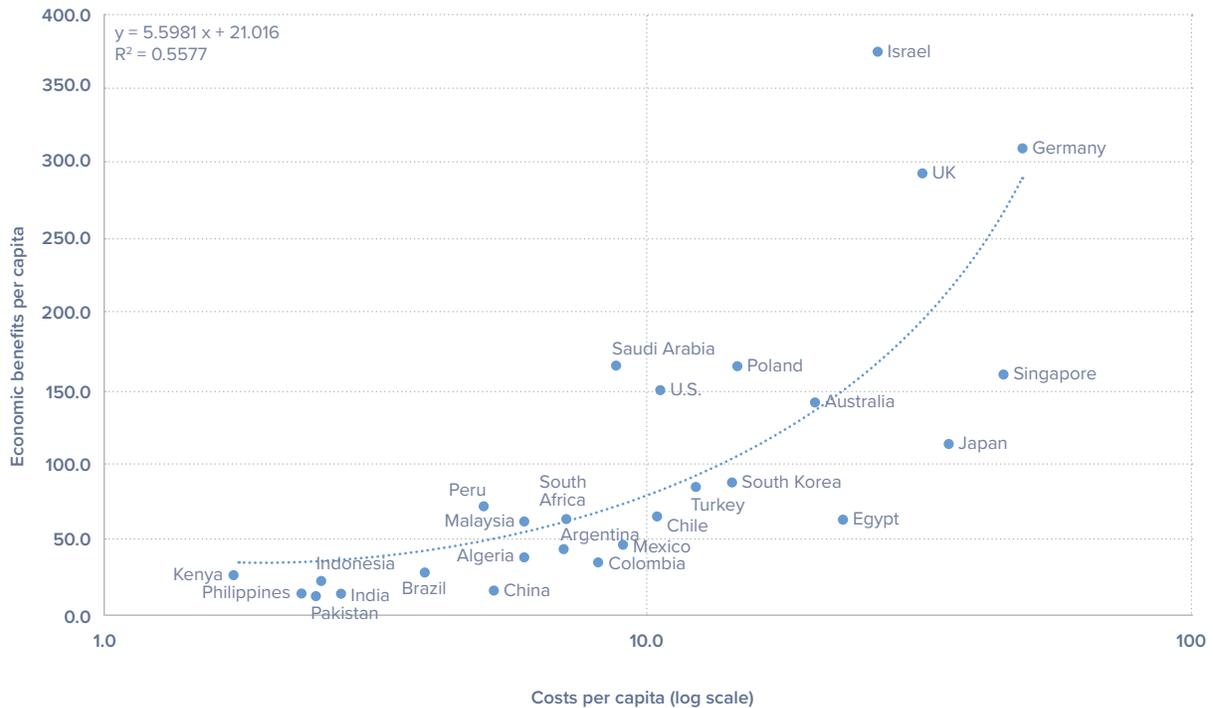
Benefit-cost ratios for CVD and diabetes, 27 countries, 2020–2030



Source: VISES.

FIGURE 20

Cost and economic benefits per capita, CVD and diabetes, 15–64 years, 27 countries, 2020–2030, USD



There are other factors, most importantly the different demographics (e.g., age composition) in addition to income that generate differences in the benefit-cost ratios between countries. Differences in relative costs of pharmaceutical supplies, medical staff, and so forth have an impact on overall costs. On the benefits side, labor force participation rates, particularly for women, also have a bearing on benefits. Countries with high female participation rates such as the United States and Australia generate higher benefits compared with countries with low rates, such as India and Pakistan.

The economic benefit-cost ratios tend to be higher in high income countries. This is largely because the additional days employed from the improved health outcomes are valued in terms of GDP per worker. Therefore, the benefits measured for high income countries tend to be higher than for low income countries. Although some costs also rise with income, for example, medical staff time costs more in the United States than in Mexico. There are other costs for which

the effect is less marked. An approximation of the relationship is given by comparing average per capita costs and economic benefits for each country; the dollar value of the costs and benefits is divided by the target population aged 15–64. Figure 20 shows that on average across countries, per capita economic benefits rise by a factor of about 6 times per capita costs.

The average economic benefit per capita for CVD is US\$97 for the 27 countries. High-income countries such as Germany, United Kingdom, Israel, Singapore, United States, and Australia achieved benefits well above the average per capita because of the high levels of GDP per worker. Low-income countries such as India, Kenya, Pakistan, and Philippines attained the lowest economic benefit per capita of all the countries for CVD because of their low levels of GDP per worker. The average cost per capita for CVD is US\$14, and again high-income countries experienced higher costs per capita than low-income countries.

6.4 MENTAL HEALTH INTERVENTIONS

The interventions costed for mental illness, and separately modelled for anxiety disorders and depression, were a combination of psychosocial treatment and antidepressant medication.

Anxiety disorders

- Basic psychosocial treatment and anti-depressant medication for anxiety disorders (moderate-severe cases)
- Intensive psychosocial treatment and antidepressant medication for anxiety disorders (moderate-severe cases)

Depression

- Basic psychosocial treatment
 - For mild depression
 - For anti-depressant medication of first episode moderate-severe cases
- Intensive psychosocial treatment and anti-depressant medication of recurrent
 - Of first episode moderate to severe cases
 - Of recurrent moderate to severe cases on an episodic basis
 - Of recurrent moderate to severe cases on a maintenance basis
- Psychosocial care for perinatal depression

6.5 GLOBAL MENTAL HEALTH RESULTS

Figure 21 shows the benefit-cost ratios for economic and social benefits for depression and anxiety for the period 2020–2030. The average economic benefit-cost ratio is 10 and the social benefit-cost ratio is 12, giving an average economic and social benefit-cost

ratio of 22. South Korea, Singapore, Brazil, United States, and China achieved a higher benefit-cost ratio for depression than the average, while South Africa, Turkey, and Colombia had the lowest benefit-cost ratio for depression.

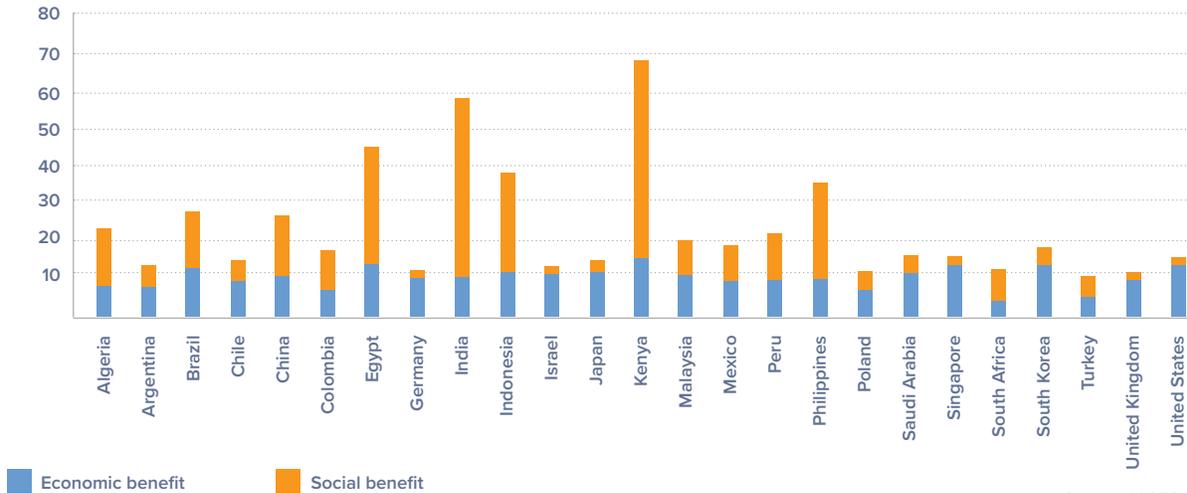
The high social benefit-cost ratio for low income countries, with the benefits valued at global GDP per capita, indicates the substantial gains to be made from a community perspective in addressing mental health issues for India, Indonesia, Egypt, Kenya, and Philippines, among other countries, where depression and anxiety tend to be undertreated. A number of countries, such as Kenya, Indonesia, and Egypt, also have relatively high economic benefit-cost ratios.

Figure 22 shows the benefit-and costs per capita for depression and anxiety over the period 2020–2030. It shows that per capita benefits increased about 12 times costs. Higher income countries have both higher per capita economic benefits and costs on account of their higher per capita and per worker GDP values. This places a greater value on working time gained through the improved health outcomes for higher income countries.

The average economic benefits per capita is US\$25. The United States, United Kingdom, Israel, Singapore, Germany, and Japan achieved higher economic benefits per capita for depression and anxiety than the average, while Philippines, Kenya, Indonesia, India, and Algeria showed the lowest economic benefits. The average cost per capita is US\$2.40 and high-income countries, such as Israel, Singapore, United Kingdom, and Germany, had higher than average cost per capita, whereas low income countries, such as India and Indonesia, had the lowest per capita cost.

FIGURE 21

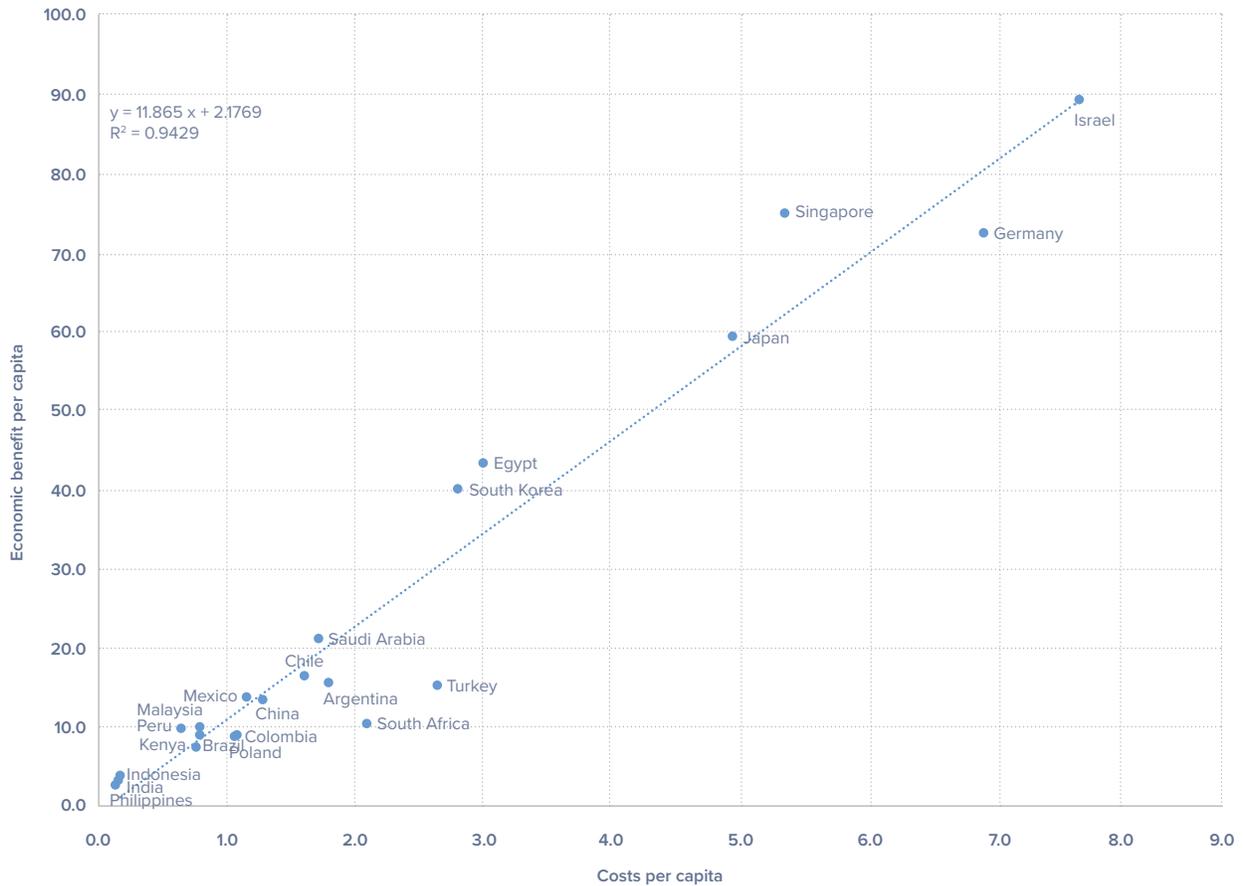
Results, benefit-cost ratio for anxiety disorders and depression, selected countries, 2020–2030



Source: VISES.

FIGURE 22

Costs and economic benefits per capita for anxiety disorders and depression, selected countries, 2020–2030, USD



Study Conclusion

The results of this study demonstrate the high economic and social benefits of investing in interventions to reduce the burden of cardiovascular disease and diabetes, as well as anxiety disorders and depression, which adversely affect the productivity of the working age population. The generally very high benefit-cost ratios for the 27 countries show the value of investing in the treatment programs for these diseases, arising from the enhanced productivity of those receiving the treatment.

The average benefit-cost ratios for both disease areas are similar. The total benefit-cost ratio for cardiovascular disease and diabetes is 20, of which the economic component is 8 (Table 2). The total benefit-cost ratio for anxiety disorders and depression is 22, of which the economic component is 10. The benefit-cost ratios for both disease areas indicate the high returns to reduce absences from work, presenteeism, and stress-related early retirement.

This study suggests that beyond the usual human rights arguments in favor of spending money on health, there are very sound economic reasons for doing so, which lead to higher overall economic growth and development.

TABLE 2

Results, benefits of investing in health, benefit-cost ratios, 27 country average

Disease area	Economic benefit	Economic and social benefit
Cardiovascular disease and diabetes	8.0	17
Anxiety disorders and depression	10	22

Sources: VISES.

TABLE 3

Results, benefits of investing in health, benefit-cost-ratios for each country

Disease area	CVD and Diabetes		Mental Health	
	Economic benefit	Economic and social benefit	Economic benefit	Economic and social benefit
Algeria	6.1	25.7	8.3	23.7
Argentina	6.0	13.4	8.1	13.7
Australia	6.9	9.3	*	*
Brazil	6.6	20.3	13.1	28.3
Chile	6.1	11.5	9.6	15.1
China	2.3	9.3	10.9	27.2
Colombia	3.9	12.4	7.3	17.8
Egypt	2.7	12.2	14.2	45.4
Germany	6.4	8.5	10.4	12.5
India	4.4	30.5	10.7	58.5
Indonesia	7.8	30.2	12.1	38.6
Israel	14.4	17.6	11.6	13.5
Japan	3.2	4.8	11.9	15.1
Kenya	14.1	65.4	15.8	68.7
Malaysia	9.9	23.0	11.3	20.5
Mexico	5.0	11.9	9.7	19.2
Pakistan	3.9	29.4	*	*
Peru	14.2	34.7	9.9	22.3
Philippines	4.4	20.0	10.1	35.7
Poland	11.4	23.3	7.2	12.2
Saudi Arabia	19.0	29.5	11.6	16.3
Singapore	3.6	4.7	13.8	16.2
South Africa	8.7	26.0	4.4	12.9
South Korea	6.2	9.7	13.9	18.7
Turkey	6.9	19.6	5.3	10.8
United Kingdom	9.3	12.5	9.7	11.9
United States	14.2	18.3	13.8	15.8

*Note: Unresolved data integrity issues with depression and anxiety for Australia and Pakistan precluded these countries from further analysis.

Opportunities for Private Sector Collaboration Towards NCD Reduction and Health Systems Strengthening

Collaboration with the private sector in chronic disease prevention and management can lead to the development of disruptive innovations and the deployment of solutions. As countries consider the next steps of chronic disease management and preventive health services, they will need to examine interventions that will maximize the social and economic returns on investment. They will also need to consider public-private partnership models that support financing and maximize impact.

7.1 RECOMMENDATIONS

Support Employer-led Health and Wellness Initiatives

- Establish working groups composed of the public sector, the private sector, NGOs, and academia to identify areas where the private sector can contribute to government's public awareness and health literacy programs on chronic disease awareness and wellness.
- Develop pilot projects to demonstrate the impact of workforce wellness programs. Collaborate across public agencies and private industry leaders to scale-up evidence-based workplace health promotion and disease prevention programs with a focus on both COVID-19 and chronic diseases.

Adopt Innovative Health Technology to Accelerate the Prevention and Control of NCDs

- Explore opportunities to increase the quality, efficiency, and safety of health systems by adopting health technologies in areas such as digital health, health information management systems, digital therapeutics, and telehealth. Assess the barriers and limitations to health technology implementation, including policy, legal, workforce, and privacy issues in order to build a new health ecosystem.

Leverage the Private Sector to Inform NCD Policy

- Work with the private sector to evaluate potential opportunities and challenges to health public-private partnerships (PPPs), including areas for needed capacity building, improved resource utilization, and partnership formation.
- Establish consultations between the private sector and government stakeholders to discuss opportunities and areas of improvement regarding market access to expedite access to treatments related to NCDs.

References

- Bertram, M.Y., Sweeny, K., Lauer, J.A., Chisholm, D., Sheehan, P., Rasmussen, B., et al. 2018, 'Investing in non-communicable diseases: An estimation of the return on investment for prevention and treatment services', *The Lancet*, vol. 391, no. 10134, pp. 2071–2078.
- CDC 2020a, 'People with certain medical condition', Centers for Disease Control and Prevention, Atlanta, at https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fneed-extra-precautions%2Fgroups-at-higher-risk.html (accessed July 27, 2020).
- CDC 2020b, 'Evidence used to update the list of underlying medical conditions that increase a person's risk of severe illness from COVID-19', Centers for Disease Control and Prevention, Atlanta, at <https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/evidence-table.html> (accessed July 27, 2020).
- Chisholm, D., Sweeny, K., Sheehan, P., Rasmussen, B., Smit, F., et al. 2016, 'Scaling-up treatment of depression and anxiety: A global return on investment analysis', *Lancet Psychiatry*, vol. 3, pp. 415–424.
- Clark, A., Jit, M., Warren-Gash, C., Guthrie, B., Wang, H.H.X. et al. 2020, 'Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: A modelling study', *Lancet*, vol. 8, no. 8, pp. E1003–E1017.
- Guan, W., Ni, Z., Hu, Y., Liang, W., Ou, C. et al. 2020, 'Clinical characteristics of coronavirus disease 2019 in China', *New England Journal of Medicine*, vol. 382, pp. 1708–1720.
- Friedman, H.S. 2020, *Ultimate Price: The Value We Place on Life*, University of California Press, Berkeley, Calif.
- IHME 2017, 'Financing Global Health 2016: Development Assistance, Public and Private Health Spending for the Pursuit of Universal Health Coverage', Institute for Health Metrics and Evaluation, Seattle, at <http://www.healthdata.org/policy-report/financing-global-health-2016-development-assistance-public-and-private-health-spending> (accessed September 9, 2020).
- IHME 2020, 'GBD Data', Institute of Health Metrics and Evaluation, Seattle, at <http://www.healthdata.org/gbd/data> (accessed July 27, 2020).
- ILO 2015, 'ILOSTAT Database', International Labour Organization, Geneva, at http://www.ilo.org/ilostat/faces/home/statisticaldata/bulk-download?_adf.ctrl-state=16g1j32hwt_4&clean=true&_afLoop=477715768788438
- Instituto de Salud Carlos III 2020, 'Informe sobre la situación de COVID-19 en España: Informe COVID-19 nº 28, 04 de mayo de 2020', Ministerio de Ciencia e Innovación, Madrid, at <https://www.isciii.es/QueHacemos/Servicios/VigilanciaSaludPublicaRENAVE/EnfermedadesTransmisibles/Paginas/-COVID-19-Informes-previos.aspx> (accessed July 27, 2020).
- Johnson, S.F., Jordan, M., Tiako, N., Flash, M.J.E., Lamas, D.J. and Alba, G. A. 2020, 'Disparities in the recovery from critical illness due to COVID-19', *Lancet Psychiatry*, vol. 7, no. 8, pp. e54–e55.
- Mathers, C., Stevens, G. and Mascarenhas, M. 2009, 'Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks', Geneva, World Health Organization, at https://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf (accessed July 27, 2020).
- Moreno, C., Wykes, T., Galderisi, S., Nordentoft, M. et al. 2020, 'How mental health care should change as a consequence of the COVID-19 pandemic', *The Lancet Psychiatry*, vol. 7, pp. 813–824.
- Murray, C.J.L. and Lopez, A.D. 1996, *Global Health Statistics*, Harvard School of Public Health, Cambridge, MA.
- Murray, C.J.L., Barber, R.M., Foreman, K.J., et al. 2015, 'Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: Quantifying the epidemiological transition', *The Lancet*, vol. 386, pp. 2145–2191.
- NCD Alliance 2020, 'Making NCD Prevention and Control a Priority, Everywhere', at <https://ncdalliance.org/> (accessed July 27, 2020).
- Novel Coronavirus Pneumonia Emergency Response Epidemiology Team 2020, 'The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19)—China, 2020', *China CDC Weekly*, vol.2, pp. 113–122, at <http://weekly.chinacdc.cn/en/article/id/e53946e2-c6c4-41e9-9a9b-fea8db1a8f51> (accessed July 27, 2020).
- OECD 2011a, 'OECD Contribution to the UN High-level Meeting on the Prevention and Control of Non-communicable Diseases', Organization for Economic Cooperation and Development, Paris, at <https://www.oecd.org/health/health-systems/non-communicable-diseases.htm> (accessed July 27, 2020).
- OECD 2011b, 'Applying Modelling to Improve Health and Economic Policy Decisions in the Americas: The Case of Noncommunicable Diseases', Organization for Economic Cooperation and Development, Paris, at http://www.paho.org/HQ/index.php?option=com_content&view=article&id=6232:taller-economia-prevencion-enfermedades-no-transmisibles-sus-factores-riesgo-2011&Itemid=4339&lang=en (accessed July 27, 2020).
- Omran, A.R. 2005, 'The epidemiologic transition: A theory of the epidemiology of population change', *The Millbank Quarterly*, vol. 83, no. 4, pp. 731–757.
- Palmieri, L., Andrianou, X., Barbariol, P., Bella, A., Bellino, S. et al. 2020, 'Characteristics of SARS-CoV-2 Patients Dying in Italy', (based on available data on April 29, 2020), Istituto Superiore di Sanità, Rome, at <https://www.epicentro.iss.it/en/coronavirus/sars-cov-2-analysis-of-deaths> (accessed July 27, 2020).

Pinto, M.C. and Bertolucci, L.C. 2020, 'Type 2 diabetes as a major risk factor for COVID-19 severity: A meta-analysis', *Archives of Endocrinology and Metabolism*, vol. 64, no. 3, pp. 199-200.

Rasmussen, B., Sweeny, K. and Sheehan, P. 2016, 'Health and the Economy: The Impact of Wellness on Workforce Productivity in Global Markets', Report to the U.S. Chamber of Commerce's Global Initiative on Health and Economy, USCC, Washington DC, at <https://www.uschamber.com/report/health-and-the-economy-the-impact-wellness-workforce-productivity-global-markets-0> (accessed July 27, 2020).

Sheehan, P., Rasmussen, B. and Sweeny, K. 2014, *The Impact of Health on Worker Attendance and Productivity in the APEC Region*, Report to the APEC Business Advisory Council, VISES, Melbourne, July, at http://www.vises.org.au/documents/2014_VISES_Impact_of_Health_on_Productivity.pdf (accessed July 27, 2020).

Sheehan, P., Sweeny, K., Rasmussen, B., Wils, A., Friedman, H.S., Mahon, J., Patton, G.C., Sawyer, S.M., Howard, E., Symons, J., Stenberg, K., Chalasani, S., Maharaj, N., Reavley, N., Shi, H., Fridman, M., Welsh, A., Nsofor, E. and Laski, L. 2017, 'Building the foundations for sustainable development: A case for global investment in the capabilities of adolescents', *The Lancet*, vol. 390, pp. 1792-1806

Stenberg, K., Axelson, H., Sheehan, P., Anderson, I., Gülmezoglu, A.M., Temmerman, M., et al. 2014, 'Advancing social and economic development by investing in women's and children's health: A new global investment framework', *The Lancet*, vol. 383, pp. 1333-1354

UN 2011, 'Non-communicable Diseases Deemed Development Challenge of 'Epidemic Proportions' in Political Declaration Adopted During Landmark General Assembly Summit', 66th General Assembly Plenary, United Nations, New York, at <https://www.un.org/press/en/2011/ga1138.doc.htm> (accessed July 27, 2020).

UN 2015 'Resolution adopted by the General Assembly on 25 September 2015: Transforming our World: the 2030 Agenda for Sustainable Development', Resolution 70/1, United Nations, New York, at https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E (accessed July 27, 2020).

Wang, B., Li, R., Lu, Z. and Huang, Y. 2020, 'Does comorbidity increase the risk of patients with COVID-19: Evidence from meta-analysis', *Aging*, vol. 12, no. 7, pp. 6049-6057.

WHO 2000, '53rd World Health Assembly: Summary Records of Committees and Ministerial Round Tables Reports of Committees', World Health Organization, Geneva, at <https://apps.who.int/iris/bitstream/handle/10665/260193/WHA53-2000-REC3-eng.pdf?sequence=1&isAllowed=y> (accessed July 27, 2020).

WHO 2008, '2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Noncommunicable Diseases', World Health Organization, Geneva, at <https://www.who.int/nmh/Actionplan-PC-NCD-2008.pdf?ua=1> (accessed July 27, 2020).

WHO 2013, 'Global Action Plan for the Prevention and Control of Noncommunicable Diseases 2013-2020', World Health Organization, Geneva, at https://www.who.int/nmh/events/ncd_action_plan/en/ (accessed July 27, 2020).

WHO 2018, 'Time to Deliver: Report of the WHO Independent High-level Commission on Noncommunicable Diseases', World Health Organization, Geneva, at <https://www.who.int/ncds/management/time-to-deliver/en/> (accessed July 27, 2020).

WHO 2020, 'Assessing National Capacity for the Prevention and Control of Noncommunicable Diseases: Report of the 2019 Global Survey', World Health Organization, Geneva, at <https://www.who.int/publications/i/item/ncd-ccs-2019> (accessed July 27, 2020).

WHO n.d. 'NCDnet: Global Noncommunicable Disease Network', World Health Organization, Geneva, at <https://www.who.int/ncdnet/en/> (accessed July 27, 2020).

Yang, X., Yu, Y., Xu, J., Shu, H., Xia, J. et al. 2020, 'Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: A single-centered, retrospective, observational study', *Lancet Respiratory Medicine*, vol. 8, no. 5, pp. 475-481.

Zhang, J.J., Dong, X., Cao, Y.Y., Yuan, Y., Yang, Y. et al. 2020, 'Clinical characteristics of 140 patients infected by SARS-CoV-2 in Wuhan, China', *Allergy: European Journal of Allergy and Clinical Immunology*, vol. 75, no. 7, pp. 1730-1741.



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