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# Prioritizing health

A prescription for prosperity



July 2020

# McKinsey Global Institute

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# Preface

Health is often taken for granted—until something goes wrong. This applies equally to individual lives and to the global economy, as the COVID-19 pandemic has shown. For the past century or more, health improvements from vaccines, antibiotics, sanitation, and nutrition, among others, have saved millions of lives and also been a powerful catalyst for economic growth. Better health promotes economic growth by expanding the labor force and by boosting productivity, while also delivering immense social benefits. However, in recent years, a focus on rising healthcare costs, especially in mature economies, has dominated the policy debate, whereas health as an investment in our societies has largely been ignored. The pandemic is an unwelcome reminder of just how much health matters for individuals, society, and the global economy.

In this report, we focus on what it would take to improve the health of the world's population, and we calculate the benefits for individuals, societies, and economies. The product of a yearlong research effort across McKinsey & Company, this report is a collaboration between the McKinsey Global Institute (MGI) and McKinsey experts in healthcare, life science, and global public health. It builds on MGI's long history of research on economic growth and productivity as well as McKinsey's considerable expertise in health and its publications on topics including productivity in healthcare, digital, analytics, and technology trends, healthcare system reform, the wider determinants of health, and the COVID-19 pandemic. This report is intended to provide insight based on our research and currently available information and not to provide specific advice, medical or otherwise.

The research was led by Jaana Remes, an MGI partner based in San Francisco, and Katherine Linzer, a McKinsey partner in the healthcare practice based in Chicago, together with Jonathan Woetzel, an MGI director based in Shanghai, and Sven Smit, MGI co-chairman and director based in Amsterdam; McKinsey senior partners Penelope Dash and Martin Dewhurst, based in London; Matthias Evers, based in Hamburg; Shubham Singhal, based in Detroit; and Matt Wilson, based in New York, as well as McKinsey partner Kristin-Anne Rutter, based in London. The project team was led by Aditi Ramdorai and included Julia Chin, Ada Cierkowska,

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As with all MGI research, this work is independent, reflects our own views, and has not been commissioned by any business, government, or other institution. We welcome your comments on the research at [MGI@mckinsey.com](mailto:MGI@mckinsey.com).

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# Prioritizing health: A prescription for prosperity

The COVID-19 shock illustrates that widespread health is essential for global prosperity. Early estimates suggest the pandemic and its repercussions could lead to a 3 to 8 percent drop in global GDP in 2020. Yet each year, poor health reduces global GDP by 15 percent. As the whole world reimagines public health and rebuilds its economy, we have a unique opportunity not merely to restore the past but to dramatically advance broad-based health and prosperity. In this report, we quantify the upside of focusing on health as an investment with economic and social benefits, not just a cost to manage. We analyze almost 200 countries over two decades to 2040 to identify the different challenges and opportunities facing each, and aggregate findings at regional, income archetype, and global levels to provide a synthesis. Key findings include:

- **Using interventions that already exist today, the global disease burden could be reduced by about 40 percent over the next two decades.** Over 70 percent of the gains could be achieved from prevention by creating cleaner and safer environments, encouraging healthier behaviors and addressing the social factors that lie behind these, as well as broadening access to vaccines and preventive medicine. The remainder would come from treating disease and acute conditions with proven therapies including medication and surgery.
- **Reimagining health could bring tremendous benefits: an average 65-year-old in 2040 could be as healthy as a 55-year-old today.** Infant mortality would decline by 65 percent, the health inequity gap would narrow, and 230 million more people would be alive by 2040. Broader social benefits, defined as the welfare value of good health, could be as high as \$100 trillion.
- **Health innovations in the visible pipeline could cut the disease burden by a further 6 to 10 percent.** Pharmaceutical and healthcare innovations will be needed to prevent or treat diseases for some 60 percent

of the global disease burden that we cannot effectively tackle today, including mental and neurological disorders, cardiovascular disorders, and cancers. We identify ten high-impact technologies that already show promise in providing better care, improving the quality of post-therapy life of patients, and slowing aging. These include cell therapy and regenerative medicine, digital therapeutics, and gene therapy.

- **Better health could add \$12 trillion to global GDP in 2040, an 8 percent boost that translates into 0.4 percent faster growth every year.** About half of these annual economic benefits come from a larger and healthier workforce. The remainder come from expanding the capacity of older people, people with disabilities, and informal caregivers to work as well as from productivity gains as the burden of chronic health conditions is reduced.
- **The economic return could be \$2 to \$4 for each \$1 invested in better health.** In higher-income countries, implementation costs could be more than offset by productivity gains in healthcare delivery. Low-income countries continue to need more investment in basic health infrastructure.
- **Realizing the healthy growth opportunity would require a pivot to prevention both within healthcare systems and beyond.** This will not be easy and requires all stakeholders to work together on four imperatives: make health a social and economic priority; keep health on everyone's agenda; transform healthcare systems; and double down on innovation in therapeutics and beyond.

As countries emerge from the COVID-19 crisis, we have a once-in-a-generation opportunity to rethink the role of health in a post-pandemic future. Making health a priority and shifting focus to areas with highest return can improve resilience, reduce health inequity, and promote greater individual, social, and economic well-being.

# What would the benefits be from improving health globally?

In a typical year, poor health costs the global economy:

**43 days**

per person lost to poor health and premature death

**5%**

productivity loss per worker with chronic conditions

**15%**

of GDP which is...

**2–5x**

more than the expected GDP impact from the COVID-19 pandemic

Using known interventions, we could reduce the global disease burden over 40%

● 47% saved from noncommunicable diseases

● 37% saved from infectious diseases

● 16% saved from other diseases

**230,000,000**

more people would be alive in 2040

**>70%**

comes from **prevention**

including environmental, behavioral, and social interventions, and preventive health measures

**65**

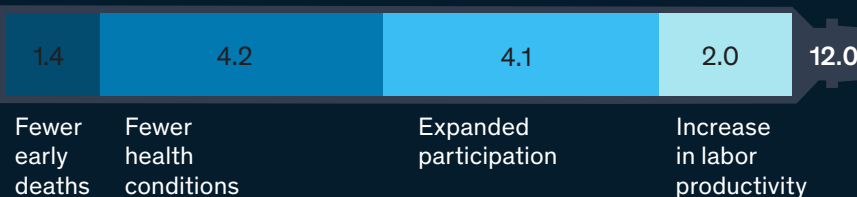
would be the new

**55**

**Middle-age benefit**

The health benefits we size would inject \$12 trillion into the global economy in 2040

GDP impact in 2040, \$ trillion



**8%** boost to GDP in 2040

**\$2–\$4**

of economic benefits for every dollar invested in better health







# Executive summary

By June 2020, the COVID-19 pandemic had caused hundreds of thousands of deaths around the world, triggered the largest quarterly contraction of global GDP ever recorded, and left hundreds of millions of people without jobs.<sup>1</sup> The associated costs are unprecedented, reaching into trillions of dollars. Yet even in normal circumstances, poor health takes a heavy personal and economic toll. In a typical year, 17 million people die prematurely from a variety of long-term health conditions, many of which are avoidable.<sup>2</sup> About eight million people die annually—over one-third before reaching their 20th birthday—from infectious diseases that are largely preventable and treatable, amounting to almost 250 million years of lost future life.<sup>3</sup> Almost one billion people worldwide suffer from mental health disorders, including more than 200 million children.<sup>4</sup> And then there are accidents. About 4.5 million people die each year from accidental injuries, with 80 percent under the age of 70.<sup>5</sup> What would happen if avoidable health conditions were successfully addressed? And what if mental health were improved and accidents reduced?

# 17M

people die prematurely from a variety of long-term health conditions

In this report, we examine what it would take to improve the health of the world's population and calculate the benefits for individuals, societies, and the global economy. We show that with existing treatments and preventive health interventions, the global disease burden could be reduced by about 40 percent over the next 20 years, a path that we refer to as the healthy growth scenario (see Box E1, "Our research methodology").<sup>6</sup> That means about one-third fewer deaths from cancers and cardiovascular diseases and about 60 percent fewer deaths from tropical diseases and malaria. Overall, 230 million more people would be alive by 2040. The economic payoff would be significant as their productive potential is realized. By expanding the labor force and increasing productivity, we estimate, the health benefits could be worth \$12 trillion in additional annual global GDP in 2040, an 8 percent uplift to GDP without including additional benefits from future innovations and welfare gains. Improving global health would also improve the resilience of societies and economies when they face unexpected health shocks such as pandemics. But the best part is this: many of the benefits we size can be achieved without significant additional costs. In fact, in higher-income countries, implementation costs could be more than offset by moderate productivity gains in the healthcare system.

That does not mean capturing the health and economic benefits will be easy. It requires reorienting thinking about and investing in health and healthcare delivery, as well as fostering healthier living conditions and changing behavior. It also requires changes in the workplace and economic policy to allow, among others, increased participation of older people in the workforce. However tragic and destructive it has been, COVID-19 has placed society at a unique point in time to prioritize health. Could there be a better moment to invest in global health to promote well-being and prosperity?

<sup>1</sup> According to the latest ILO estimate, there has been a 10.7 percent decline in hours worked since Q4 2019, equivalent to over 300 million full-time jobs. See "ILO Monitor: COVID-19 and the world of work," fourth edition, May 2020.

<sup>2</sup> Defined as deaths in people aged <70 years from noncommunicable diseases. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>3</sup> Defined as years of life lost (YLLs). This measure quantifies the years between death and average life expectancy. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>4</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>5</sup> Ibid.

<sup>6</sup> We define health interventions as actions aimed at assessing, promoting, or improving the health of an individual or population, ranging from public sanitation programs to surgical procedures, recommended by leading institutions like the World Health Organization or national medical associations.

## Our research methodology

In this report, we measure the potential to reduce the burden of disease globally through the application of proven interventions across the human lifespan and quantify the impact on population health, the economy, and wider welfare over the period to 2040. We often use shorthand throughout this report to refer to this potential as the healthy growth scenario. Our work provides a pragmatic assessment of the range of interventions that could lead to meaningful health improvement at the population level and boost long-term global economic growth prospects. We conduct our analysis for almost 200 countries; our global, regional, and income-level analyses are aggregated from the country-level analysis.<sup>1</sup>

### Assessment of the potential to reduce the disease burden

We source our disease burden forecasts to 2040 from the Global Burden of Disease data set developed by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington. This data set includes diseases that cause death and contribute to years lived in poor health. We define diseases broadly as health conditions that affect quality of life, including infectious diseases, chronic conditions, and injuries.

To estimate the reduction in the disease burden achievable in our healthy growth scenario, we conducted a detailed review of clinical evidence and guidelines to identify the interventions, both currently available and in the pipeline, with the greatest potential for scalable reduction of today's disease burden. We did so systematically for the top 52 diseases, which contribute to almost 80 percent of global disease burden, and relied on clinical guidelines and evidence from leading institutions such as the World Health Organization, Disease Control Priorities Network, and academic journals such as *The Lancet*, *New England Journal of Medicine*, and *British Medical Journal*.

to estimate the health improvement potential. In all cases, our aim was to identify a basket of highly effective interventions with wide applicability, roughly 150 in total, rather than to catalog all possible interventions that might be found in a well-resourced and comprehensive healthcare system.

For each individual intervention for the 52 diseases, we followed three steps. First, we sized the health improvement potential. This is an estimate of the share of the disease burden that could be averted through rigorous application of an intervention affecting people with the disease. Second, we estimated the potential to increase adoption from current levels in countries that fall within four income archetypes (high, upper middle, lower middle, and low). For interventions that require ongoing compliance with a treatment program, this adoption estimate includes the sustained adherence and not just initial uptake. Third, we estimated the time required to reach the full impact. This involved two considerations: the time needed for implementation, and the time lag between delivering the intervention and gaining the health benefits from it. Where evidence on current or potential levels of adoption was limited, we made reasonable assumptions based on principles set out in the technical appendix.<sup>2</sup>

### Quantification of the economic impact

To quantify the economic impact of these health improvements, we relied on population and labor force forecasts to 2040 and incorporated the impact of health improvements by age group each year. We then translated the improvements in population health to labor force participation and labor productivity and to GDP through four channels: fewer premature deaths; lower rates of disability among the potential labor force; higher labor market participation among healthier older people, informal caregivers, and people with disabilities; and higher productivity

<sup>1</sup> Country-level data on disease burden are based on the best available evidence; reliability for individual countries varies. In general, epidemiological data are less reliable in lower-income countries, where the resources for disease surveillance, data collection, and quality assurance are limited. We use the World Bank classification system, which groups countries into four categories based on GNI per capita: low income, lower-middle income, upper-middle income, and high income. Afghanistan and Ethiopia are examples of low-income countries, while India and Kenya are examples of lower-middle-income countries. China and Brazil are the largest upper-middle-income countries, and the United States, Japan, and all countries in Western Europe are examples of high-income countries.

<sup>2</sup> For example, in smoking cessation we assume that adoption of the full range of interventions could reach 50 percent of smokers over 20 years in all countries, and that this would reduce the disease burden medically associated with tobacco use by 59 percent (the effect of giving up smoking) among them, leading to an overall reduction in the disease burden associated with smoking of 29.5 percent over 20 years. For pneumococcal vaccine for people with chronic obstructive pulmonary disorder (COPD), we assume that adoption could increase by 20 percent in high- and upper-middle-income countries over 10 years, and by 60 percent in low- and lower-middle-income countries over 15 years. Based on assessment of clinical evidence, we assume this intervention would reduce the disease burden associated with pneumonia in people with COPD by 29 percent (the mortality reduction observed in vaccinated patients), leading to an overall reduction of 6 percent (higher income) to 17 percent (lower income) of the disease burden associated with pneumonia in COPD over ten to 15 years.

of a healthier workforce. The assumptions used to estimate impact across each of these channels were drawn from academic research where available and tested with an expert advisory group of economists.

### **Uncertainties in our analysis**

A number of uncertainties are inherent in an attempt to understand how global health could be improved and what the benefits would be in 20 years. These uncertainties surround the evolution of the global disease burden, the availability and effectiveness of different interventions (both those currently in use and those in development) in diverse populations, and the impact of improvements in health on society and the economy. We manage these uncertainties in each step of our analysis in the following ways:

**1. The evolution of the disease burden.** While McKinsey & Company employs many medical experts and scientists, we are not a disease forecasting firm. We rely on disease burden forecasts provided by IHME, which maintains the most comprehensive database of the global disease burden. Forecasts of the global disease burden are inherently uncertain and health shocks such as the COVID-19 pandemic may affect forecasts.

**2. The availability and effectiveness of interventions.** Our estimates are a snapshot of a very large scientific evidence base that is constantly evolving, often inconclusive, and uneven (in quantity and quality) across disease areas and specific interventions. In addition to the uncertainty inherent in the underlying evidence and our interpretation of it, other aspects of our methodological approach influence our findings. We have mitigated them by sharing and reviewing our approach and interim results with academic and clinical experts at all stages of the research processes, and by providing a detailed description of our method and sources in the technical appendix and bibliography.

**3. Future innovations.** Research and development in the life and medical sciences is inherently risky and uncertain as is the future rate of adoption of any new technology. We attempted to constrain these inherent uncertainties by looking only at technologies at relatively later stages of development—those that had already passed initial hurdles—and by looking at defined yet relatively broad innovation categories rather than at individual products. We shared and reviewed our method and findings with experts in the field at all stages of the research.

**4. Economic potential.** In the economic analysis, we make assumptions about what labor market choices people can and choose to make if health benefits are realized. Importantly, we make assumptions about rates of participation in the labor force for groups at different ages and in different health states. These assumptions are grounded in evidence, such as statistics on current and historical rates of labor force participation by age group, country, and health status. Another key assumption was that the labor market could fully absorb additions to the workforce at average levels of productivity. We addressed this uncertainty using a sensitivity analysis, based on a dynamic equilibrium economic model (for more details, see chapter 4).

### **What this report does not do**

This report does not forecast health trends. Its purpose is to provide a sense of the magnitude of potential health and economic benefits that could be achieved by more broadly applying known interventions. Our estimates are not predictions, and we recognize the significant changes needed to achieve the identified health gains in just two decades. We also recognize the risks and threats that could alter the underlying disease burden and the validity of our estimates. In particular, the near- and long-term consequences of new diseases, such as COVID-19, and our response to them, will affect this underlying burden in ways that we cannot reliably quantify today.

This report does not assess current and future healthcare costs. Instead, we provide a high-level estimate of the cost implications of shifting to a healthy growth path by drawing on published research assessing the net cost for countries to implement the interventions identified. These implementation costs are incremental to current healthcare spending but could be largely offset by productivity gains in healthcare spending in middle- and high-income countries.

This report does not make recommendations about spending by any government or organization. It is intended to provide insight into what is possible to achieve with a broad-based improvement in global health. While our study provides a guide for how to improve the health of the world's population, every country has unique local health and economic conditions that should be considered to determine the most effective interventions in each case.

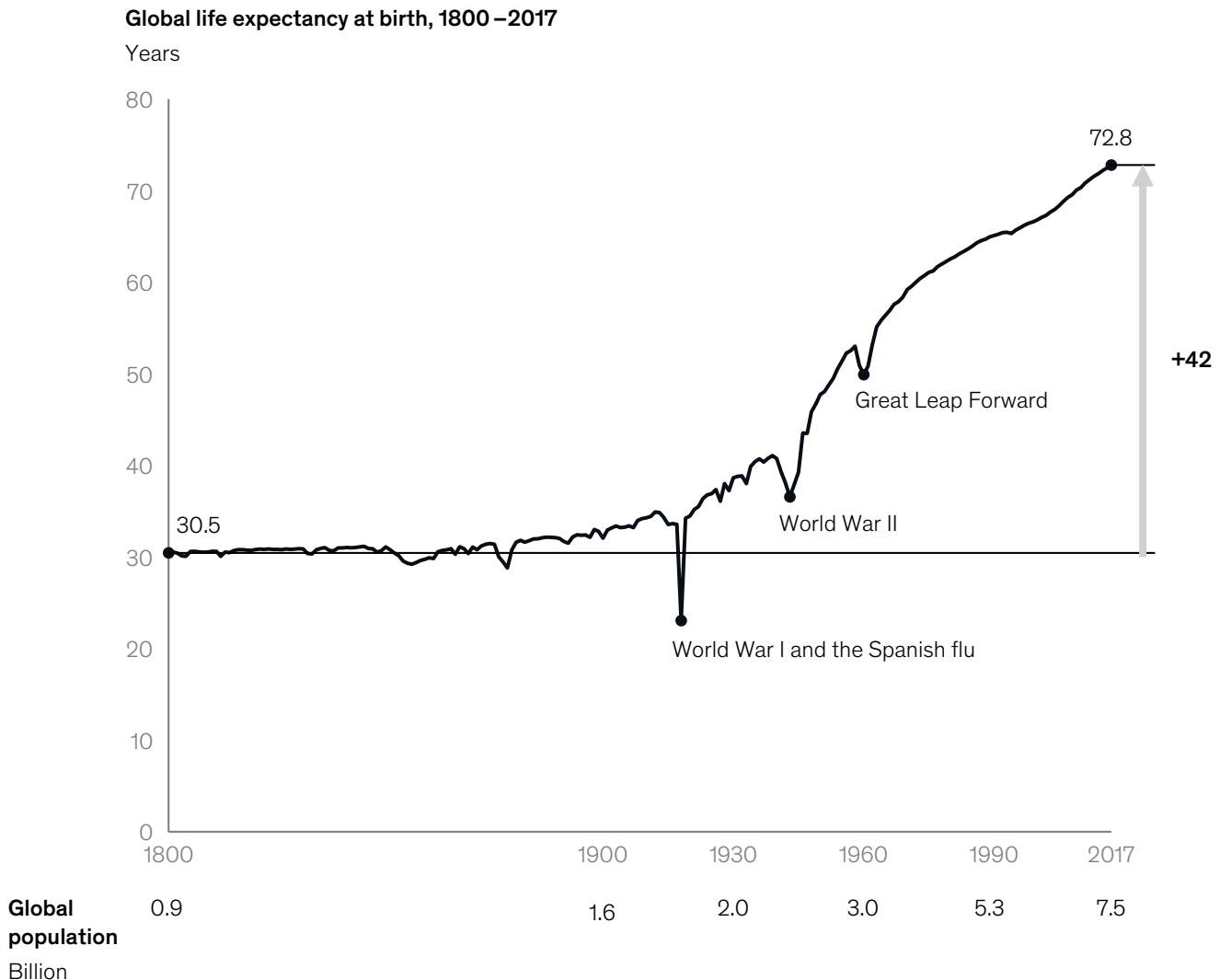
For more details about our methodology, see the [technical appendix](#).

## Better health was a catalyst for economic growth in the past and can be a powerful driver once more

Over the past century, improved hygiene, better nutrition, antibiotics, vaccines, and new technologies, among others, have contributed to tremendous progress in global health. Recent innovations have led to dramatic improvements in survival rates for people with certain types of cancer, heart disease, and stroke in many countries.<sup>7</sup> Improvements in health have extended lives and improved quality of life, contributing to the rapid expansion of the labor force and labor productivity in the second half of the 20th century, which were key factors behind strong economic growth over that period (Exhibit E1).

Exhibit E1

**As health improved in the 20th century, life expectancy more than doubled and the global labor force expanded.**



Source: Gapminder.org; McKinsey Global Institute analysis

As countries grew richer, they invested in better food and safer environments, creating a virtuous cycle of improved health and higher incomes. Economists estimate that about one-third of economic growth in advanced economies in the past century could be attributed to

<sup>7</sup> George A. Mensah et al., "Decline in cardiovascular mortality: Possible causes and implications," *Circulation Research*, January 2017, Volume 120, Issue 2; Melina Arnold et al., "Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): A population-based study," *The Lancet Oncology*, November 2019, Volume 20, Number 11, pp. 1493–505; Malcolm A. Smith et al., "Declining childhood and adolescent cancer mortality," *Cancer*, August 2014, Volume 120.



improvements in the health of global populations.<sup>8</sup> Research focused on more recent years has found that health contributed almost as much to income growth as education.<sup>9</sup>

Despite the progress of the past century, in a typical year, poor health and health inequity continue to limit economic prosperity. This plays out in two ways.

First, premature deaths limit growth by reducing the size of the potential labor force. Cardiovascular disorders and cancers are the top conditions that affect the mortality of populations aged 15 to 64, and 55 percent of those premature deaths occur in low- and lower-middle-income countries. A disease such HIV/AIDS takes an exceptionally high toll on the economy because it disproportionately affects people of prime working age. On top of the widespread humanitarian crisis from HIV/AIDS in the 1990s and 2000s, the pandemic particularly affected Southern and Eastern Africa, where HIV prevalence rates among miners were as high as 25 percent in some areas.<sup>10</sup>

Second, poor health or morbidity makes it hard for those suffering from health conditions to be economically active and realize their full productive potential. In 2017, a total of 580 million person-years were lost to poor health among those aged 15 and 64, leading them to be absent from work or quit employment altogether.<sup>11</sup> In mature economies, one in five workers suffer from a chronic condition—commonly, low back pain, migraine and headache, and anxiety and depression—that affects their productivity at work.<sup>12</sup> For example, in Europe, people with more than one chronic condition are 20 percentage points less likely to be employed than their peers.<sup>13</sup> Moreover, employees managing chronic conditions experience higher levels of “presenteeism,” defined as being at work but not fully functioning because of illness. In the United States, employees with depression are estimated to lose four hours per week due to presenteeism.<sup>14</sup> In low-income countries, infectious diseases such as tuberculosis (TB) present the largest losses to labor supply and household income. The recovery time for TB is several months, and studies have shown that patients lose three to four months of work time when diagnosed.<sup>15</sup> This can affect output substantially and force households into debt and poverty.<sup>16</sup>

Overall, we estimate that the cost of ill health was more than \$12 trillion in 2017, 15 percent of global GDP—or about the same size as China’s economy in that year.<sup>17</sup> Health shocks such as the COVID-19 pandemic, H1N1 influenza, and SARS can result in additional humanitarian and economic costs. The effects of the COVID-19 pandemic, such as the shelter-in-place measures to control the spread of the virus, are forecast to reduce global GDP by 3 to 8 percent in 2020.<sup>18</sup>

Health has not typically been part of economic growth discussions, especially in developed countries where the recent debate has revolved around the cost of healthcare, with a few exceptions. We hope this report contributes to a greater understanding of the many ways in

# \$12T

cost of ill health in 2017

<sup>8</sup> Based on estimates from Robert W. Fogel and Suchit Arora. See Robert W. Fogel, “Health, nutrition, and economic growth,” *Economic Development and Cultural Change*, April 2004, Volume 52, Issue 3; Suchit Arora, “Health, human productivity, and long-term economic growth,” *Journal of Economic History*, September 2001, Volume 61, Issue 3. See chapter 1 for more details.

<sup>9</sup> Jamison et al. analyzed growth rates in 50 countries from 1965 to 1990 and found that better health contributed 11 percent of income growth overall. Investment in physical capital accounted for 67 percent and improved education for 14 percent. See Dean T. Jamison, Lawrence J. Lau, and Jia Wang, “Health’s contribution to economic growth in an environment of partially endogenous technical progress,” in *Health and Economic Growth: Findings and Policy Implications*, Guillem López-Casasnovas, Berta Rivera, and Luis Currais, eds., Cambridge, MA: MIT Press, 2005.

<sup>10</sup> Rose Smart, “HIV/AIDS guide for the mining sector: A resource for developing stakeholder competency and compliance in mining communities in Southern Africa,” World Bank, 2004; David E. Bloom et al., *AIDS and economics*, World Health Organization Commission on Macroeconomics and Health working paper series number WG1:15, November 2001.

<sup>11</sup> Measured in years lived with disability, or YLDs, for age group 15 to 64. In total, all ages lost 860 million years in 2017. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>12</sup> Donna Allen et al., “Four-year review of presenteeism data among employees of a large United States health care system: A retrospective prevalence study,” *Human Resources for Health*, November 2018, Volume 16, Issue 1.

<sup>13</sup> “The labour market impacts of ill-health,” in *Health at a Glance: Europe 2016: State of health in the EU cycle*, OECD, 2016.

<sup>14</sup> Walter F. Stewart et al., “Cost of lost productive work time among US workers with depression,” *JAMA*, June 2003, Volume 289, Number 23; *Health and productivity benchmarking 2016*, Integrated Benefits Institute, November 2017.

<sup>15</sup> *The economic cost of tuberculosis*, WHO, 2000.

<sup>16</sup> Sukhan Jackson et al., “Poverty and the economic effects of TB in rural China,” *International Journal of Tuberculosis and Lung Disease*, October 2006, Volume 10, Issue 10.

<sup>17</sup> This is a total estimate of the cost of poor health, not just health conditions that are avoidable.

<sup>18</sup> Reflects range of several estimates as of June 2020. See: OECD Economic Outlook, June 2020; IMF World Economic Outlook, April 2020; COVID-19: Briefing materials, McKinsey & Company, June 2020.

which health influences the economy and encourages further research into the link between health and economic prosperity.<sup>19</sup> Investments in health could also play an important role in promoting economic recovery in the wake of the COVID-19 pandemic. Furthermore, a number of trends suggest that health may well matter more for growth in coming decades. First, improving health can counter the drag on growth that results from slowing population growth. Labor force growth globally is expected to slow from an annual rate of 1.8 percent over the past 50 years to 0.3 percent in the next 50 years.<sup>20</sup> At the same time, the demand for highly skilled knowledge workers is increasing.<sup>21</sup> Improved health can help counter these longer-term headwinds by extending healthy lifespan for workers of prime working age and older, and by developing the physical and cognitive ability of children, the future labor force of the world.<sup>22</sup> Second, health is no longer improving in all regions because obesity-related conditions and mental health challenges are burdening people of all ages, including those of prime working age. In addition, persistent and in many cases growing health inequity creates a gap in health outcomes between rich and poor within societies.<sup>23</sup> Third, healthier populations are more resilient in the face of new infectious diseases, like COVID-19, that often present higher risks to people with existing health conditions.<sup>24</sup>

## Use of known interventions could cut the global disease burden by about 40 percent and extend active middle age by ten years

# 10

number of years healthy middle age could be extended

While global health has advanced tremendously during the past century, gains are projected to slow in the future, especially as age-related health conditions become more prevalent. Fortunately, proven interventions are available to tackle some of the most common chronic conditions and infectious diseases. We analyzed the current and future disease burden and found that by more comprehensively applying known interventions, the current global disease burden could be reduced by about 40 percent by 2040.

### Overall health improvements are slowing as chronic conditions continue to increase

The global disease burden is projected to decline at a slower rate than in the past, especially in mature economies where the population is aging and facing more age-related health conditions. The disease burden is measured in disability-adjusted life years, known as DALYs, by the Institute for Health Metrics and Evaluation (IHME), the institution that maintains the leading database on the global disease burden. Because each DALY reflects a year of good health lost, health improvements can be measured by the number of DALYs averted.<sup>25</sup> According to IHME, over the next 20 years, the global threat posed by infectious diseases such as malaria, tuberculosis, and HIV/AIDS is expected to diminish because of concerted efforts to implement effective treatments (Exhibit E2). While the COVID-19 pandemic has led to an unexpected spike in mortality, our analysis at the time of publication suggests that the impact of premature deaths during the initial wave of the disease is unlikely to materially shift population projections for 2040.<sup>26</sup> Greater health gains are expected in low-income countries, many of which lag behind higher-income countries in life expectancy and other measures of health, mainly from preventable and treatable causes such as diarrhea and malaria, nutritional disorders, and poor child and maternal health.

<sup>19</sup> See chapter 1 for more details.

<sup>20</sup> Analysis for G-19 countries (the G-20 minus the European Union) and Nigeria; see *Global growth: Can productivity save the day in an aging world?*, McKinsey Global Institute, 2015.

<sup>21</sup> *Skill shift: Automation and the future of the workforce*, McKinsey Global Institute, May 2018.

<sup>22</sup> *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, McKinsey Global Institute, December 2017.

<sup>23</sup> *Environmental health inequalities in Europe: Assessment report*, WHO, 2012; Gareth Iacobucci, "Life expectancy gap between rich and poor in England widens," *The BMJ*, March 2019; Michael Marmot et al., "Closing the gap in a generation: Health equity through action on the social determinants of health," *The Lancet*, Volume 372, Issue 9650, 2008.

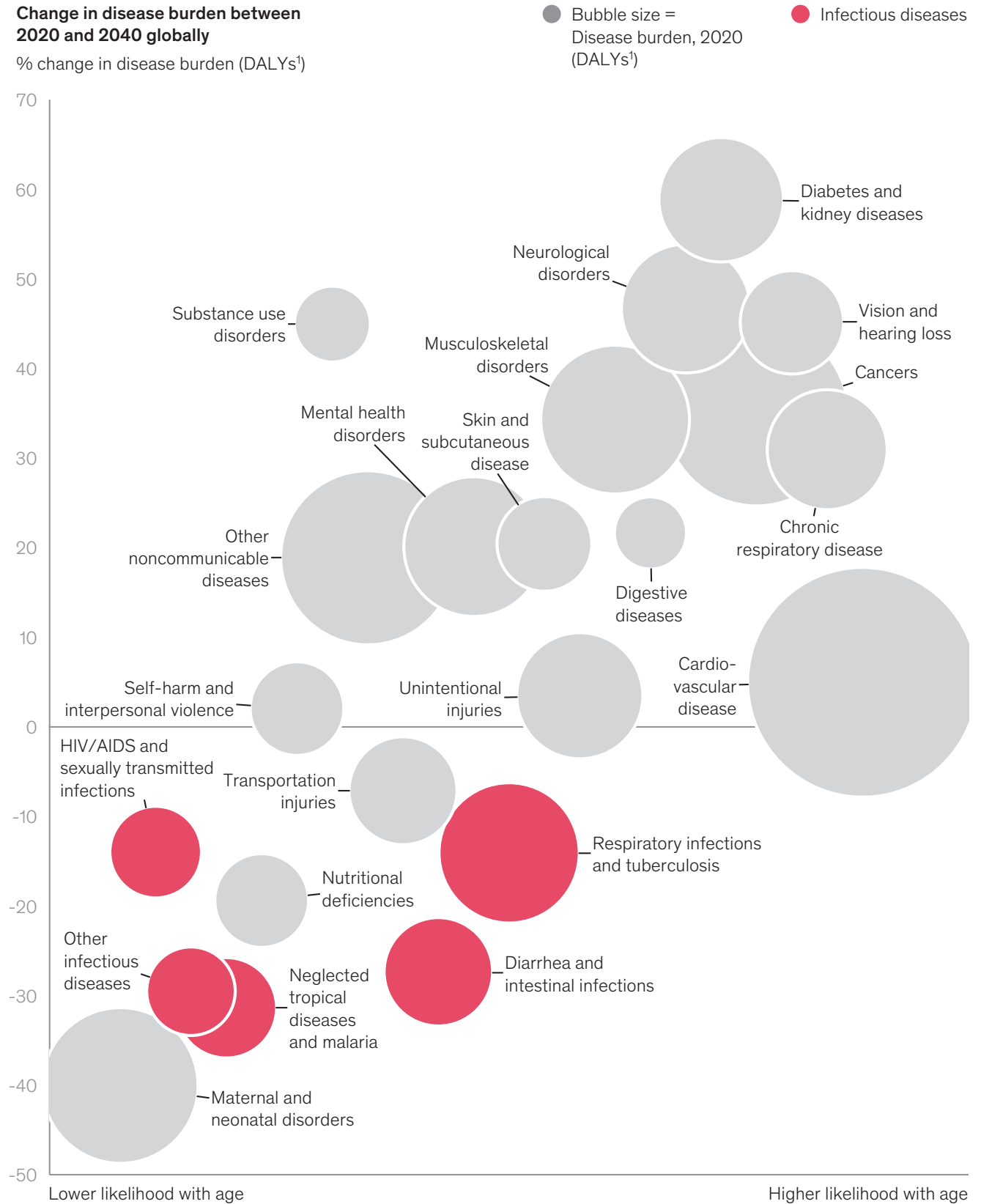
<sup>24</sup> Wei-jie Guan et al., "Comorbidity and its impact on 1590 patients with COVID-19 in China: A nationwide analysis," *European Respiratory Journal*, May 2020, Volume 55, Issue 5; Norbert Stefan et al., "Obesity and impaired metabolic health in patients with COVID-19," *Nature Reviews Endocrinology*, April 2020.

<sup>25</sup> The DALY is a generic measure that captures both years lost to premature death and the duration and severity of time spent in ill health. DALYs are made up of years of life lost to premature death (YLLs) and years lived with disability (YLDs). YLLs are counted in full years from the age at death to the average life expectancy (specific to the country and year). For example, a person dying from a stroke at 65 in a country where the average life expectancy is 75 will lose 10 YLLs. YLDs are weighted according to the severity of the disease (from 0 to 1). For example, a person living with Parkinson's disease in a place where the condition has a disability weight of 0.35 would lose 0.35 YLD for each year living with the condition.

<sup>26</sup> We recognize that there is considerable uncertainty, particularly for low- and middle-income countries.

## Looking ahead, incidence of age- and lifestyle-related diseases is expected to rise while many infectious diseases could decrease significantly.

Disease baseline forecast



1. DALY = disability-adjusted life year.

Source: Global Burden of Disease Database 2016, Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

A challenge in all countries is the threat of lifestyle- and obesity-related chronic conditions such as diabetes, cardiovascular disease, and some cancers, all of which tend to rise with income and age.<sup>27</sup> Age-related conditions, such as Alzheimer's disease and other dementias as well as vision and hearing loss, are also expected to increase as populations age. As a result, in many high-income countries, healthy life expectancy—years lived in good health—is not keeping pace with rising life expectancy, and additional years gained at the end of life are increasingly spent in poor health.

In addition, many countries may experience additional disease burden associated with the immediate and longer-term consequences of the pandemic, such as delays in diagnosis and treatment of serious conditions such as cancer and tuberculosis, and negative health consequences of substantially higher levels of unemployment.<sup>28</sup>

**With known interventions, ten years could be added to middle age and child mortality could be reduced by 65 percent**

We estimate that the current global disease burden in 2040 could be reduced by about 40 percent by applying known interventions in broader segments of populations and with closer adherence to the most effective tools available. This is an aspirational yet realistic estimate given current knowledge and proven practices.

A reduction in the global disease burden of this magnitude would deliver significant health benefits. Child mortality could drop by 65 percent by 2040. Cancer deaths could decline by about 30 percent, cardiovascular disease deaths by about 40 percent, and neglected tropical diseases and malaria deaths by about 60 percent. Overall, 230 million more people would be alive in 2040, half of them under the age of 70. For people at middle age, the shift could extend the number of years in good health by a decade, essentially making 65 the new 55.<sup>29</sup> Every region in the world would experience an improvement in this range.

While we find that the overall potential to improve global health is substantial, known interventions vary widely in their capacity to battle specific diseases (Exhibit E3). Some conditions, like diarrhea, respond to effective, low-cost interventions such as oral rehydration that have already helped eradicate them in most high-income economies. Making those interventions available consistently and at scale to the people who need them could similarly reduce the global burden. For other conditions, such as diabetes and cardiovascular disease, prevention and disease management are well understood, but measures to ensure people follow through by taking medication, changing their diet, and exercising, for example, are lacking. Finally, some conditions, like Alzheimer's disease and some types of mental health disorders, are currently beyond medicine's ability to prevent or treat effectively; for these, the disease burden in coming decades is likely to increase until more effective therapies are discovered and implemented.

**230M**

more people alive by 2040

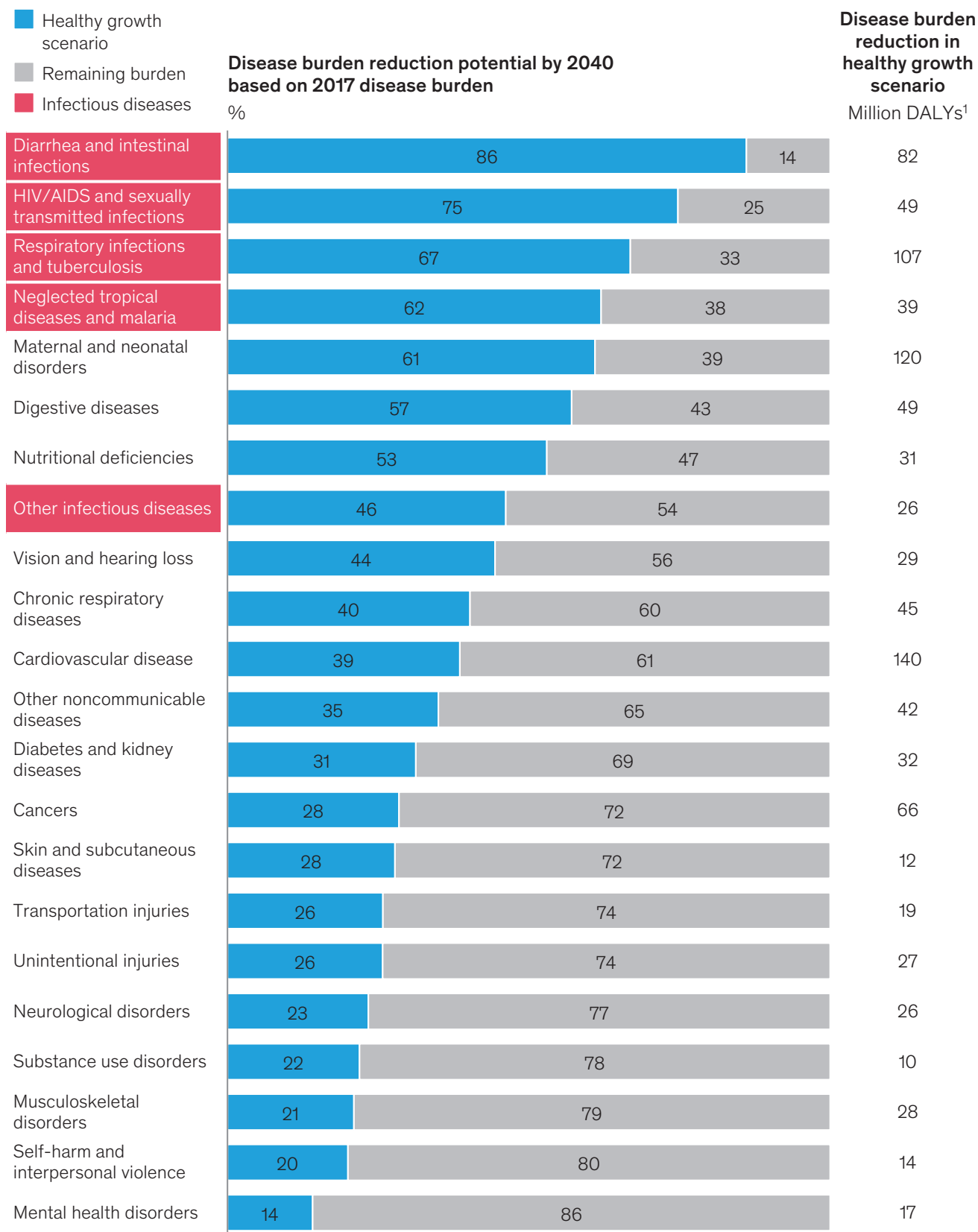
**For people at middle age, the shift could extend the number of years in good health by a decade, essentially making 65 the new 55.**

<sup>27</sup> Fabrizio Ferretti, "Unhealthy behaviours: An international comparison," *PLOS One*, October 2015, Volume 10, Issue 10; Thomas Bollyky et al., "Lower-income countries that face the most rapid shift in noncommunicable disease burden are also the least prepared," *Health Affairs*, November 2017, Volume 36, Number 11; *The heavy burden of obesity: The economics of prevention*, OECD, OECD Health Policy Studies, 2019.

<sup>28</sup> Early indications of these additional conditions include: Emily A. Holmes et al., "Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science," *The Lancet Psychiatry*, April 2020; David Cox, "Some patients who survive COVID-19 may suffer lasting lung damage," *Science News Daily*, April 2020; Eleanor Philpotts, "GP urgent cancer referrals decline by more than 70% as fewer patients come forward," *Pulse Today*, April 2020.

<sup>29</sup> With the health improvement set out in our healthy growth scenario, a 65-year-old in 2040 would have the equivalent health of a 55-year-old today. This is defined as the probability of survival to a selected age in good health.

**The potential to reduce the disease burden varies significantly by disease type; chronic conditions are more challenging to tackle.**



1. DALY = disability-adjusted life year.

Note: Figures may not sum to 100% because of rounding.

Source: Global Burden of Disease Database 2017, Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis



## **Over 70 percent of the health benefits we size come from prevention through healthier environments, behaviors, and preventive care**

It has long been known that prevention plays a key role in delivering health benefits. Our analysis demonstrates that the vast majority of health benefits, over 70 percent, are achievable not by treating disease but through preventing it (Exhibit E4).<sup>30</sup> In fact, one of the most effective ways to improve health is to invest in communities so that children can grow up and live long and healthy lives as adults. Unpolluted air and water, affordable healthy food, and health literacy shape individual behavior and, together with preventive care (for example, safe childbirth, vaccinations), help reduce the disease burden over the long term. The remaining 30 percent of benefits come from proven therapies to treat existing health conditions.

While these interventions may be known, they are not reaching the people who need them at the right time today. The main challenges include societal failure to assess and address the many unaddressed social and environmental health risks, current incentives that encourage healthcare providers to focus on treatment rather than prevention, and the individual tendency to prioritize immediate needs over longer-term health. The challenge of transitioning to a healthy growth scenario is that it requires change far beyond healthcare systems alone.

## **A large share of the identified health improvements would cost less than \$100 per additional healthy life year**

Cost curves identify interventions with the highest health benefit at the lowest cost. Because the costs of delivering better health vary widely, we estimate them separately for four country income archetypes.

# 70%

share of interventions  
from prevention

In low-income countries, we find the most cost-effective interventions (lowest incremental cost of reducing one year lived in poor health) include childhood immunizations, prevention and treatment of malaria, safe childbirth, better nutrition, and cardiovascular disease prevention. In these countries, the younger population are major beneficiaries, with 42 percent of the healthy life gains going to people under 20 years of age, compared with 18 percent globally. More than 35 percent of the disease burden can be reduced for under \$100 per year of healthy life year gained. For example, diarrhea is a leading cause of preventable childhood mortality worldwide. Almost 90 percent of these deaths could be averted with basic interventions including oral rehydration solutions and oral zinc supplementation, adequate sanitation, and comprehensive childhood immunization.<sup>31</sup>

In lower-middle-income countries, we find midwife-assisted safe childbirth could deliver 1 percent of the total addressable disease burden for 0.1 percent of the total additional costs. Treatment for malaria and TB, and prevention of cardiovascular disease, with support and education for lifestyle change and pharmacological prevention are also very important. More than half of the total health improvement opportunity identified could be delivered through interventions with incremental costs of less than \$100 per year of healthy life gained. Compared to countries with low incomes, a higher share of health improvement can be delivered at lower unit costs in these countries, because the base level of infrastructure—for transport and logistics as well as healthcare—reduces some of the challenge and costs of getting care to the people who could benefit.

In upper-middle- and high-income countries, the greatest health improvement could come from increased use of known preventive strategies for cardiovascular disease and diabetes including weight management, smoking cessation, and prevention and treatment of substance use disorders and low back pain. In all of these conditions, a common challenge is encouraging initial uptake in those who would most benefit and achieving sustained adherence to both medications and behaviors over many years. Cardiovascular disease

<sup>30</sup> We estimated the impact of preventive interventions (including environmental, social, behavioral, and medical prevention) on health first, and apply therapeutic interventions only on the remaining disease burden not averted by preventive actions.

<sup>31</sup> *Progress on household drinking water, sanitation, and hygiene, 2000–2017: Special focus on inequalities*, UNICEF and WHO, June 2019.

## Over 70 percent of the health improvement potential from known interventions comes from environmental, social, and behavioral interventions, and preventive health measures.

### Disease reduction potential by intervention type<sup>1</sup>

100% represents the 41% reduction in the global disease burden

	Top 3 in category	Description	Examples	
33%	Environmental, social, and behavioral	Dietary interventions 7%	Interventions designed to support people to achieve a nutritious and balanced diet, and to meet specific nutritional goals for people with conditions affected by their dietary intake and weight	<ul style="list-style-type: none"> <li>Iron fortification of staple foodstuffs</li> <li>Nutritional guidance and education for supported weight management</li> </ul>
		Supported behavior change 7%	Interventions designed to encourage sustained changes in lifestyle and behaviors, including levels of physical activity, eating habits, substance use, and management of stress	<ul style="list-style-type: none"> <li>Fitness tracking app, including goal setting, guidance, and monitoring</li> <li>Peer support group for substance use disorders</li> </ul>
		Smoking cessation 4%	Full range of national and local policies and support programs to reduce uptake of smoking and encourage smokers to quit (including policies affecting pricing, marketing, and availability of tobacco products; smoking bans; and cessation support)	<ul style="list-style-type: none"> <li>Taxation of tobacco products</li> <li>Nicotine-replacement therapy</li> </ul>
38%	Health promotion	Vaccines 11%	Medical products designed to provide immunity against a specific disease or group of related diseases by stimulating production of antibodies in individuals receiving the vaccine without inducing development of full disease	<ul style="list-style-type: none"> <li>Measles, mumps, and rubella (MMR)</li> <li>Hepatitis B vaccine</li> <li>Seasonal influenza vaccine</li> </ul>
		Safe childbirth 9%	Provision of an appropriately equipped and resourced setting for intrapartum care that addresses main risks to maternal and neonatal health (eg, hemorrhage, infection, obstructed labor, and complications related to prematurity)	<ul style="list-style-type: none"> <li>Presence of certified midwife or obstetrician</li> <li>Clean delivery room and sterile equipment</li> <li>Treatment of preeclampsia and eclampsia</li> </ul>
		Medicines for heart disease, stroke prevention, and diabetes 7%	A range of medicines that reduce risk of disease progression, complications, and mortality from these conditions by regulating blood pressure, cholesterol levels, and blood glucose levels; improving blood flow; and reducing risk of blood clots developing	<ul style="list-style-type: none"> <li>Antihypertensives</li> <li>Statins for cholesterol reduction</li> <li>Metformin for diabetes</li> </ul>
29%	Therapeutic	Anti-infective medicines 10%	A range of medicines that treat or manage infectious diseases including bacterial, viral, or fungal infections, either by killing the pathogen (eg, bacteria or other microorganism) or slowing or interrupting its growth and ability to replicate	<ul style="list-style-type: none"> <li>Antibiotics for pneumonia</li> <li>Antiretroviral therapy for HIV</li> <li>Artemisinin combination therapy for malaria</li> </ul>
		Specialist surgery 5%	A range of surgical or interventional procedures used to treat complex conditions such as advanced heart disease, and major trauma; includes routine day surgery procedures (eg, cataract surgery)	<ul style="list-style-type: none"> <li>Cardiac catheterization</li> <li>Major trauma surgery</li> <li>Neonatal surgery</li> </ul>
		Counseling and talking therapies 3%	Interventions designed to address a range of conditions including mental health disorders, substance use disorders, and self-harm, using psychological techniques and talking in group or individual settings	<ul style="list-style-type: none"> <li>Cognitive behavioral therapy</li> <li>Addiction therapy (eg, 12-step programs)</li> </ul>

Source: McKinsey Global Institute analysis

prevention with medication (a combination of antihypertensives and statins) along with lifestyle education could address 3 percent of the addressable disease burden in upper-middle-income countries and would account for only 0.02 percent of the total additional costs. Even in high-income countries, we find that almost 60 percent of interventions cost less than \$1,000 per year of good health (Exhibit E5). Australia's approach to smoking cessation is an example of public policy intervention.<sup>32</sup> Smoking prevalence in Australian adults fell from 35 percent in 1980 to 14 percent in 2016, with similar sharp decreases in tobacco consumption by teenagers. Key interventions included awareness and media campaigns, comprehensive bans on tobacco advertising, assistance programs to quit smoking, banning smoking in public places, and high taxes on cigarettes.

In addition to interventions that improve health, steps to prepare for future health shocks such as pandemics will be important across countries (see Box E2, "Societies will also need to consider how to prepare for a broad range of potential health shocks, including future pandemics").

## Box E2

### **Societies will also need to consider how to prepare for a broad range of potential health shocks, including future pandemics**

Improving global health will bolster the resilience of societies and economies when faced with unexpected health shocks. People with preexisting conditions, such as obesity and heart disease, have been particularly vulnerable during the COVID-19 pandemic.<sup>1</sup> In parallel, societies can take specific measures to be better prepared for the unpredictable health crises ahead. This will require effort on several fronts.

First, prevention to reduce the frequency of hazards, exposure to them, and the impact of that exposure. This includes comprehensive vaccination development programs, environmental and agricultural standards to reduce the risk of novel diseases crossing from animals to humans, and minimum standards for cybersecurity to protect healthcare systems.

Second, planning and preparedness, which includes effective and internationally coordinated disease and risk surveillance, early warning systems, and sharing of best practices.

Finally, investment in technology to improve the speed and quality of response. This includes investment in tests, vaccines, treatments, and other solutions, but also strategies for tracking and managing disease spread and transmission. In many cases these investments build on the strong primary and community care systems and structures that support broader population and public health, including data and analytics.

<sup>1</sup> ICNARC report on COVID-19 in critical care, Intensive Care National Audit and Research Centre, April 2020.

### **Ten innovations in the visible pipeline could reduce the total disease burden by a further 6 to 10 percent by 2040**

Today's interventions are the innovations of the past. Without them, healthy lifespans would not be as long as they are. Innovation continues to be critical to tackle diseases without a known cure as well as help us increase uptake and adherence to interventions we know work. Leading the list of diseases without a known cure are mental health and neurological disorders, cardiovascular disease, and cancers. The good news is that innovations that completely change the lives of patients continue to emerge and prove the continuing power of innovation. One example is the nearly 70 percent reduction in premature death due to chronic myeloid leukemia in Switzerland from 1995 to 2017.<sup>33</sup>

We identify ten promising innovations in progress that could have a material impact on health by 2040 (Exhibit E6). We determined these technologies by focusing on areas with

<sup>32</sup> Elizabeth Greenhalgh, Michelle Scollo, and Margaret Winstanley, *Tobacco in Australia: Facts and issues*, Cancer Council Victoria, 2020.

<sup>33</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

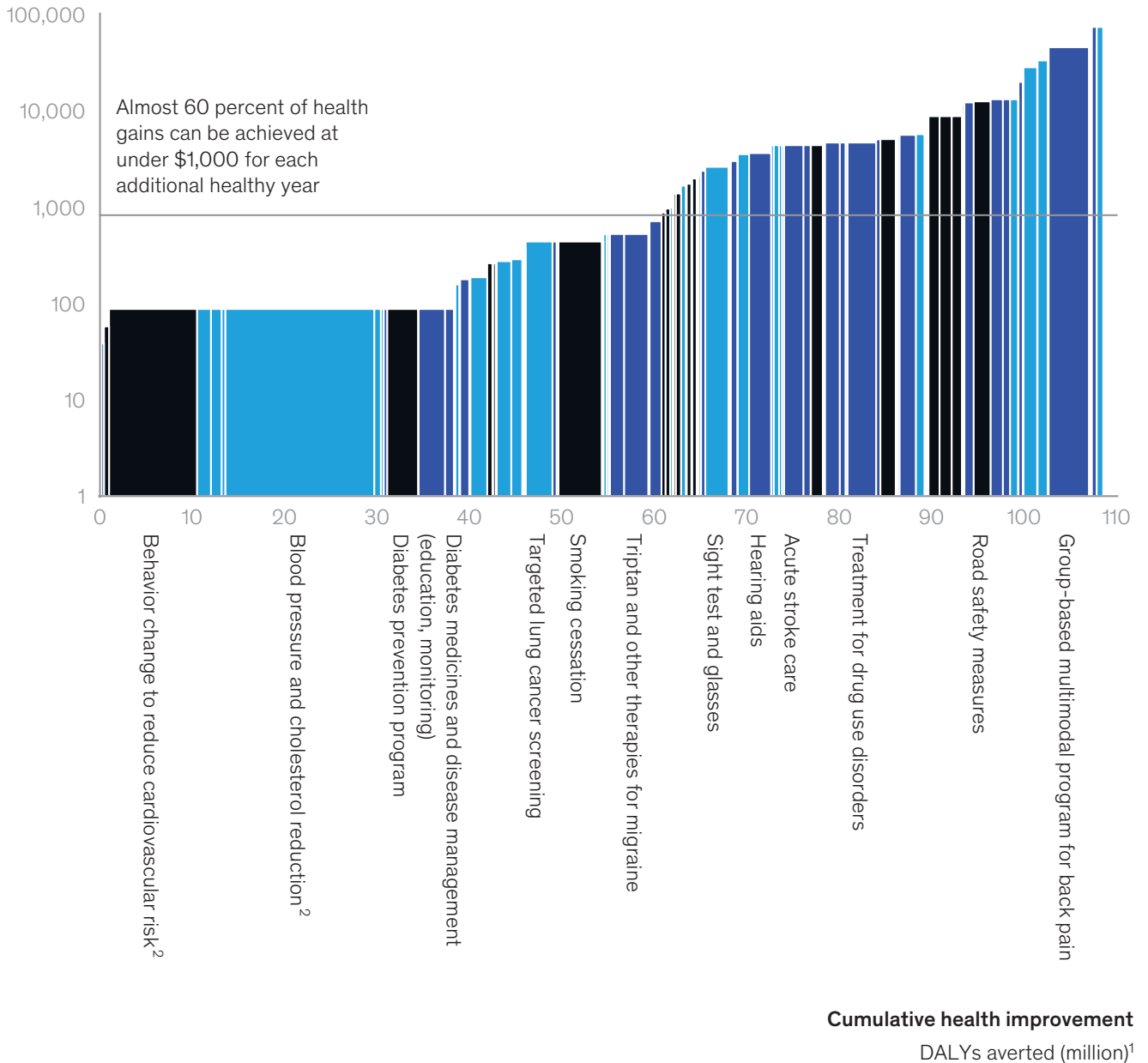
## In high-income countries, cardiovascular disease prevention and smoking cessation have the most potential to improve health.

High-income countries

■ Environmental, social, and behavioral   ■ Prevention and health promotion   ■ Therapeutic

### Cost-effectiveness

Cost per DALY averted (\$, log scale)<sup>1</sup>



1. DALY = disability-adjusted life year.

2. Pharmacological prevention of cardiovascular disease includes use of antihypertensives and statins (and/or other cholesterol-lowering medicines). Cardiovascular lifestyle education includes physical activity, diet, smoking cessation, and alleviation of other risks. These interventions are delivered as a combined program.

Note: Interventions are ordered in ascending order of cost for every healthy life year. The higher the disease burden reduction potential, the larger the width under each intervention.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; WHO, *Updated Appendix 3 of the WHO global NCD action plan 2013–2020*, April 2017; “Disease Control Priorities 3 (DCP-3): Economic evaluation for health,” University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

the greatest combination of unmet need, biological understanding of the disease pathway, and the effort and excitement surrounding each, measured by funding. While identifying and sizing the potential scope of innovations in the pipeline is inherently difficult, we estimate that these technologies have the potential to reduce the disease burden by a further 6 to 10 percent, on top of the 40 percent from known interventions, assuming aspirational yet realistic adoption rates by 2040. Not only could some of these innovations be fully curative for some diseases, but by tackling the underlying biology of aging, they could significantly extend healthy lifespan by postponing the onset of several age-related conditions. This contrasts with innovations of the past 30 years, many of which reduced symptoms or delayed disease progression while prevention and cures were rare. Additionally, the innovations we have identified here are more digitally enabled than in the past. As an example, artificial intelligence (AI) systems make advances in omics and molecular technologies, such as gene editing, faster and more accurate.<sup>34</sup>

Realizing these innovations will require continual investment in research and development across pharmaceutical companies, medical and other technology companies, and academia.

### **Better health could add \$12 trillion to global GDP in 2040, far more than implementation costs**

# 245M

more people employed by 2040

Often healthcare discussions tend to focus on older cohorts. However, almost 70 percent of health improvements we identify accrue to the global population under 70 years of age. This would in turn increase the size and productivity of the labor force, boosting annual GDP growth globally by 0.4 percent every year over the next two decades. These benefits generate an estimated economic benefit of \$2 to \$4 for each \$1 invested in improving the health of the global population. That is before accounting for the additional value unlocked by forthcoming innovations or the broader social benefits to individuals, families, and communities.

### **A larger, healthier, and more productive labor force could counter demographic headwinds and boost global growth**

The economic benefits from the health improvements we size are substantial enough to add \$12 trillion or 8 percent to global GDP in 2040 (Exhibit E7). These benefits arise through the labor market, both by expanding future employment through fewer early deaths, fewer health conditions, and higher labor force participation of healthier people and through the productivity gains achievable by workers who are physically and cognitively healthier.

By 2040, 245 million more people could be employed. About 60 million of them would have avoided early death from cardiovascular disease, cancers, malaria, and other causes, adding \$1.4 trillion to 2040 GDP. Addressing mental health disorders, diabetes, or other conditions would no longer be a barrier to joining the labor force, for an equivalent of about 120 million full-time workers contributing an additional \$4.2 trillion. Another \$4.1 trillion could be unlocked by expanding labor force participation among three groups: older populations for whom better health can be an opportunity to work longer (about 40 million people), informal caregivers who no longer need to care for loved ones (12 million people), and people with disabilities who can go to work because workplaces adapted to accommodate their needs (eight million people).

Lastly, improving health could drive up productivity and lift GDP by as much as \$2.0 trillion by reducing presenteeism from chronic conditions such as low back pain, but also through investing in childhood nutrition, which improves the cognitive and physical health of the future workforce. Just addressing adolescents' mental and behavioral health issues, which affect about 60 million young people globally, could unlock \$600 billion by 2040 through raising their educational attainment and earnings potential.

<sup>34</sup> *The Bio Revolution: Innovations transforming economies, societies, and our lives*, McKinsey Global Institute, May 2020.



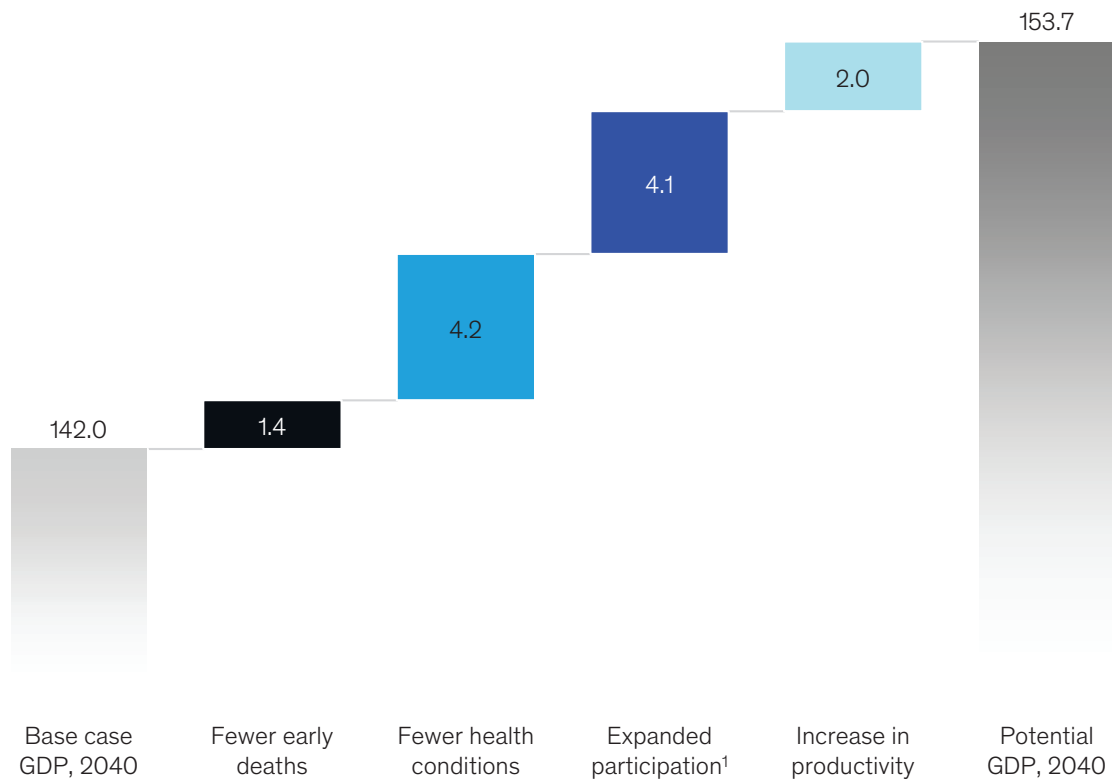
## We have identified ten promising technology categories.

Technology category	Example technology
<p><b>Omics and molecular technologies</b></p> <p>A medicine or diagnostic created by harnessing the power of molecules at a subcellular level; includes genome editing and proteomics</p>	<p> <b>CRISPR and curbing malaria</b></p> <p>Genetic modification of malaria-carrying mosquitoes using gene-editing technologies (eg, CRISPR); may potentially enable significant disease reduction by propagating the modified genes across the mosquito population</p>
<p><b>Next-generation pharmaceutical</b></p> <p>Newer iterations of traditional chemical compounds (small molecules) and classes of molecules used as medicinal drugs, possibly with multiple and concurrent target structures</p>	<p> <b>Senolytics and regulation of cellular aging</b></p> <p>Senolytics (a class of small molecules) may decrease or eliminate aging cells that can cause cellular inflammation, dysfunction, and tissue damage; has implications for delaying the occurrence of age-related diseases</p>
<p><b>Cellular therapy and regenerative medicine</b></p> <p><i>Cellular therapy</i>—a biological product, derived from living cells, used for therapeutic purposes to replace or repair damaged cells and/or tissue</p> <p><i>Regenerative medicine</i>—a therapy with the power to restore diseased and/or injured tissues and organs, potentially decreasing reliance on transplantation</p>	<p> <b>CAR T-cell therapy and treatment of solid tumors</b></p> <p>CAR T-cell therapy reprograms a patient's T-cells (immune system cells) against tumor cells; when infused into the patient, the T-cells bind to an antigen on tumor cells, attacking and destroying them</p>
<p><b>Innovative vaccines</b></p> <p>Substances that stimulate the immune system to respond to and destroy a bacterium, or virus; historically, vaccines have eradicated and/or controlled the spread of a number of infectious diseases around the world, and in the future, they may be used to target noncommunicable diseases (eg, cancer)</p>	<p> <b>The AT04A vaccine and the lowering of cholesterol</b></p> <p>AT04A is a vaccine made up of molecules that bind to blood cholesterol and degrade it; vaccination would be required only once a year, potentially improving outcomes</p>
<p><b>Advanced surgical procedures</b></p> <p>Advances in the treatment of injuries or disorders with minimally invasive incisions and/or small instruments, including robotic surgery; also includes any technique that improves surgery-related processes outside the operating room</p>	<p> <b>Suspended animation for severe trauma patients</b></p> <p>A cold saline solution could be injected in the first contact with the patient to cool the body to 10–15°C and stop its function, allowing time for surgeons to operate before resuscitating the patient</p>
<p><b>Connected and cognitive devices</b></p> <p>Portable, wearable, ingestible, and/or implantable devices that can monitor health and fitness information, engage patients and their community of caregivers, and deliver self-regulated therapies autonomously</p>	<p> <b>E-tattoos for heart diagnostics</b></p> <p>Ultra-thin e-tattoos can provide longer periods of heart monitoring and increase patient comfort while providing a wider range of data to enhance clinical decision making</p>
<p><b>Electroceuticals</b></p> <p>Small therapeutic agents that target the neural circuits of organs; therapy involves the mapping of neural circuitry with neural impulses (administered via an implantable device) delivered to these specific targets</p>	<p> <b>Implantable microchips and the mitigation of chronic pain</b></p> <p>Spinal cord stimulation can improve patient quality of life, allowing increased mobility, enhanced sleep, and reduced need for pain medication</p>
<p><b>Robotics and prosthetics</b></p> <p>A wide variety of programmable, self-controlled devices consisting of electronic, electrical, or mechanical units and artificial substitutes or replacements for a part of the body</p>	<p> <b>Next-generation exoskeletons and mobility support</b></p> <p>Next-generation exoskeletons, powered by small motors that mimic human muscles, could allow older patients to recover their autonomy while reducing the likelihood of accidents and falls</p>
<p><b>Digital therapeutics</b></p> <p>Preventive and therapeutic evidence-based interventions driven by software for a broad spectrum of physical, mental, and behavioral conditions</p>	<p> <b>AI-powered app to enable behavior change</b></p> <p>Digital therapeutics powered by AI, patient data, and behavioral science can help patients adopt and sustain health behaviors through gamification and other forms of engagement</p>
<p><b>Tech-enabled care delivery</b></p> <p>Technology-enabled care delivery that incorporates new and larger data sets, applies new analytics capabilities to determine insights, and applies those insights to providers and patients to improve care outcomes, experience, and efficiency</p>	<p> <b>Multichannel care delivery</b></p> <p>Multichannel care delivery using online platforms may facilitate data sharing and improve treatment efficiency; particularly relevant for chronic diseases like diabetes where the patient's glucose levels and other vital signs are continuously shared with the specialist</p>

Source: McKinsey Global Institute analysis

**Global GDP could rise by about \$12 trillion in 2040, an 8 percent increase, mainly from fewer health conditions and expanded participation in the labor force.**

**GDP, 2040**  
\$ trillion



**Annual growth rate, 2020–40**

**2.6%**

**3.0%**

1. Includes impact on older adults (only high- and upper-middle-income countries), informal caregivers (only in OECD), and people with disabilities (global).

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; OECD; Eurostat; National Transfer Accounts project; McKinsey Global Institute analysis

The expansion of the labor supply in the healthy growth scenario could add 0.3 percent to global employment growth. One-fifth of the new labor market entrants would be in high-income economies, where this expansion could fully counter the projected slowdown in labor force growth. The rest, 80 percent, would improve health and increase the labor force in low- and middle-income countries.<sup>35</sup> (See Box E3, “Variations in the disease burden and labor market structures determine health opportunities for individual countries.”)

Because preventive health benefits—about 70 percent of the untapped opportunity we identify—tend to accrue and pay off over a lifetime, the benefits would continue to rise beyond 2040. The health impact from innovations would also take time to flow through but could contribute an additional \$5 trillion to annual GDP after 2040.

<sup>35</sup> In many low- and middle-income economies, populations are younger but suffer from more health conditions and have higher rates of premature mortality. This means that health benefits accrue to younger cohorts with longer economically active lives ahead. However, realizing this economic potential depends on additional factors, including access to education, and capital for investment and infrastructure to create high-value employment opportunities. We recognize that this is a challenge in many parts of the world.

## **The social benefits of improved health far exceed the economic benefits, estimated to be approximately \$100 trillion by 2040**

Ill health diminishes the ability to enjoy life and all that it has to offer, creating a physical, emotional, and financial burden for individuals, families, dependents, and caregivers. Beyond working, better health would give people the freedom to spend their leisure time on what they want to do most. This includes older people, many of whom may choose to give back to society in other ways after retirement. We estimate that having a healthier population aged 65 and up could add \$20 billion to \$30 billion in value to societies in 2040 through volunteering alone. Our GDP estimates do not capture the benefits of volunteering, stronger social relationships, and happier retirees, all factors that would further help transition to a healthier growth path by helping maintain better health.

# \$100T

worth of social benefits from  
better health

While more challenging to value in dollars, we estimate the social benefits from improved health by applying the approach used in economics to measure welfare.<sup>36</sup> We estimate the total combined value of deaths averted and reduced ill health could reach \$100 trillion without adjustments for income levels—eight times the estimated GDP benefits.<sup>37</sup> This number is so high because people typically value good health above everything else. Improving health could also help narrow health disparities within countries and across countries. This in turn could contribute to reducing income inequality within countries and strengthening the social contract.<sup>38</sup>

## **Viewed on a cost-benefit basis, focusing on known health improvements could deliver an incremental economic benefit of \$2 to \$4 for each \$1 invested**

The economic and welfare benefits we have estimated far exceed the implementation costs of achieving this level of health improvement, delivering a GDP uplift of \$2 to \$4 for each \$1 invested over 20 years (Exhibit E9).<sup>39</sup> Realizing the benefits would mean shifting spending to prevention.<sup>40</sup> Prevention of diseases usually is less expensive than treatment and reduces the need for more expensive treatment later on, contributing to a high economic return. Shifting incremental spending to prevention would not be simple, however, because it requires substantial changes in where and how healthcare is delivered, as well as changes to communities that would help individuals grow up, work, and age in healthy ways. It is important to note that our economic analysis should not be interpreted as calling for additional funding for healthcare as currently delivered, but as an alternative approach under which health needs are addressed early, with proven, effective, typically lower-cost approaches.

A key question is what this transition would cost in different countries. The answer varies by region. In developed countries with established healthcare systems, the benefits of shifting from treatment to prevention are high and the incremental costs low. Even a moderate improvement in healthcare delivery efficiency could more than pay for the additional spending required. Researchers find opportunities in all countries to reduce healthcare delivery costs by up to 22 percent from today's levels through higher productivity. This includes standardizing operational processes in clinical and nonclinical areas, transitioning to lower-intensity settings of care where appropriate, addressing unnecessary duplication of services, reducing medical errors, avoiding clinically ineffective activity, and increasing levels

<sup>36</sup> Many economists, including the members of the Lancet Commission on Investing in Health, quantify the financial value of welfare or societal benefits by measuring "inclusive income" on the basis of "willingness to pay" for health gains. This value is typically determined by surveys using monetary and health trade-offs. For more details, see Dean Jamison et al., *Investing in health: The economic case: Report of the WISH Investing in Health Forum 2016*, World Innovation Summit for Health (WISH), 2016.

<sup>37</sup> This analysis uses a single global value per additional healthy life year. See chapter 4 and the technical appendix for more details.

<sup>38</sup> *The social contract in the 21st century: Outcomes so far for workers, consumers, and savers in advanced economies*, McKinsey Global Institute, February 2020.

<sup>39</sup> Positive economic return does not mean all countries can afford the initial investment required; the full benefits of preventive interventions can take years to realize and require a societal perspective, because the returns are accrued across society and not directly to the initial investor. We look at transition costs in more detail in chapter 4.

<sup>40</sup> Our analysis focuses on the incremental healthcare expenditure required to transition to the healthy growth scenario, not overall healthcare spending pattern changes. Our analysis suggests that to achieve the healthy growth scenario, the majority of new investment should be allocated to prevention, including environmental, social, and behavioral interventions, as well as promotion of prevention and health. This would suggest an overall rebalancing in favor of greater spending on prevention, but we have not assessed overall allocations (across total healthcare expenditure), which vary by healthcare system depending on current baseline spending allocation, levels of unmet need, and other factors.

## Variations in health outcomes and labor market structures determine economic opportunities for individual countries

A larger and healthier labor force translates into substantial economic benefits across all countries. Yet underlying differences in the health outcomes and labor market structure shape the opportunities individual countries have to capture those economic benefits (Exhibit E8). Highlights from the patterns we observed include:

In the **United States and Canada**, significant opportunity comes from reducing obesity-related conditions and substance use disorders. Mortality rates for substance use disorders, for example, are six times higher in the United States than in Western Europe. Addressing low back pain, migraines, and mental health disorders is also a large opportunity in the United States, Australasia, and Western Europe. In **Western Europe**, broadening the opportunities for people to remain in the labor force provides the biggest boost to GDP because the effective retirement age remains low in many countries.<sup>1</sup>

In **Eastern Europe and Central Asia**, one of the biggest opportunities lies in averting premature deaths from ischemic heart diseases and stroke, both of which occur at higher rates than in Western Europe. Controlling high rates of excess alcohol use and smoking could reduce the risk of developing several of these conditions as well as lung and liver illnesses.<sup>2</sup>

In **East Asia**, cardiovascular disease is a big and growing killer, linked to changing diets and lifestyles. Averting deaths from chronic obstructive pulmonary disease will have a major impact in coming decades. Increases in chronic lung conditions are mainly linked to higher rates of smoking and indoor and outdoor air pollution in Asian countries.<sup>3</sup>

In **Latin America**, opportunities come from preventing and treating cardiovascular disease as well as reducing low back pain and vision impairment. The prevalence of blindness is much higher in Latin America than in the United States. Researchers estimate that 43 to 88 percent of blindness in Latin America is caused by cataract and refractive errors that could be curable.<sup>4</sup>

In **South Asia and sub-Saharan Africa**, investing in child health today would have a significant payoff in the future. Sub-Saharan Africa would have 3.3 million more young adults alive by 2040 if the health of children were improved with better childbirth practices, treatment of lower respiratory diseases, and prevention of diarrhea and malaria, among others.

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<sup>1</sup> As people in middle age become healthier, they may choose to stay in the workforce longer. We size the economic potential impact if the labor force participation of people between 65 and 69 would increase to current levels of labor force participation of people between 60 and 64 today.

<sup>2</sup> Elizabeth Wilkins et al., *European cardiovascular disease statistics 2017*, European Heart Network, February 2017.

<sup>3</sup> Wan C. Tan and Tze P. Ng, "COPD in Asia: Where East meets West," *Chest*, February 2008, Volume 133, Issue 2.

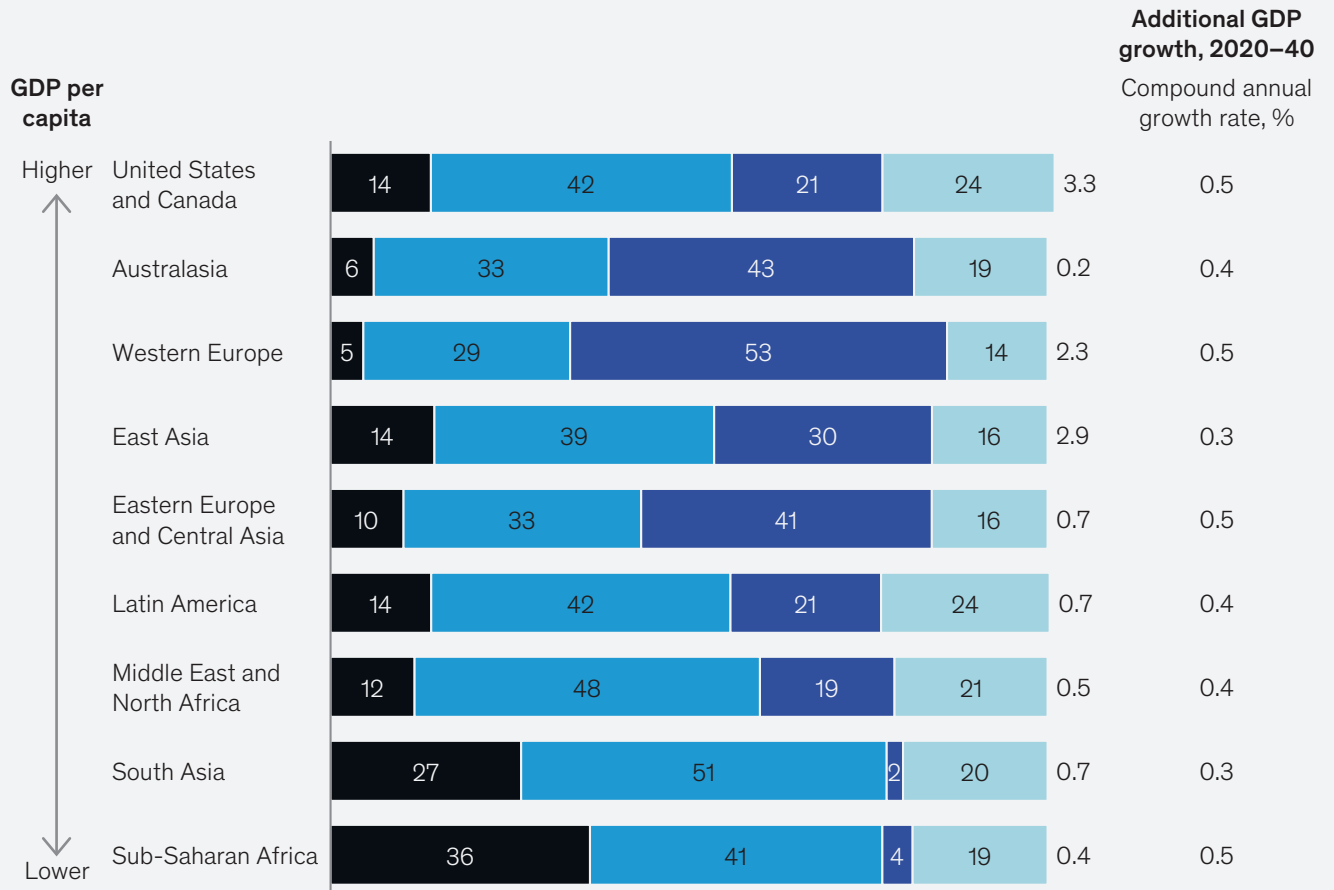
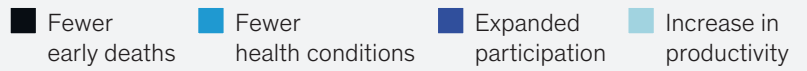
<sup>4</sup> Hans Limburg et al., "Review of recent surveys on blindness and visual impairment in Latin America," *British Journal of Ophthalmology*, March 2008, Volume 92, Issue 3.

**Across regions, the economic benefits of better health are driven by differences in the underlying disease burden and labor market structures of countries.**

**GDP impact breakdown, 2040**

Healthy growth scenario

%; \$ trillion



Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; OECD; Eurostat; National Transfer Accounts project; McKinsey Global Institute analysis

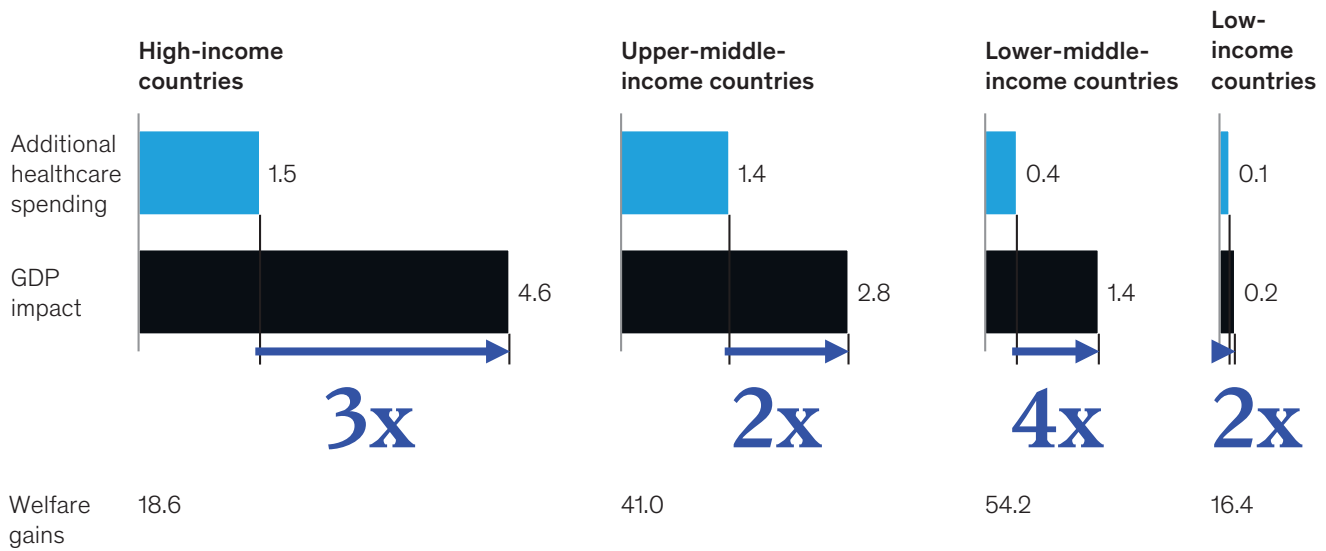
of digitization. Longer term, greater use of automation and artificial intelligence could also increase productivity. In the lowest-income countries, costs are relatively higher than in lower-middle-income countries due to limitations of existing health infrastructure and services. In low-income countries, we estimate that the additional spending required would be about two percentage points of GDP.<sup>41</sup>

Exhibit E9

**For each \$1 invested in improving health, an economic return of \$2 to \$4 is possible.**

**Healthy growth scenario, 2040**

\$ trillion



Note: Snapshot view of the healthy growth scenario in 2040. Additional healthcare spending, GDP impact, and welfare gains directly attributable to better health only (excluding expanded participation).  
 Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; National Transfer Accounts project; WHO, *Updated Appendix 3 of the WHO global NCD action plan 2013–2020*, April 2017; “Disease Control Priorities 3 (DCP-3): Economic evaluation for health,” University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

**Realizing the health opportunity would require a pivot to prevention within healthcare systems and societies more broadly**

Capturing the benefits that we identify in this report would require a focus that extends beyond what we typically think of as healthcare. That means it would necessitate change by governments and regional authorities, companies, innovators, and communities to shape environments and societies in ways that promote healthy lives and capture the societal and economic benefits we size. The COVID-19 pandemic provides a unique moment to engage governments, companies, and communities around the world in this endeavor. The pandemic has exposed deep vulnerabilities in healthcare systems, supply chains, and social structures, and vast inequities that need to be addressed. As societies emerge from the immediate crisis, we can aspire to do more than plug gaps and hope for recovery. We can build a better healthcare system and a stronger, more resilient global economy that delivers better health for all and shared prosperity for decades to come. To help realize that opportunity, we identify four imperatives: make healthy growth a social and economic priority; keep health on everyone’s agenda; transform healthcare systems; and double down on innovation in therapeutics and beyond.

<sup>41</sup> This estimate assumes that the health services would be provided at the state-of-the-art efficiency and productivity, with costs per unit of activity 22 percent lower than they are today in real terms.



Each of these imperatives should be tailored to specific cohorts. For example, cutting across all these imperatives is the need to rethink aging. While many countries are already experiencing rapid aging in their populations, this will only increase as health outcomes improve. This older, healthier cohort will contribute positively to societies and economies in many ways, as active citizens, family members, consumers, volunteers, and, for some, workers and entrepreneurs. Globally, the boost to consumption in 2040 from healthier people living longer could be some \$1.8 trillion. It will be necessary to consider how to adapt environments, housing and living arrangements, workplaces, and recreational facilities for an older population.

Highlights of these four imperatives include:

1. **Make healthy growth a social and economic priority.** Our analysis shows that investing in health can be a critical lever for future growth and an important part of the economic policy debate. Instead of thinking of health as a cost to manage, focusing on health as an investment can deliver significant social and economic returns. Governments around the world are in the driver's seat and should consider developing and delivering healthy life agendas, including labor market and employment policies, that deliver both health and economic benefits. Imperatives include the following:

**\$1.8T**

boost to consumption in 2040

- **Develop and deliver an integrated healthy life agenda.** As governments lead their citizens out of the COVID-19 pandemic, they have an opportunity to integrate health into decision making in all policy areas. For example, they can harmonize investments, incentives, and services in public health, physical and mental health, education, labor, research and development, and social services. In parallel, governments may need to work more closely with the tech sector to integrate and embed robust data and advanced analytics into health monitoring, policy development, and decision making.
- **Prioritize rethinking labor and employment policies.** Ensuring that individuals can work in an environment that maximizes their physical and mental health would go a long way toward realizing the health benefits we size. This might include broadening opportunities for people with disabilities and encouraging the participation of older workers in the labor force by addressing work discrimination and financial disincentives to extend working lives. Promoting a safe work environment to better match the physical and behavioral health needs of workers would also be key.

2. **Keep health on everyone's agenda.** The COVID-19 pandemic forced health onto the agenda of every organization and every household around the world. Keeping it there can deliver significant benefits. Long-term prevention and health promotion, which encompasses more than 70 percent of the benefits we identified, cannot simply be left to healthcare providers or healthcare systems. It is quite literally everybody's business. Some examples of steps to consider include:

- **Advance healthy communities.** Too few people today live in communities where making healthy choices is an affordable or achievable option. Policies promoting healthy environments and behaviors can make a difference, for example by ensuring clean water and sanitation, building affordable housing, improving road safety, encouraging physical activity, and making children's health a priority in schools. Companies have a role to play, too. By acknowledging, monitoring, and improving their organizational health footprint, companies can make a positive impact on the communities they operate in.
- **Advance healthy and inclusive workplaces.** To take advantage of the health opportunities, employers can invest more fully in the health and wellness of a diverse set of employees. Some focus areas to consider include occupational health and safety and providing health education, incentives for healthy behaviors, and fitness and medical services, while ensuring preparedness and employee protection in times of heightened health risk. Companies could also adapt workplaces to draw on the entire labor force. This includes providing policies, assistive technologies, and training, and creating a culture that addresses discrimination in order to attract and retain older workers and people with disabilities. A workplace that introduces flexible working for people with

caring responsibilities and policies that support transitions/reentry into the formal labor force could help informal caregivers to stay in work.

3. **Transform healthcare systems.** The COVID-19 pandemic has exposed vulnerabilities in healthcare systems everywhere. Taking the opportunity to strengthen and reimagine systems may not only ensure better preparation for future crises but also deliver healthcare more effectively. The challenge is making and sustaining changes that shift to preventive health while ensuring resilience and flexibility. This will involve high-quality and holistic primary care and services that address behavioral and social health needs, like housing, deploying a broader range of delivery channels to reach people when and where they are most likely to benefit. The current incentives in many healthcare systems and organizations are not sufficient to ensure this transition and require a fundamental reassessment. Some examples of steps that could be considered include:

- **Reorient and strengthen the healthcare system.** Governments are facing immediate needs for addressing weaknesses in supply chains, information sharing, coordination, and planning. But they can do much more in the process to ensure that the most effective proven interventions are available to all who could benefit. In low-income countries, this could mean developing an adaptable and community-focused healthcare infrastructure to broaden access and ensure that the most effective interventions are available at scale. High-income countries may need to reorient infrastructure toward primary and community care, addressing social determinants of poor health, and improving access for underserved communities. In many cases, this could mean revisiting incentives to encourage the adoption of more effective care. For example, closer collaboration between pharmaceutical and medical technology companies, payers, and providers could help achieve the necessary pivot to prevention and community healthcare and scaling of the most effective interventions.
- **Introduce next-generation healthcare delivery.** Providers and healthcare systems leaders could help rebuild and reimagine healthcare systems by embedding innovations and productivity improvements—some of which the COVID-19 pandemic has already catalyzed—and promoting infrastructure that is more community based, holistic, and tech-enabled. Payers can consider encouraging more innovative care delivery through closer connection with healthcare providers and engaging members through digital and virtual channels (building on many successful experiments from the crisis).

4. **Double down on innovation.** As the world awaits a vaccine or an effective treatment for COVID-19, the vital role that innovation plays for health and the global economy could not be more evident. Innovations will continue to be critical to improving the health of the world's population. Today a little over a half of the \$300 billion in global R&D spending on healthcare comes from the private sector.<sup>42</sup> Promising innovations include genomics to deliver more targeted prevention and treatment; data science and AI to detect and monitor disease and enhance research; tech-enabled delivery to expand and reimagine access; and advances in the understanding of the biology of aging. However, realizing the full potential of the innovation pipeline may require shifting economic incentives to reward the areas with greatest need and highest return. Steps that could be considered include:

- **Expand and align research and innovation with societal priorities.** We find that the level of research effort for some disease areas—for example, mental and neurological disorders, cardiovascular disease, and communicable diseases—is considerably lower than their disease burden. Treatment for established disease is more likely to be reimbursed by insurers and is rewarded much more than health promotion, preventive care, or early intervention. As a result, potentially transformative innovations for preventive interventions can be difficult to monetize. This thinking flows through to the research agenda, where the economic case for investing in prevention and health promotion is often challenging. Intensifying research in areas with large unmet needs,

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<sup>42</sup> Parexel *Biopharmaceutical R&D Statistical Sourcebook 2017/2018*, Barnett International, 2019.

how to sustain behavioral change, healthcare delivery to boost access, and creating innovative funding models can help.

- **Build more collaborative and effective approaches to R&D.** Accelerated and collaborative ways of working, developed in the heat of the COVID-19 crisis, could be sustained and focused to drive R&D investment, expand innovation in other areas with unmet needs, and develop more effective preventive actions. This may require governments, academic institutions, and philanthropic organizations to reassess their research agendas. Multiple-stakeholder partnerships, streamlining R&D processes, and harmonizing regulatory environments can help. Expanding efforts to reduce the time delay—often of a decade or more—that too often exists between transformative innovations reaching high-income markets and their availability in all regions could be important, too.

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Realizing the healthy growth opportunity that we size in this report requires a coordinated effort by all stakeholders—governments, companies, and health institutions—to promote change within healthcare systems and beyond. But today, in the face of the COVID-19 pandemic, a unique opportunity to do just that has emerged. The benefits would be large: a \$12 trillion economic opportunity, hundreds of millions of lives saved, and better health in the global population. Could there be a more important objective than making the world both healthier and more prosperous?

**As societies emerge from the immediate crisis, we can aspire to do more than plug gaps and hope for recovery. We can build a better healthcare system and a stronger, more resilient global economy that delivers better health for all and shared prosperity for decades to come.**





# 1. A catalyst for growth

In a typical year, poor health takes a heavy personal and economic toll globally. An average person of working age loses the equivalent of 43 days a year to poor health.<sup>43</sup> Each year, over 17 million people die prematurely, mostly from cardiovascular disease and cancers, cutting short their productive potential.<sup>44</sup> More than 250 million children face nutritional deficiencies, often hindering their physical and cognitive development.<sup>45</sup> In the United States, depression affects 6 percent of workers, who lose an average of four productive hours out of each workweek.<sup>46</sup> HIV/AIDS has plagued a large part of Africa, with rising deaths among workers in industries such as mining in Southern and Eastern Africa. Pandemics and other health shocks impose additional costs that can be immense, as the novel coronavirus has shown. However, even a health shock on the scale of the COVID-19 crisis is not as large as the cumulative daily death toll of avoidable poor health. Every day, lives are lost prematurely and individuals' ability to fully participate in society and the economy is hampered by poor health.

# 250M

children face nutritional deficiencies

Yet history shows that the opposite is also true. Health improvements resulting from vaccines, antibiotics, sanitation, and nutrition, among other advances, have been a powerful catalyst for economic growth by expanding the labor force, leading to higher productivity and consumption as well as delivering immense social benefits. In this chapter, we lay out the economic case for improving the health of the world's population, not only to tackle COVID-19 but to fuel economic growth and prosperity over the coming decades.

## The economic case for investing in better health starts with the labor force

Health has long been recognized as a crucial determinant of well-being and a basic human right.<sup>47</sup> However, the economic case for investing in better health is rarely made. When economists examine economic growth, they typically focus on the role of inputs, such as labor and capital, and how efficiently those inputs are used. They often omit the factors that determine the quality of those inputs (with education of workers being a notable exception). In the case of labor, another major determinant is health. Better health has been a critically important enabler of global growth over the past century by catalyzing labor force growth and rising productivity.

## Improved health has contributed significantly to global GDP growth over the past century, but large disparities remain between emerging and mature economies

Over the past century, improved hygiene, better nutrition, antibiotics, and vaccines have contributed to tremendous progress in global health. Recent innovations have led to dramatic improvements in survival rates for people with cancer, heart disease, and stroke in many countries.<sup>48</sup> These medical advances and improvements in public health extended lives

<sup>43</sup> This takes into account the overall burden of poor health and premature mortality in the working-age population—defined as people aged 15 to 64—including those unable to work, or working part time, on account of their health needs. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>44</sup> Defined as deaths in people aged <70 years from noncommunicable diseases. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>45</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>46</sup> Donna Allen et al., "Four-year review of presenteeism data among employees of a large United States health care system: A retrospective prevalence study," *Human Resources for Health*, November 2018, Volume 16, Issue 1.

<sup>47</sup> See *The Alma-Ata declaration*, WHO, 1978, and *World Development Report 1993: Investing in Health*, World Bank, New York, NY: Oxford University Press, 1993.

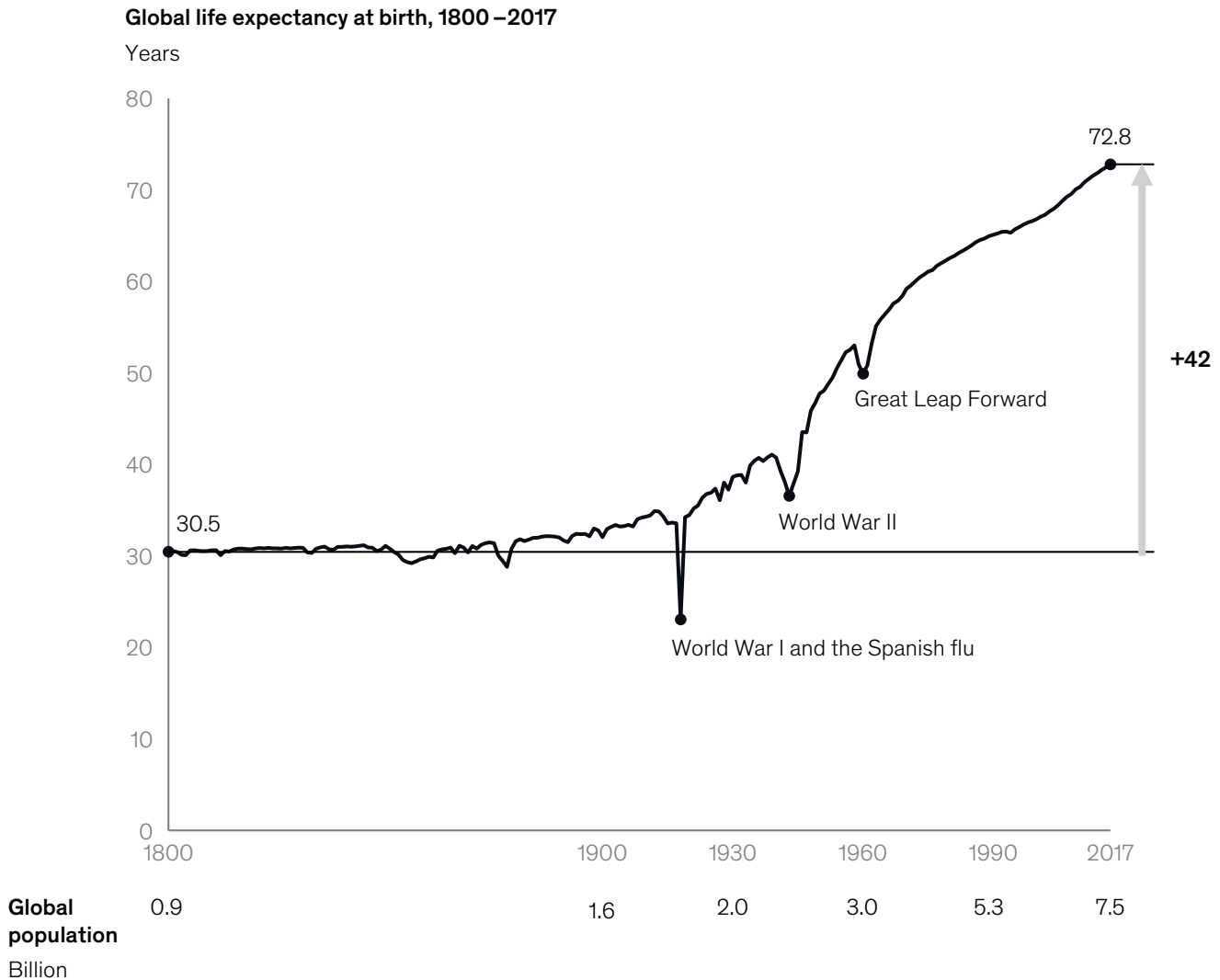
<sup>48</sup> See, for example, George A. Mensah et al., "Decline in cardiovascular mortality: Possible causes and implications," *Circulation Research*, January 2017, Volume 120, Issue 2; Melina Arnold et al., "Progress in cancer survival, mortality, and incidence in seven high-income countries 1995–2014 (ICBP SURVMARK-2): A population-based study," *The Lancet Oncology*, November 2019, Volume 20, Number 11, pp. 1493–505; Malcolm A. Smith et al., "Declining childhood and adolescent cancer mortality," *Cancer*, August 2014, Volume 120.

and improved quality of life, contributing to the rapid expansion of the global labor force in the second half of the 20th century. Life expectancy increased by almost 2.5 times between 1800 and 2017, from just over 30 years to 73 years (Exhibit 1).

Improving the health of populations has enabled economic growth that resulted from increasing the size of the labor force and from enhancing the productivity of labor (see Box 1, “What economic research says about health and growth”). As countries have grown richer, they have invested in better food and safer environments, typically creating a virtuous cycle connecting health and higher income.

Exhibit 1

**As health improved in the 20th century, life expectancy more than doubled and the global labor force expanded.**



Source: Gapminder.org; McKinsey Global Institute analysis

Countries are at different stages of economic development and as a result experience different health outcomes.<sup>49</sup> It is well established that population health is highly correlated with per capita income levels, and a considerable gap in life expectancy and other health measures separates low- and high-income countries (Exhibit 2).<sup>50</sup>

<sup>49</sup> We use the World Bank classification of countries by income. The categories, based on GNI per capita, are low income, lower-middle income, upper-middle income, and high income. Afghanistan and Ethiopia are examples of low-income countries, while India and Kenya are examples of lower-middle-income countries. China and Brazil are the largest upper-middle-income countries, and the United States, Japan, and all countries in Western Europe are examples of high-income countries.

<sup>50</sup> Samuel H. Preston, “The changing relation between mortality and level of economic development,” *Population Studies*, July 1975, Volume 29, Issue 2.



## What economic research says about health and growth

Prior to the COVID-19 pandemic, health was largely absent from mainstream debates about economic growth or pro-growth policy. Yet the correlation between better health and higher income has been well established across and within countries as well as over time as countries develop. In the field of economic development, health became recognized as a critical aspect of policy with the publication of seminal reports by the World Bank in 1993 and the World Health Organization's Commission on Macroeconomics and Health in 2001.<sup>1</sup>

Although economists have researched the topic, clarity is lacking about how health and economic growth interact.<sup>2</sup> Arora and Fogel studied the role of health during the earlier stages of development in today's high-income countries.<sup>3</sup> Their estimates suggest that health accounted for about one-third of the overall GDP per capita growth in the past century, as fewer people suffered from childhood diseases, sufficient calories made people stronger and more able to work and be productive, and parents were more likely to invest in educating their children because they were more likely to live into adulthood.<sup>4</sup> Using a welfare measure that values both income

and health, Nordhaus estimated that in the United States, improvements in longevity over the 20th century contributed as much to individual well-being as did the increase in consumption of all goods and services.<sup>5</sup> Extensive research by Bloom et al. has also found a positive economic impact of improved health; they estimate that a one-year improvement in the population's life expectancy contributes a 4 percent increase in output.<sup>6</sup> Jamison et al. analyzed growth rates in 50 countries from 1965 to 1990 and found that better health contributed 11 percent of income growth overall. Investment in physical capital accounted for 67 percent and improved education for 14 percent.<sup>7</sup>

These estimates should be considered directionally indicative of the importance of health for economic growth rather than exact estimates for two reasons. First, the bidirectional relationship between better health and rising incomes makes it difficult to identify specific parameters. Healthier populations produce more output and have more resources to further improve health, creating a virtuous cycle, so trying to separate the two is inherently challenging. Furthermore, the economic gains from healthier populations

depend on other factors that matter for economic development, such as institutions and access to capital, which are hard to fully account for in an estimation.<sup>8</sup> Second, the relationship evolves with economic development and thus is not constant over time. In early stages of development, improved sanitation and nutrition boost labor force growth and workers' physical strength, while later on, what often matters more are the productivity benefits achievable because cognitively better prepared cohorts are able to learn more through education and training. In recent decades, health gains in high-income economies have accrued disproportionately to older people who may be retired and contribute to society in ways other than their direct labor market impact.

Health has not typically been part of economic growth discussions, especially in developed countries where the recent debate has revolved around the cost of healthcare, with a few exceptions.<sup>9</sup> We hope that this report contributes to a greater understanding of the many ways in which health influences the economy and that it encourages further research into the link between health and economic prosperity.

<sup>1</sup> *World Development Report 1993: Investing in Health*, World Bank, New York, NY: Oxford University Press, 1993; *Macroeconomics and health: Investing in health for economic development: Report of the Commission on Macroeconomics and Health*, World Health Organization, 2001. At the 20th anniversary of the 1993 report, the Lancet Commission on Global Health 2035 examined progress in health and economic development over the prior two decades and revisited the implications for investing in health in low- and middle-income countries. Dean T. Jamison et al., "Global health 2035: A world converging within a generation," *The Lancet*, December 2013, Volume 382, Issue 9908.

<sup>2</sup> For a synthesis of the early research, see Michael Spence and Maureen Lewis, eds., *Health and growth: Commission on Growth and Development*, World Bank, 2009. For a synthesis that includes more recent research, see David E. Bloom, Michael Kuhn, and Klaus Prettner, *Health and economic growth*, IZA Institute of Labor Economics discussion paper number 11939, November 2018.

<sup>3</sup> Arora examined the relationship between health and economic growth in ten industrialized countries from the 1880s to the 1990s. Suchit Arora, "Health, human productivity, and long-term economic growth," *Journal of Economic History*, September 2001, Volume 61, Issue 3. Fogel examined the impact of improved health and nutrition in Great Britain over two centuries. Robert W. Fogel, "Health, nutrition, and economic growth," *Economic Development and Cultural Change*, April 2004, Volume 52, Issue 3.

<sup>4</sup> Improvements in children's and women's health led to declining fertility and more investments in nutrition and education for each child in smaller households. David E. Bloom, Michael Kuhn, and Klaus Prettner, *The contribution of female health to economic development*, NBER working paper number 21411, July 2015.

<sup>5</sup> William D. Nordhaus, "The health of nations: The contribution of improved health to living standards," in Kevin M. Murphy and Robert H. Topel, eds., *Measuring the Gains from Medical Research: An Economic Approach*, Chicago, IL: University of Chicago Press, 2003.

<sup>6</sup> David E. Bloom, David Canning, and Jaypee Sevilla, "The effect of health on economic growth: A production function approach," *World Development*, January 2004, Volume 32, Issue 1. See also David E. Bloom and David Canning, "The health and wealth of nations," *Science*, February 2000, Volume 287, Issue 5456; David E. Bloom, Michael Kuhn, and Klaus Prettner, *Health and economic growth*, IZA Institute of Labor Economics discussion paper number 11939, November 2018.

<sup>7</sup> Dean T. Jamison, Lawrence J. Lau, and Jia Wang, "Health's contribution to economic growth in an environment of partially endogenous technical progress," in *Health and Economic Growth: Findings and Policy Implications*, Guillem López-Casasnovas, Berta Rivera, and Luis Currais, eds., Cambridge, MA: MIT Press, 2005.

<sup>8</sup> While most researchers have found a positive and significant connection between health and economic growth, some have found the link inconclusive. See Daron Acemoglu and Simon Johnson, "Disease and development: The effect of life expectancy on economic growth," *Journal of Political Economy*, December 2007, Volume 115, Number 6; and Alok Bhargava et al., "Modeling the effects of health on economic growth," *Journal of Health Economics*, May 2001, Volume 20, Issue 3.

<sup>9</sup> For link between health and economic growth in advanced economies, see: Tammy Boyce and Chris Brown, "Economic and social impacts and benefits of health systems," World Health Organization, 2019; Marc Suhrcke et al., "Investment in health could be good for Europe's economies," *The BMJ*, 2006. For an overview of healthcare expenditure and its drivers, see "OECD health statistics 2019," OECD, 2019; José J. Martín Martín, M. Puerto López del Amo González, and M. Dolores Cano García; "Review of the literature on the determinants of healthcare expenditure," *Applied Economics*, Volume 43, Issue 1, 2011; Luca Lorenzoni, Annalisa Belloni, and Franco Sassi, "Health-care expenditure and health policy in the USA versus other high-spending OECD countries," *The Lancet*, July 2014, Volume 384, Issue 9937.

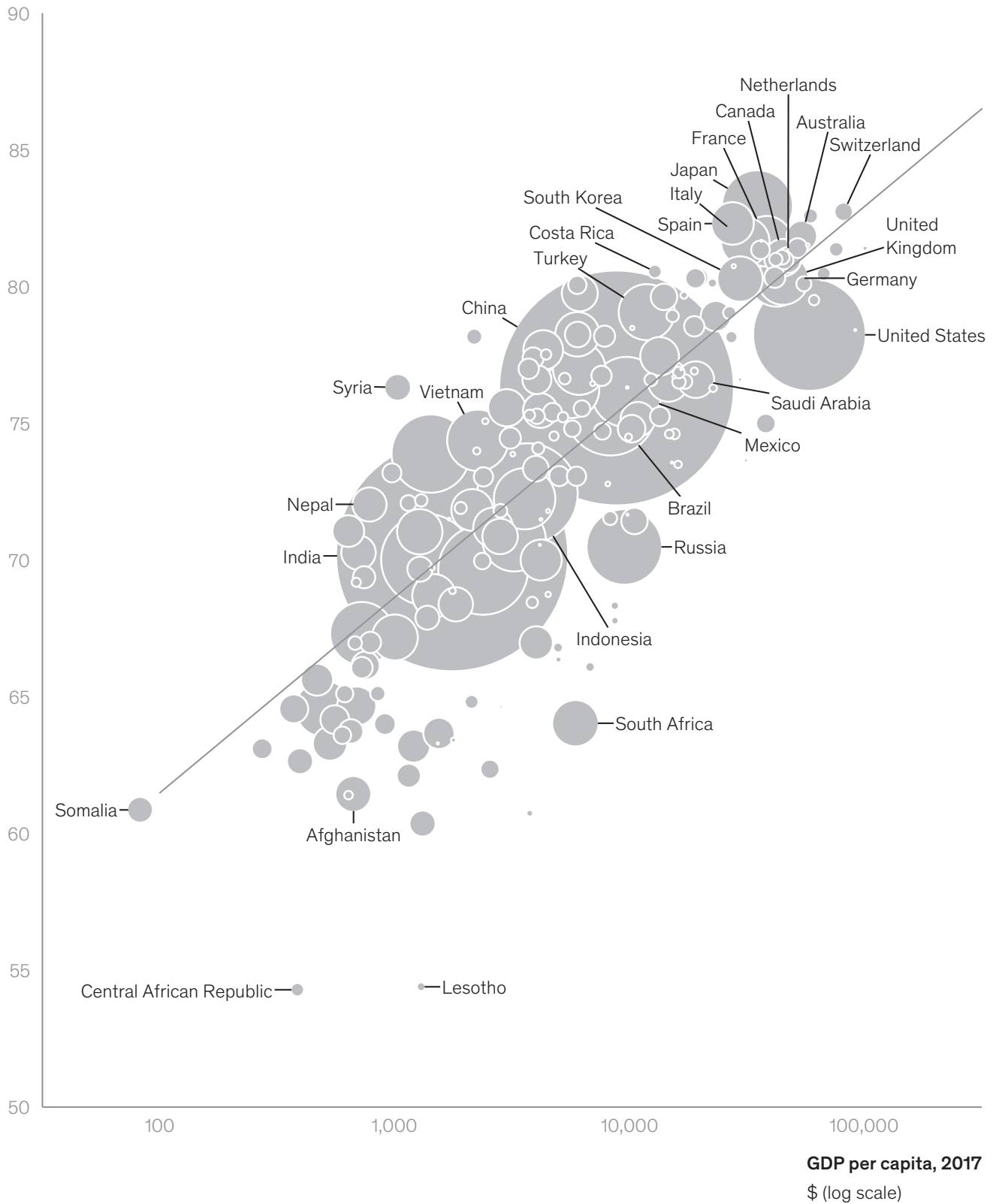
## Countries with higher incomes have higher life expectancy.

Relationship between GDP per capita and life expectancy globally

● Bubble size = population

Life expectancy at birth, 2017

Years



Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; McKinsey Global Institute analysis

# 1.7M

number of children under five who die each year from largely preventable causes in low-income countries

Citizens in low- and lower-middle-income countries continue to experience a significant disease burden from preventable and treatable health causes. These include communicable diseases like diarrhea and malaria, nutritional disorders, and poor child and maternal health. For example, the mortality from infectious, maternal, and neonatal diseases contributes 52 percent to the total disease burden in low-income countries, where child mortality is 16 times higher than in high-income countries.<sup>51</sup> These conditions drive the high share of deaths under the age of 50 (Exhibit 3).<sup>52</sup> Many regions of these countries lack clean water and sanitation, vaccines, and safe childbirth. In low-income countries, more than 1.7 million children under the age of five die each year—about 35 percent of all deaths in these regions—mostly due to neonatal disorders, respiratory infections, and diarrhea.<sup>53</sup> While most of these countries are making significant progress, the life expectancy gap with high-income countries persists; the difference is 16 years for low-income countries and ten years for lower-middle-income countries.

While health improvements have been impressive in past decades in high-income countries, it is getting harder to continue to achieve improvements at similar rates when most people already live to an older age. The most common causes of death 100 years ago, such as tuberculosis, smallpox, and polio, have almost all been eradicated, and the biggest disease burden today comes from cancers, cardiovascular disease, and musculoskeletal disorders. Some of today's disease burden reflects negative health outcomes from lifestyle-related risk factors such as obesity and stress.<sup>54</sup> As a result, healthy life expectancy—years lived in good health—is not keeping pace with rising life expectancy, and additional years gained are spent in poor health (Exhibit 4). Furthermore, upper-middle- and high-income countries saw slower gains in life expectancy in the past 30 years than they did in the mid-20th century. In fact, there are some signs that life expectancy may be reaching a plateau in countries such as the United States. In the United States, this is mainly driven by a steady increase from 2013 to 2017 in mortality rates among younger men and women, whose leading causes of death are substance use disorders and self-harm.<sup>55</sup>

A few developed countries, for example Singapore and France, appear to be countering this trend, with healthy years rising together with overall life expectancy. While the evidence is uncertain, it would appear that differences in diet, patterns of eating, and daily exercise levels contribute to lower rates of obesity and lower incidence of associated health conditions such as cardiovascular disease—the largest single contributor to the global disease burden.<sup>56</sup> Governments in both countries have been proactive in supporting healthy diets and regular exercise, but preexisting social and behavioral norms are also likely to be important, along with other factors.<sup>57</sup>

Health disparities exist not only between countries, but also within countries at all income levels. The poorest individuals have the least access to healthcare, leading to worse health outcomes, reducing participation and productivity in the labor force, and increasing economic vulnerability (see Box 2, “The role of health inequity in health outcomes”). This can and typically does create a vicious cycle of poor health and poverty, and undermines social cohesion.<sup>58</sup>

<sup>51</sup> Institute for Health Metrics and Evaluation, used with permission, all rights reserved.

<sup>52</sup> Ibid.

<sup>53</sup> Ibid.

<sup>54</sup> Obesity is defined using body mass index, or weight in kilograms divided by the square of height in meters. A person with a BMI of 30 or more is generally considered obese. A person with a BMI equal to or more than 25 is considered overweight. See “Obesity and overweight,” WHO, [who.int/en/news-room/fact-sheets/detail/obesity-and-overweight](http://who.int/en/news-room/fact-sheets/detail/obesity-and-overweight).

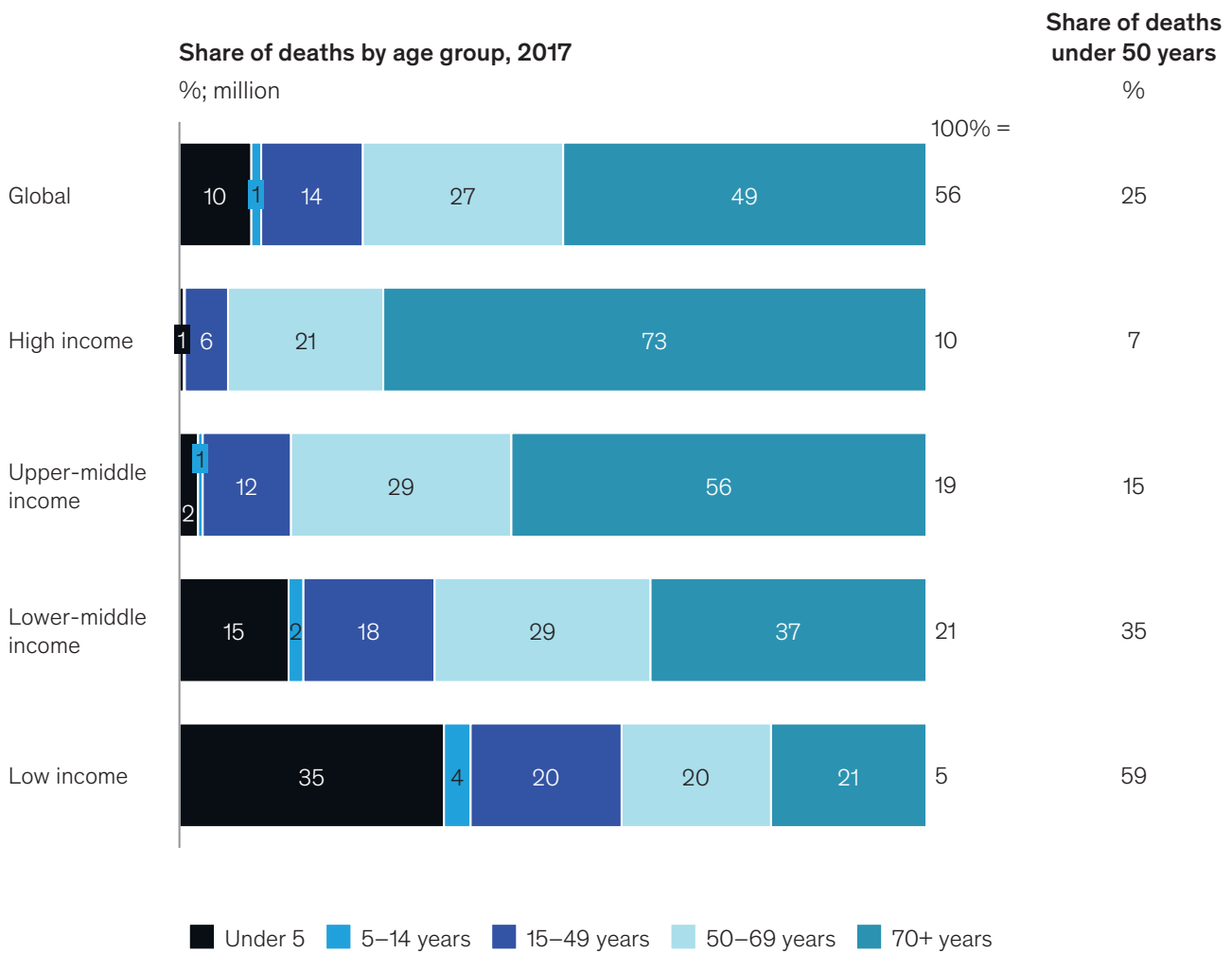
<sup>55</sup> Most recent data indicate that deaths from drug overdoses in the United States declined for the first time in over 20 years and life expectancy increased once again from 2017 to 2018. See Centers for Disease Control and Prevention, “Changes in Life Expectancy at Birth, 2010–2018.”

<sup>56</sup> Andrew Scott, “A longevity agenda for Singapore,” *Stanford Center on Longevity*, October 2019; Veena S. Raleigh, “Trends in life expectancy in EU and other OECD countries: Why are improvements slowing?,” OECD Health Working Paper number 108, 2019; “Why the French live longer,” AARP, 2017.

<sup>57</sup> Ibid.

<sup>58</sup> *The social contract in the 21st century: Outcomes so far for workers, consumers, and savers in advanced economies*, McKinsey Global Institute, February 2020.

**Premature deaths, mostly from preventable or treatable diseases, are prevalent in low- and lower-middle-income countries.**



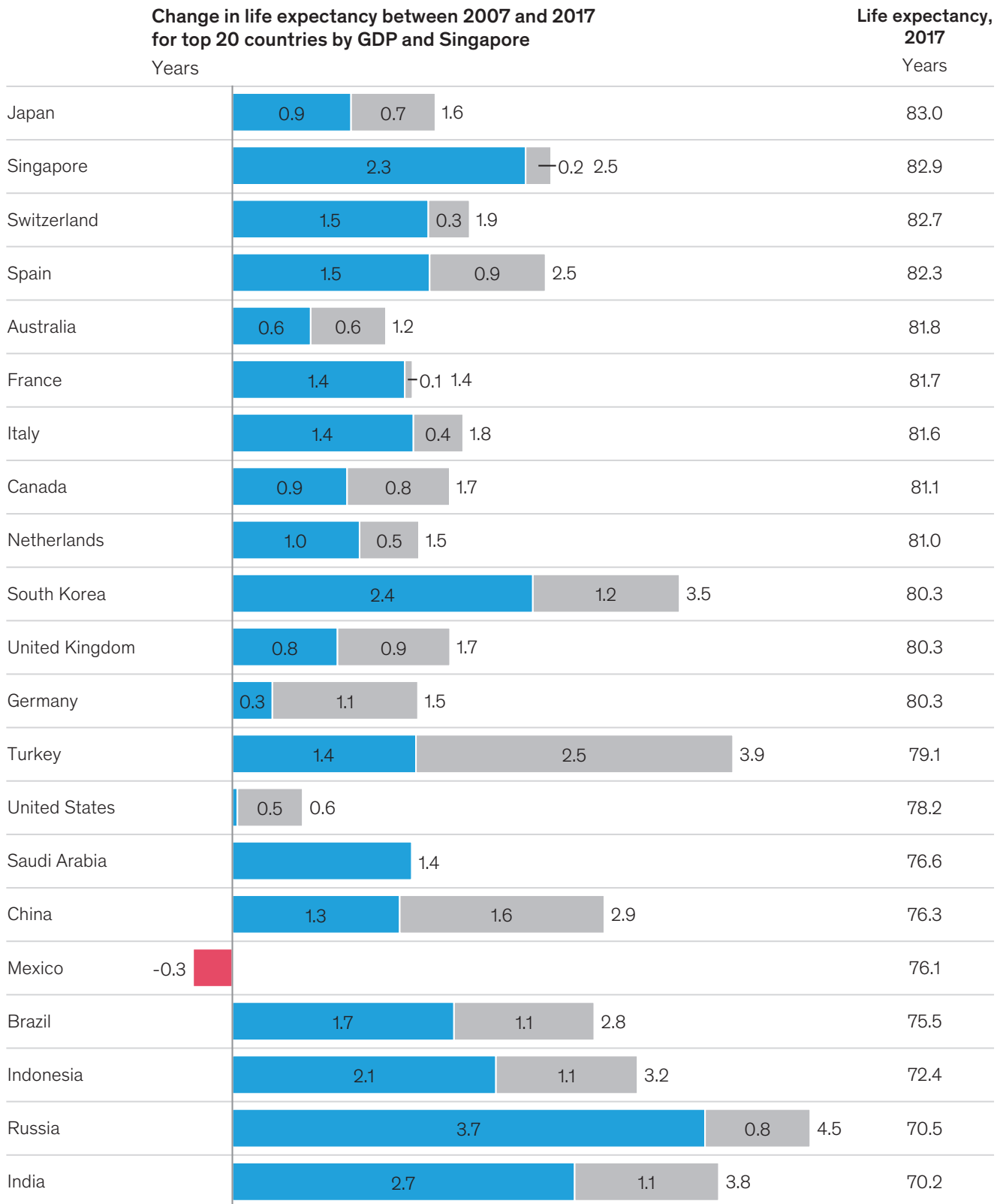
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis



### People are living longer but not necessarily in better health.

■ In good health ■ In poor health ■ Loss in life expectancy



Note: Healthy life expectancy, also called health adjusted life expectancy, is disability-free life expectancy where years lived with disability are subtracted from overall life expectancy as a share of life expectancy. Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; World Bank; McKinsey Global Institute analysis

## The role of health inequity in health outcomes

National health trends obscure differences in health outcomes between the rich and poor within countries or even cities. A large body of work developed over many years highlights the role income plays in health outcomes.<sup>1</sup> It is well established that health-related behaviors correlate closely with a person's social and economic environment, making it hard to unpick the complex connections between lifestyle and socioeconomic factors and other sources of discrimination, disadvantage, deprivation, or vulnerability, such as race, ethnicity, caste, or gender.<sup>2</sup> Research focused on the United States and the United Kingdom has found that people in the lowest socioeconomic group can experience almost a decade longer of ill health compared to the highest group, and the gap has been increasing. The picture in the developing world is similar, though in some countries efforts to expand health coverage and access are narrowing but not closing the gap.<sup>3</sup>

Poorer people tend to have worse health, which can limit economic potential and may even create a vicious cycle. Recent studies show that medical debt accounted for about

half of bankruptcies filed in the United States.<sup>4</sup> Further, early analysis of the COVID-19 pandemic has shown that marginalized and more deprived populations are disproportionately affected.<sup>5</sup> In low-income countries, health shocks may lead households to sell assets or borrow, become homeless, or take children out of school.<sup>6</sup> For households, this often results in a downward spiral. Emerging evidence suggests that ill health may perpetuate a poverty trap: poor childhood health translates to lower socioeconomic status in adulthood, which then affects subsequent generations of children.<sup>7</sup>

Strategies to improve health will have greater impact if informed and shaped by an understanding of the underlying health inequalities in the population. Interventions could be tailored to meet the needs of disadvantaged groups, recognizing and addressing the additional barriers to health that exist in different communities. In many cases, this would require multisectoral approaches crossing, for example, housing, education, social services, and employment, in addition to healthcare services.

<sup>1</sup> Paola Zaninotto et al., "Socioeconomic Inequalities in Disability-free Life Expectancy in Older People from England and the United States: A Cross-national Population-Based Study," *Journals of Gerontology: Series A*, May 2020, Volume 75, Issue 5; glz266. Selected examples only: *Closing the gap in a generation: Health equity through action on the social determinants of health*, WHO, 2008; Raj Chetty, Nathaniel Hendren, and Lawrence F. Katz, "The effects of exposure to better neighborhoods on children: New evidence from the moving to opportunity experiment," Harvard University and NBER, 2015; "Closing the health inequalities gap: An international perspective," WHO, 2005; Michael Marmot, "The influence of income on health: Views of an epidemiologist," *Health Affairs*, Volume 21, Issue 2, 2002; *Social determinants of health: The solid facts*, Richard Wilkinson and Michael Marmot, eds., WHO, 2003; *An equal start: improving outcomes in children's centres*, UCL Institute of Health Equity, October 2012.

<sup>2</sup> Despite strong evidence of persistent health inequities in specific countries, we were not able to analyze health outcomes by socioeconomic, ethnic, or other strata within countries because of limitations in consistent and comparable data available globally. We believe this is a critical area for further research. Yanping Li et al., "Healthy lifestyle and life expectancy free of cancer, cardiovascular disease, and type 2 diabetes: prospective cohort study," *The BMJ*, January 2020, Volume 368, Issue 8228; *COVID-19: Investing in black lives and livelihoods*, McKinsey & Company, April 2020; Martha Hostetter and Sarah Klein, "In Focus: Reducing racial disparities in health care by confronting racism," The Commonwealth Fund, 2018; Jamila Taylor, "Racism, inequality, and health care for African Americans," The Century Foundation, 2019; Maria Evandrou et al., "Ethnic inequalities in limiting health and self-reported health in later life revisited," *Journal of Epidemiology and Community Health*, July 2016, Volume 70, Number 7; Sanghmitra S. Acharya, "Health equity in India: An examination through the lens of social exclusion," *Journal of Social Inclusion Studies*, 2018, Volume 4, Issue 1.

<sup>3</sup> Davidson R. Gwatkin, "Trends in health inequalities in developing countries," *The Lancet Global Health*, April 2017, Volume 5, Number 4.

<sup>4</sup> David U. Himmelstein et al., "Illness and injury as contributors to bankruptcy: Even universal coverage could leave many Americans vulnerable to bankruptcy unless such coverage was more comprehensive than many current policies," *Health Affairs*, Volume 24, Issue 1, 2005.

<sup>5</sup> For example, in the United Kingdom ethnic minorities account for 34 percent of COVID-19 mortality in intensive care units while only accounting for 16 percent of the population. See "ICNARC report on COVID-19 in critical care 17 April 2020," ICNARC, 2020. Studies in some parts of the United States have reported similar findings. See for example, *COVID-19: Investing in black lives and livelihoods*, McKinsey & Company, April 2020.

<sup>6</sup> Adam Leive and Xu Ke, "Coping with out-of-pocket health payments: Empirical evidence from 15 African countries," *Bulletin of the World Health Organization*, Volume 86, Issue 11; Abhijit V. Banerjee and Esther Duflo, "The economic lives of the poor," *Journal of Economic Perspectives*, Volume 21, Issue 1, 2007.

<sup>7</sup> Anna Case, Angela Fertig, and Christina Paxson, "The lasting impact of childhood health and circumstance," *Journal of health economics*, Volume 24, Issue 2, 2005; Janet Currie, "Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development," *Journal of Economic Literature*, Volume 47, Issue 1, 2009; *The social contract in the 21st century: Outcomes so far for workers, consumers, and savers in advanced economies*, McKinsey Global Institute, February 2020.

# 1 in 5

workers who have a chronic condition that affects their productivity in mature economies

## Poor health reduces global growth by as much as \$12 trillion in a typical year

Despite the progress over the past century, poor health continues to limit global GDP growth. We estimate that the cost of ill health was more than \$12 trillion in 2017, about the same size as China's economy in that year. This is due to poor health from conditions that hinder the productivity of workers with health conditions and reduce the size of the labor force through premature deaths. For example, in 2017 alone, about 580 million years were lost to poor health, resulting in short- or long-term absence from work or workers leaving the labor force entirely.<sup>59</sup> In many mature economies, one in five workers has a chronic condition that affects their productivity at work.<sup>60</sup>

Premature deaths limit growth by reducing the size of the potential labor force. Cardiovascular disorders and cancers are the top conditions that affect the mortality of populations aged 15 to 64, and 55 percent of these premature deaths occur in low- and lower-middle-income countries. Premature deaths take an exceptionally high toll on the economy when people in their prime working years are affected disproportionately. HIV/AIDS has been a humanitarian tragedy in countries in Southern and Eastern Africa. For instance, in Botswana, life expectancy fell 28 years from 1995 to 2005 because of HIV/AIDS, nullifying all gains in the post-World War II period.<sup>61</sup> Some sectors, like mining, were particularly affected by the pandemic in the 1990s and 2000s because of the mortality of the young workforce. In South Africa, HIV prevalence rates among miners varied from 25 to 30 percent in some areas. This added economic losses in these areas to the devastating personal and social costs.<sup>62</sup> In fact, researchers estimate that HIV/AIDS reduced GDP growth rates by 2 to 4 percent in more than 40 African countries.<sup>63</sup>

Poor health makes it hard for those suffering from health conditions to be economically active and realize their full productive potential. In mature economies, chronic health conditions are the major cause of poor health. For instance, in Europe, people with more than one chronic condition are 20 percentage points less likely to be employed than their peers.<sup>64</sup> In the United States, 6 percent of the workforce will take short-term disability leave of up to six months in any given year, and more than one in four of today's 20-year-olds can expect to be out of the workforce for a year or more due to a health condition at some point during their working life.<sup>65</sup> The most common chronic diseases for people aged 15 to 64 are low back pain, migraine and other headaches, depressive disorders, and diabetes. Employees managing chronic conditions experience higher levels of presenteeism, defined as being at work but not fully functioning because of illness. In the United States, employees who have depression are estimated to lose four hours per week due to presenteeism related to their condition.<sup>66</sup> This could be because people are less able to concentrate or work more slowly than usual, but also because quality of work may suffer.<sup>67</sup> In low-income countries, poor health affects household wages.<sup>68</sup> Infectious diseases such as tuberculosis present the largest losses to labor supply and household income. The recovery time for tuberculosis is a few months, and studies have shown that tuberculosis patients lose three to four months of work time when diagnosed.<sup>69</sup> This can affect output substantially. A study in Uganda shows that 95 percent of subsistence

<sup>59</sup> Measured in YLDs (years lived with disability) for age group 15-64. In total 860 million years were lost for all ages in 2017. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>60</sup> Donna Allen et al., "Four-year review of presenteeism data among employees of a large United States health care system: A retrospective prevalence study," *Human Resources for Health*, November 2018, Volume 16, Issue 1.

<sup>61</sup> Ilavenil Ramiah and Michael R. Reich, "Public-private partnerships and antiretroviral drugs for HIV/AIDS: Lessons from Botswana," *Health Affairs*, Volume 24, Issue 2, 2005.

<sup>62</sup> Rose Smart, "HIV/AIDS Guide for the mining sector: A resource for developing stakeholder competency and compliance in mining communities in Southern Africa," World Bank Group, 2004; David E. Bloom et al., *AIDS and economics*, World Health Organization Commission on Macroeconomics and Health working paper series WG1:15, November 2001.

<sup>63</sup> Simon Dixon, Scott McDonald, and Jennifer Roberts, "The impact of HIV and AIDS on Africa's economic development," *The BMJ*, Volume 324, Issue 7331, 2002.

<sup>64</sup> "The labour market impacts of ill-health," Chapter 1, *Health at a Glance: Europe 2016*, OECD 2016.

<sup>65</sup> Walter Stewart et al., "Cost of lost productive work time among US workers with depression," *Journal of American Medical Association*, 2003, Volume 289, Number 23; *Health and Productivity Benchmarking 2016*, Integrated Benefits Institute, November 2017.

<sup>66</sup> Ibid.

<sup>67</sup> Marco Hafner et al., *The economic benefits of a more physically active population: An international analysis*, RAND Corporation, 2019; Paul Hemp, "Presenteeism: At work—but out of it," *Harvard Business Review*, Volume 82, Issue 10, 2004.

<sup>68</sup> *World Development Report 1993: Investing in Health*, World Bank, 1993.

<sup>69</sup> *The economic impact of tuberculosis*, WHO, 2000.

farmers suffering from tuberculosis reported that their production had decreased due to their reduced capacity to work.<sup>70</sup> Treatment costs and loss of work combined can force households into debt and poverty.<sup>71</sup> Conditions such as anemia, more prevalent in low-income regions, affect physical energy level and reduce productivity and wages in occupations that require either physical or cognitive skills.<sup>72</sup> Some field studies show a 5 to 17 percent increase in productivity at work as well as a boost to activity outside paid work, such as childcare, when levels of anemia were reduced.<sup>73</sup>

Our estimate does not include the effect of pandemics, such as COVID-19, H1N1, or SARS, which can have an additional negative impact on the economy, causing supply chain and travel disruptions and depressed economic activity. Early estimates suggest that COVID-19 could result in a loss of about 3 to 8 percent in global GDP in 2020.<sup>74</sup>

### **Investing in health can help bolster a post-COVID recovery and counter longer-term demographic headwinds**

As the world grapples with the COVID-19 pandemic, a focus on health promotion can play a critical role in economic recovery. A strong public health response that succeeds in controlling the spread of the virus would be critical for countries to recover faster.<sup>75</sup> Looking at the 1918 flu pandemic, researchers found that cities that acted aggressively to implement public health measures and other interventions grew faster once the pandemic was over.<sup>76</sup> In the medium term, increased government spending on health may speed up economic recovery.<sup>77</sup>

# 3–8%

forecast reduction in global GDP in 2020 from COVID-19

Over the longer term, health improvements can counter the slowdown in the growth of the working-age population due to slowing fertility rates. Globally, labor force growth is expected to slow from an annual rate of 1.8 percent over the past 50 years to 0.3 percent in the next 50 years.<sup>78</sup> At the same time, the demand for highly skilled knowledge workers is increasing. Improved health can help counter these headwinds by extending the healthy lifespan of older workers and by investing in the early years of the future workforce.<sup>79</sup> Indeed, young brains are exceptionally impressionable, and ensuring the cognitive skills needed for the future knowledge workforce is a priority for all economies.

In aging societies, the capacity of older people to remain healthy and economically and socially active makes a big difference for economic prospects. Ill health is one reason people are not able to stay in the workforce for as long as they need to or would like to.<sup>80</sup> In the United States, health forced about 14 percent of retirees to drop out of the workforce earlier than planned.<sup>81</sup> Instead of continuing to live an active personal life and contributing as workers, volunteers, and community members, older people in poor health are more likely to become socially isolated and experience further health decline earlier.<sup>82</sup> This is a rising

<sup>70</sup> Paul R. Saunderson, "An economic evaluation of alternative programme designs for tuberculosis control in rural Uganda," *Social Science and Medicine*, 1995, Volume 40, Issue 1203.

<sup>71</sup> Sukhan Jackson et al., "Poverty and the economic effects of TB in rural China," *International Journal of Tuberculosis and Lung Disease*, October 2006, Volume 10, Issue 10.

<sup>72</sup> *Repositioning nutrition as central to development: A strategy for large scale action*, World Bank, 2006; Jere R. Behrman, Harold Alderman, and John Hoddinott, *The Challenge of Hunger and Malnutrition*, Cambridge University Press, 2004.

<sup>73</sup> Sue Horton and Carol Levin, "Commentary on 'evidence that iron deficiency anemia causes reduced work capacity,'" *Journal of Nutrition*, Volume 131, Issue 2, 2001; *Repositioning nutrition: Why invest in nutrition?*, World Bank Group, 2005.

<sup>74</sup> *Safeguarding our lives and our livelihoods: The imperative of our time*, McKinsey & Company, March 2020.

<sup>75</sup> *Ibid.*

<sup>76</sup> Sergio Correia, Stephan Luck, and Emil Verner, "Pandemics depress the economy, public health interventions do not: Evidence from the 1918 flu," March 30, 2020.

<sup>77</sup> Aaron Reeves et al., "Does investment in the health sector promote or inhibit economic growth?," *Globalization and Health*, Volume 9, Issue 43, 2013.

<sup>78</sup> Analysis done for G-19 countries and Nigeria; see *Global growth: Can productivity save the day in an aging world?*, McKinsey Global Institute, 2015.

<sup>79</sup> *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, McKinsey Global Institute, December 2017.

<sup>80</sup> Lixin Cai and Guyonne Kalb, "Health status and labour force participation: Evidence from Australia," *Health Economics*, Volume 15, Issue 3, 2006; Tilja van den Berg et al., "The impact of ill health on exit from paid employment in Europe among older workers," *Occupational and Environmental Medicine*, December 2010, Volume 67, Issue 12.

<sup>81</sup> *Retirement Confidence Survey Summary Report*, Employee Benefit Research Institute, 2019.

<sup>82</sup> The other factors known to be associated with social isolation in older adults are retirement and loss of a spouse (either through death or the spouse going into residential care). Bianca D.M. Wilson et al., "Upstream thinking and health promotion planning for older adults at risk of social isolation," *International Journal of Older People Nursing*, Volume 6, Issue 6, 2011; Caitlin Coyle and Erin Dugan, "Social isolation, loneliness and health among older adults," *Journal of Aging Health*, Volume 24, Issue 17, 2012.



concern in rapidly aging advanced economies such as Germany and Japan, where 22 percent and 27 percent of the population, respectively, will be over 70 by 2040. The figures are 19 percent in China and 25 percent in South Korea.<sup>83</sup> Furthermore, healthier populations require less time from family caregivers and healthcare professionals, allowing them to spend time on other productive activities. In Organisation for Economic Co-operation and Development (OECD) countries, on average, 7 percent of people over 55 provide care to their family and social network on a daily basis.<sup>84</sup> An additional benefit of older citizens remaining economically active after they retire is that they can help expand the demand for goods and services in the future, helping catalyze much-needed investment in economies where growth expectations have slowed.

Healthier children grow up to be mentally and physically healthier and more productive adults. There is increasing evidence that poor childhood health or adverse childhood experience has a profound effect on future educational and labor market outcomes. This applies to children in low-income countries as well as developed countries.<sup>85</sup>

# 2–3%

economic cost of  
malnutrition each year

In low-income countries, childhood malnutrition and stunting are prevalent, causing significant losses in cognitive development, future health, and future earning capacity.<sup>86</sup> Studies show that a 1 percent loss in adult height as a result of childhood stunting equals a 1.4 percent loss in productivity.<sup>87</sup> Longitudinal studies have shown that combating malnutrition in children can increase annual wages as adults by 14 to 28 percent.<sup>88</sup> In fact, several studies show that many of these effects start even before the child is born. In total, the economic cost of malnutrition is estimated to range from 2 to 3 percent of GDP.<sup>89</sup> The effects of malnutrition are long-term and trap generations of individuals and communities in the vicious circle of poverty.

In developed countries, adverse childhood experience and mental health disorders also affect children's ability to reach their full potential in life. A study spanning more than 30 years found that children affected by mental health problems go on to earn 20 percent less than their peers, the result of diminished educational attainment and additional challenges in finding and retaining employment.<sup>90</sup>

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Over the past century, rising life expectancy and healthier populations have played a key role in boosting economic growth globally by expanding the labor force and increasing productivity. As the world grapples with the COVID-19 pandemic, there is a unique opportunity not merely to restore but to advance broad-based health and prosperity. What would it take to improve the health of the world's population? And what effect would that have on well-being? Those are the key questions we tackle next.

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<sup>83</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>84</sup> *Health at a Glance 2017: Informal Carers*, OECD Indicators, OECD 2017.

<sup>85</sup> Jo Boyden and Stefan Dercon, *Child development and economic development: Lessons and future challenges*, Young Lives, 2012. Daniel Prinz et al., *Health and economic activity over the lifecycle: Literature review*, NBER working paper number 24865, July 2018; Janet Currie, "Healthy, wealthy, and wise: Socioeconomic status, poor health in childhood, and human capital development," *Journal of Economic Literature*, Volume 47, Issue 1, 2009.

<sup>86</sup> Rachel Nugent et al., "Economic effects of the double burden of malnutrition," *The Lancet*, January 2020, Volume 395, Issue 10218.

<sup>87</sup> *Repositioning nutrition as central to development: A strategy for large-scale action*, World Bank, 2006.

<sup>88</sup> Jere R. Behrman, Harold Alderman, and John Hoddinott, *The Challenge of Hunger and Malnutrition*, Cambridge University Press, 2004.

<sup>89</sup> *Repositioning nutrition as central to development: A strategy for large-scale action*, World Bank, 2006.

<sup>90</sup> This finding is reported after adjustment for family and neighborhood effects. James P. Smith and Gillian C. Smith, "Long-term economic costs of psychological problems during childhood," *Social Science & Medicine*, Volume 71, Issue 1, 2010.







# 2. Improving health

How much better off would the world be if improving health outcomes became a top priority? That is the question we tackle in this chapter. While decades of medical advances have led to great strides in preventing and treating diseases, more can be done, both by applying proven interventions more consistently and, even more importantly, by shifting efforts to prevent diseases from developing in the first place. The prize for doing so is large: the global disease burden could be reduced by 40 percent in 20 years, and people in middle age could gain a decade of healthy, active life. Furthermore, while all pandemics and health crises are different, a healthier population would likely be more resilient and have higher chances of survival in the face of new health-related threats.<sup>91</sup>

# 40%

reduction in the global disease burden from better health

Building on a large body of existing research, we compile a comprehensive global view of how much lower the disease burden, including early death and life lived in poor health, could be if the 52 largest causes of ill health today were more consistently tackled. Even though our work highlights the large potential for improving health, that does not mean achieving it would be easy. There are three main reasons. First, many parts of the world, particularly in emerging economies, suffer from a lack of access to healthcare.<sup>92</sup> Second, even when known interventions exist, they can be hard to adhere to. This especially applies to unhealthy behaviors such as smoking, lack of physical exercise, and drug use. Third, many of the interventions depend on environmental and social factors outside the power of the individual or healthcare providers. For example, the stress from poverty can dramatically reduce a person's overall well-being. Therefore, achieving the health improvements we outline in this chapter would require significant change, not just in the provision of healthcare but in society more broadly. We return to this topic in chapter 5.

## Lifestyle-related chronic conditions are expected to increase globally

Globally, cardiovascular disease and cancers were the top causes of premature mortality, while musculoskeletal disorders, like back pain, and mental health disorders were the top causes of poor health.<sup>93</sup> In low- and lower-middle-income countries, preventable health conditions such as communicable diseases and poor maternal and child health continue to represent a major burden. In upper-middle- and high-income countries, more than three-quarters of health problems result from heart conditions, cancers, musculoskeletal disorders, and other noncommunicable diseases. Neurological disorders, including dementia, are already the fourth-largest cause of disease in high-income countries. Injuries, including traffic accidents and personal violence, make up between 7 and 12 percent of the total disease burden in all income archetypes (see Box 3, “How is the disease burden measured?”).

<sup>91</sup> There is a growing body of evidence from around the world to suggest that people with long-term conditions and health risks, such as obesity, are disproportionately affected by COVID-19. See for example: Norbert Stefan et al., “Obesity and impaired metabolic health in patients with COVID-19,” *Nature Reviews Endocrinology*, April 2020.

<sup>92</sup> The Universal Healthcare Service Coverage Index is more than 80 (out of 100) for high-income countries on average, almost 80 for upper-middle-income countries, less than 55 for lower-middle-income countries, and about 40 for low-income countries. See *Primary health care on the road to universal health coverage: 2019 global monitoring report*, WHO, 2019.

<sup>93</sup> Both overall mortality and mortality for people under 70 years; more effective cancer treatments have reduced mortality rates for breast, colorectal, prostate, and lung cancer in many developed countries in the past two decades. Claudia Allemani et al., “Global surveillance of trends in cancer survival 2000–14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries,” *The Lancet*, 2018, Volume 391, Issue 10125. Improvements at a similar scale have been seen in cardiovascular disease mortality rates; see Clemma J. Muller et al., “Trends in cardiovascular disease morbidity and mortality in American Indians over 25 years: The strong heart study,” *JAMA*, Volume 8, Issue 21, 2019.

Over the next 20 years, IHME forecasters estimate that the global burden of infectious diseases, particularly HIV/AIDS, malaria and TB, and maternal and neonatal disorders, will fall substantially as a result of sustained efforts on the part of governments, healthcare specialists, and communities (Exhibit 5).<sup>94</sup>

Box 3

### **How is the disease burden measured?**

The Institute for Health Metrics and Evaluation (IHME) maintains the most comprehensive database on the health conditions of the global population. Its global disease burden assessment covers chronic conditions, infectious diseases, and other conditions as well as injuries, and it takes into account all time lost to early death, poor health, or disability. The metric IHME uses is the disability-adjusted life year, known as DALY, which reflects the cost to individuals from different health conditions. The DALYs attributable to a disease are the sum of two component parts:

1. Years of life lost (YLLs) measures years lost to premature mortality. This is the number of years between death and the average life expectancy for a person in that age group in the country in that year.
2. Years lost to disability (YLDs) measures time spent in poor health or disability, adjusted for the severity of the health condition. All diseases at different severity levels are assigned a relative weighting between 0 and 1, where 0 indicates perfect health and 1 is the worst possible health (equivalent to death). YLDs is the product of years spent with the disease and the weighting for that disease.

Given that DALYs measure the burden from ill health or early death, we express our estimates of health improvement as DALYs averted, equivalent to adding one year of healthy life.

A quality-adjusted life year, or QALY, is an alternative measure for the disease burden that equates to one year in perfect health. We use DALYs in this report because it is a widely used measure of the disease burden adopted by the IHME and WHO.<sup>1</sup> QALYs are often used in individual health economic studies but are not used as broadly and systematically as would be needed for measuring disease prevalence, burden severity, or outcomes for countries and regions globally.

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<sup>1</sup> *The global burden of disease concept*, WHO, 2016; Alan D. Lopez et al., eds., *Global burden of disease and risk factors*, World Bank, 2006; and Christopher J. L. Murray and Alan D. Lopez, "Measuring global health: Motivation and evolution of the Global Burden of Disease Study," *The Lancet*, Volume 390, Issue 10100, 2017.

**Over the next 20 years, IHME forecasters estimate that the global burden of infectious, maternal, and neonatal disorders, will fall substantially as a result of sustained efforts on the part of governments, healthcare specialists, and communities.**

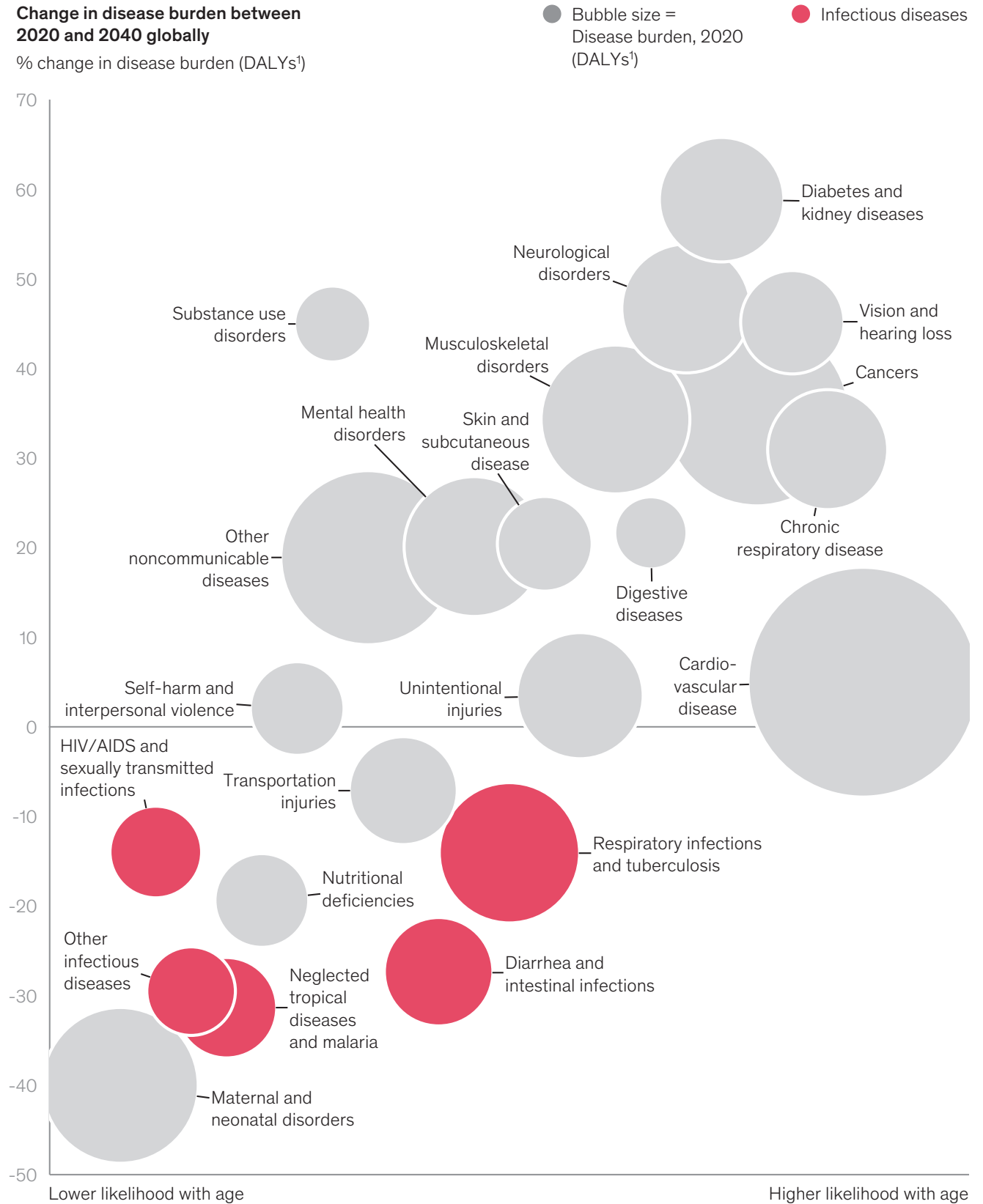
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<sup>94</sup> Programs include: creating the Millennium Development Goals, the Global Fund to Fight AIDS, Tuberculosis and Malaria, Gavi, the Vaccine Alliance, the US President's Emergency Plan For AIDS Relief (PEPFAR), the Roll Back Malaria Partnership, and the Multilateral Initiative on Malaria (MIM).



### Looking ahead, incidence of age- and lifestyle-related diseases is expected to rise while many infectious diseases could decrease significantly.

Disease baseline forecast



1. DALY = disability-adjusted life year.

Source: Global Burden of Disease Database 2016, Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

Economic development and investment in infrastructure are expected to lead to improved living conditions for many in emerging economies, reducing health risks associated with unsafe sanitation and low birth weight (expected to decrease by up to 60 percent by 2040). At the same time, higher levels of disposable income in these same countries are leading to less healthy lifestyles.<sup>95</sup> In the coming decades, this will create a double burden of disease in some countries, as infectious diseases associated with poverty persist at least for a time in parallel with chronic conditions associated with changing consumption and behavioral patterns, such as obesity. For example, according to IHME forecasts, in low-income countries, the burden of communicable, neonatal, and nutritional disorders is expected to decline by 18 percent from 2020 to 2040, while the burden of noncommunicable conditions such as cardiovascular disease is expected to increase by 63 percent and the burden of injuries by 30 percent. This is projected to lead to an overall increase in ill health (as measured in DALYs) of 15 percent. Healthcare systems and infrastructure in these nations are facing the need to expand public health interventions to lower the burden of infectious diseases associated with poverty while expanding their capabilities to prevent and tackle chronic conditions.<sup>96</sup>

In most parts of the world and particularly in higher-income countries, the burden of a number of chronic conditions is likely to increase substantially.<sup>97</sup> They include the following:

- Age-related conditions such as Alzheimer’s disease and dementia more broadly; some cancers; sight and hearing loss; risks associated with frailty.
- Obesity-related conditions such as cardiovascular disease and diabetes and their associated complications like chronic kidney disease, and some musculoskeletal disorders.
- Conditions associated with behavioral health, such as mental health disorders and substance use disorders.

# 18%

decline in communicable, neonatal, and nutritional disorders expected by 2040 in low-income countries

While many disease trends are relatively well understood, some uncertainty surrounds the full effects of changing behaviors and lifestyles, particularly when the change occurs in childhood. The lifetime health risks associated with rising levels of childhood obesity, or low levels of exposure to natural light (a result of increasingly regulated, “indoor” childhoods), may be even more damaging than currently assumed.<sup>98</sup> While these trends are captured in the baseline estimates of the disease burden evolution that underpin the analysis in this report, it is possible that more extreme consequences will result if lifestyle changes lead to faster and broader negative health changes.

Other behavioral changes, such as rising vaccine hesitancy, may also affect the outlook for a range of diseases that are currently relatively well managed through national immunization programs. There is mounting evidence that social media channels are used to spread misinformation and to discredit scientific evidence, affecting vaccine uptake in some communities.<sup>99</sup>

Furthermore, the risk from new and as yet unknown infectious diseases, in addition to COVID-19, may increase. It is important to recognize that IHME’s disease burden forecasts do not factor in the impact of the COVID-19 pandemic. As this report was being prepared, IHME had developed short-term forecasts to predict deaths and hospitalizations from COVID-19 over a few months’ time. However, as of publication, the short- and long-term impact of COVID-19 on mortality and morbidity in relation to the overall global disease burden was still uncertain, particularly in low- and middle-income countries (see Box 4, “The wider health impact of the COVID-19 pandemic”).

<sup>95</sup> Thomas J. Bollyky et al., “Understanding the relationships between noncommunicable diseases, unhealthy lifestyles, and country wealth,” *Health Affairs*, Volume 34, Issue 9, 2015.

<sup>96</sup> *Global status report on noncommunicable diseases 2014*, WHO, 2014.

<sup>97</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>98</sup> *The heavy burden of obesity: The economics of prevention*, OECD, 2019.

<sup>99</sup> “Ten threats to global health in 2019,” World Health Organization; *What does the next 25 years hold for global health?*, The Royal Society of Tropical Medicine and Hygiene, 2019.

#### Box 4

### The wider health impact of the COVID-19 pandemic

Beyond the immediate impact of rising numbers of people requiring treatment for severe respiratory infections, the COVID-19 pandemic will affect health and healthcare systems in three ways:

**1. Long-term health impact from COVID-19 infections.** There is growing evidence that some people infected by the virus may suffer longer-term complications and health consequences, the severity, frequency, and duration of which are not yet well understood.<sup>1</sup>

**2. Health repercussions of lockdown policies.** Social distancing and lockdown policies (also known as stay-at-home and shelter-in-place advisories and orders) appear to lead to higher levels of domestic violence, and it is likely that prolonged economic recession and higher rates of unemployment will lead to declining levels of mental health.<sup>2</sup> There may be some positive effects as well, including a reduction in poor health and mortality due to air pollution and fewer traffic accidents, at least for the duration of widespread lockdowns.

**3. Missed or delayed health treatments.** The direct impact of COVID-19 may be exceeded by the additional poor health and mortality created by missed and delayed treatment and monitoring. These spillover effects are the result both of health services redirecting their attention to respond to the immediate crisis and of individuals avoiding health services to reduce risk of infection. The magnitude will increase if the pandemic recurs in multiple waves, reducing access to, and uptake of, a broader range of services (and medicines, where the pandemic is creating supply chain challenges and shortages) for a prolonged period. Early signs suggest that during the first peak of the outbreak, fewer people have been receiving cancer screening and early referrals, fewer people have been treated for heart disease and stroke, ongoing treatment for conditions such as TB has been interrupted, routine immunization may also be falling, and routine checkups and monitoring may be delayed or missed altogether.<sup>3</sup> In lower-income countries, child and maternal health will be affected as the pandemic response puts pressure on maternity and neonatal care, estimated to lead to up to 1.2 million deaths over a six-month period.<sup>4</sup> If sustained over time, these changes would all be expected to create an additional health burden.

<sup>1</sup> Sufang Tian et al., "Pathological study of the 2019 novel coronavirus disease (COVID-19) through postmortem core biopsies," *Modern Pathology*, 2020; David Cox, "Some patients who survive COVID-19 may suffer lasting lung damage," *Science News Daily*, April 2020.

<sup>2</sup> House of Commons Home Affairs Select Committee, "Home Office preparedness for Covid-19 (Coronavirus): Domestic abuse and risks of harm within the home," April 2020; Fredrik Nordstrom et al., "Does unemployment contribute to poorer health-related quality of life among Swedish adults?," *BMC Public Health*, 2019.

<sup>3</sup> Emily A. Holmes et al., "Multidisciplinary research priorities for the COVID-19 pandemic: A call for action for mental health science," *The Lancet Psychiatry*, April 2020; and Eleanor Philpotts, "GP urgent cancer referrals decline by more than 70 percent as fewer patients come forward," *Pulse Today*, April 2020.

<sup>4</sup> Timothy Robertson et al., "Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: A modelling study," *The Lancet Global Health* 2020, May 2020.

## Unexpected health shocks can disrupt long-term health trends

The history of human civilization is filled with wars, large-scale famines, and pandemics that have had an impact on health and life expectancy. While these health shocks are difficult to predict, new and emerging risks can be identified that may alter expected long-term health trends.<sup>100</sup> We identify the following potential health risks:

- **Pandemics.** A number of new and existing infectious diseases have pandemic potential. They include some strains of influenza and other respiratory infections, like the coronavirus, Ebola, and Zika. Trends that increase pandemic risk include factors that affect spark, or the likelihood that a new disease with pandemic potential will emerge, and spread, or the speed and extent of contagion within and between populations.<sup>101</sup> Animals—including insects, livestock, and wildlife—are important sources of new infectious diseases. Increases in farming intensity raise the risk of livestock-to-human transmission. Human population increases lead to wildlife habitat loss, increasing the frequency of human-to-animal interactions. Population growth, urbanization, and greater global mobility and migration are increasing the risk that new infections will spread rapidly and widely.
- **Antimicrobial resistance.** While more predictable than pandemics, AMR could potentially have even greater negative effects if technological solutions are not found.<sup>102</sup> Evidence already exists of a rise in drug-resistant tuberculosis, for example.<sup>103</sup> One risk with growing AMR is that common infections and minor injuries could turn fatal if antibiotics lose their potency.<sup>104</sup>
- **Climate change.** Climate change creates and multiplies health risks and at the same time may reduce the adaptive capacity of communities to respond to these crises when they occur. The environmental and ecological changes caused by climate change could have a significant impact on vector-borne diseases (such as dengue fever, West Nile, and Lyme disease) and increase the frequency and severity of drought, flooding, and wildfires. Without adaptation, this could lead to higher levels of starvation and malnutrition, with particular long-term health risks for young children, spread of different diseases in new geographies, and other health risks associated with extreme heat and weather conditions.<sup>105</sup>
- **War and political conflicts.** Conflicts and unrest can lead to the displacement of people and have very negative long-term consequences to health resulting from reduced access to medical care, malnutrition, ongoing mental stress, and other related disabilities. This would be especially true in the event of nuclear war.
- **Cyber- and bioterrorism.** As technological advances improve individuals' lives, they also engender new sources of threat if misused. As health information and healthcare services digitize, the risks from cyberattacks and security lapses multiply, threatening services as well as data privacy and patient confidentiality. Bioterrorism, or the deliberate release of

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<sup>100</sup> "Ten threats to global health in 2019," World Health Organization, 2019; *What does the next 25 years hold for global health?*, The Royal Society of Tropical Medicine and Hygiene, 2019.

<sup>101</sup> Rachel Estrada et al., "Pandemics in a changing climate – evolving risk and the global response," Swiss Re, 2016; Nita Madhav et al., "Pandemics: Risks, impacts and mitigation," *Disease Control Priorities 3rd Edition*, Volume 9, Chapter 17, 2016; K. R. Smith et al., "Human health: impacts, adaptation, and co-benefits," in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Christopher B. Field et al., eds., Cambridge, UK: Cambridge University Press, pp. 709–754.

<sup>102</sup> *No time to wait: Securing the future from drug-resistant infections, Report to the Secretary-General of the United Nations*, Interagency Coordination Group on Antimicrobial Resistance, 2019.

<sup>103</sup> Christoph Lange et al., "Drug-resistant tuberculosis: An update on disease burden, diagnosis and treatment," *Respirology*, Volume 23, Issue 7, 2018.

<sup>104</sup> *Antimicrobial resistance: Global report on surveillance*, World Health Organization, 2014.

<sup>105</sup> Nick Watts et al., "The 2019 report of The Lancet Countdown on health and climate change: Ensuring that the health of a child born today is not defined by a changing climate," *The Lancet*, Volume 394, Issue 1836, 2019. Andy Haines and Kristie Ebi, "The imperative for climate action to protect health," *New England Journal of Medicine*, 2019, Volume 380, Number 3, pp. 263–73; K. R. Smith et al., "Human health: impacts, adaptation, and co-benefits," in *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Christopher B. Field et al., eds., Cambridge, UK: Cambridge University Press; and *The impacts of climate change on human health in the United States: A scientific assessment*, US Global Change Research Program, 2016.



pathogens with the intent to cause harm to human health, to impair the health of livestock and wildlife, or to disrupt food production and supplies, presents a further threat.<sup>106</sup>

It is beyond the scope of this report to quantify and rank these threats. However, the major global health agencies recognize that the risks are substantial, and some adverse consequences are both inevitable and, to differing degrees, already in evidence. As a result, preparing for risk is an essential intervention to promote good health.

## **A 40 percent drop in the global disease burden by 2040 could increase healthy lifespan and reduce child mortality**

We reviewed the clinical evidence and guidelines to identify the interventions with the greatest potential for scalable additional impact.<sup>107</sup> We did so systematically for the top 52 diseases, which contribute to almost 80 percent of the global disease burden (see Box 5, “Our methodology for calculating the disease burden reduction potential”). We found that over the next 20 years, the current global disease burden could be reduced by about 40 percent by applying a set of high-impact, known interventions by 2040.

Diseases cluster into three broad categories based on the effectiveness of current, known interventions (Exhibit 6). The first group includes diseases for which substantial progress toward eradication over the next 20 years is possible using well-known treatments. For example, scientists know what would be required to eradicate a number of conditions related to children’s health, including diarrhea and early childhood malnutrition, and many infectious diseases, including HIV/AIDS, malaria, and TB, within the next generation. Many countries have already done it. Of course, this would require comprehensive access and adoption, which would necessitate political will, concerted efforts, and adequate funding, as well as the infrastructure and resources for rigorous surveillance, monitoring, and preparedness to respond rapidly to changes in conditions. In addition, risks exist that changes at the disease level could alter the infection risk and efficacy of available treatments—for example through growing drug resistance in TB or new and more dangerous strains of meningitis—and that new infectious disease threats will occur with the potential to spread rapidly, as the coronavirus pandemic illustrates.

The second group includes diseases that can be prevented and managed, but for which the interventions that require behavioral and lifestyle changes have not been effectively implemented at scale. Many common chronic conditions fall into this category, including diabetes, cardiovascular disease, and chronic obstructive pulmonary disease. While ways to reduce the risk of these diseases are well understood, behavioral change and addressing the underlying social factors are critical components of prevention and effective management, and further research is needed to inform successful intervention design in this area. Tech-enabled and digital tools using real-world and real-time data and advanced analytics provide a promising avenue for exploration.<sup>108</sup>

The third group consists of diseases that currently cannot be prevented or effectively treated. This includes neurological conditions such as Alzheimer’s disease and dementia, and mental health conditions including depressive disorders, anxiety, schizophrenia, and bipolar disorder. For these, the disease burden in coming decades is likely to increase until more effective preventive interventions or therapies are discovered.

We estimate that a 63 percent reduction in the global disease burden could be achievable if all of these interventions were made available to everyone who could benefit in all countries, with a 100 percent adoption rate and sustained adherence. This is not a realistic assumption, yet this scenario helps to better explain and quantify the flip side: the remaining disease burden that simply cannot be addressed with currently available interventions. This allows

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<sup>106</sup> Bill Gates, “Shattock lecture: Innovation for pandemics,” *New England Journal of Medicine*, May 2018, Volume 378, Issue 22.

<sup>107</sup> For full details of the approach see the technical appendix. For full details of the literature reviewed see the bibliography.

<sup>108</sup> Fawad Taj, Michel C. A. Klein, and Aart van Halteren, “Digital health behavior change technology: Bibliometric and scoping review of two decades of research,” *JMIR Mhealth Uhealth*, December 2019, Volume 7, Issue 12.

## Our methodology for calculating the disease burden reduction potential

We quantify the potential to reduce the existing global disease burden, of both ill health and premature mortality, over the next 20 years through expanding access and adoption of health interventions that exist today.

We began by systematically reviewing the top 52 diseases contributing to almost 80 percent of the disease burden globally using the IHME Global Burden of Disease data set, ensuring that we included the top ten causes of the disease burden in each region. For each of the diseases, we reviewed the scientific literature, including clinical trials, meta-analyses, systematic reviews, and clinical guidelines, to identify the interventions with the greatest potential to further reduce the disease burden (premature mortality and disability). We categorized each intervention as environmental, behavioral, prevention and health promotion, or therapeutic, and summarized the evidence and efficacy for each.<sup>1</sup>

For each intervention in each disease area, we estimated the maximum potential uptake (based on evidence of best practices globally), time to achieve peak uptake, and time lag to impact on the disease burden for each country income archetype. For interventions that require sustained adherence over a prolonged period—for example, treatment of TB or diabetes, weight management programs, and treatment for substance use disorders—the adoption estimate took into account both initial uptake and sustained adherence. Assumptions were considered individually for each individual intervention and based on published evidence wherever possible; for example, vaccine coverage statistics are widely available. Where published evidence was limited, we followed a consistent set of principles to make a reasonable assumption. In these cases, our adoption and time-to-peak-uptake assumptions were consistent across similar intervention categories and income archetypes (for example, all behavioral interventions have the same time-to-peak-uptake assumptions).

The levels of adoption forecast in this analysis, while ambitious, are grounded in real-world examples from a range of different and challenging environments. As an example, we assume a drop of 50 percent in smoking prevalence rates, as demonstrated by Australia through a wide range of measures over a 20-year period.<sup>2</sup> We relied on expert interviews, case studies, and other published evidence to identify examples of best-practice adoption rates. Compared to the efficacy estimates for specific treatments, which are based on peer-reviewed scientific studies, the strength and validity of our evidence are lower. We have included brief summaries of some interventions at the end of this chapter to illustrate what is possible with holistic, thoughtful planning and sustained commitment.

We estimated the total potential to reduce the disease burden for each of the 52 diseases by applying the intervention effect size, adoption assumption, and time lag for each intervention in sequence, with therapeutic interventions applying only to the disease burden remaining after all environmental, behavioral, and preventive interventions had been applied. In general, we found that clinical evidence for therapeutic interventions was more easily available than evidence of behavioral, environmental, and social interventions. We estimated the potential reduction for the remaining diseases not included in our detailed analysis (the approximately 150 diseases that contribute the remaining 20 percent of the disease burden) by applying the average impact we sized for each specific category, such as cardiovascular disease or musculoskeletal disorders, to the remaining disease burden within the same category.

<sup>1</sup> The terms “efficacy” and “effect size” refer to the impact of an intervention as measured and reported in a clinical study or trial. The context of a clinical study or trial usually represents “ideal” conditions which may or may not be attainable in the real world. We use these terms interchangeably in the report. The term “effectiveness” refers to the impact of an intervention in the real world under pragmatic conditions.

<sup>2</sup> Elizabeth Greenhalgh, Michelle Scollo, and Margaret Winstanley, *Tobacco in Australia: Facts and issues*, Cancer Council Victoria, 2020.

We then applied the reduction potential of the disease burden (mortality and morbidity) through the interventions we identified on the IHME reference scenario forecast of the disease burden for each year to 2040, measuring only the additional impact beyond what is predicted in the IHME forecast. For example, for conditions expected to become less prevalent between now and 2040, we count only the further reduction on top of the forecast. For more details on our disease burden reduction model, see the technical appendix.

### **Illustrative example of our approach for chronic obstructive pulmonary disease (COPD)**

COPD is a chronic inflammatory lung disease that causes breathing difficulties due to obstructed airflow from the lungs. The main cause in developed countries is smoking, and in the developing world exposure to air pollution from fuels used in cooking and heating is also a major risk factor. Once established, COPD cannot be cured, but disease severity and symptoms can be reduced with treatment, including measures to prevent respiratory infections, which pose a particular danger to people with the condition.

We estimated that the global burden of COPD could be reduced by 37 percent by 2040 with higher levels of adoption of a critical set of seven interventions:<sup>3</sup>

- Environmental and social: Policies to reduce indoor and occupational exposure to air pollution could reduce the disease burden by 9 percent.
- Behavioral: A comprehensive smoking cessation policy could reduce the disease burden by 12 percent.
- Prevention and health promotion: Maintaining a register of people with COPD and promoting and providing seasonal influenza and pneumococcal vaccines could reduce the disease burden by 1 percent.
- Therapeutic: Ongoing treatment with corticosteroids and bronchodilators, combined with antibiotic treatment of pneumonia, could reduce the disease burden by 15 percent.
- Oxygen therapy and intensive care for critically ill patients would also be needed, but we have not included additional benefits from higher availability of these therapies. We focused only on interventions that, if available, would enable people to continue or return to an active life.

Adoption assumptions are tailored to each of our four income archetypes, and time lag to effect is modeled at the intervention level, with a delay of up to 20 years between implementation and impact.

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<sup>3</sup> Dmitrij Achelrod et al., "Costs and outcomes of the German disease management programme (DMP) for chronic obstructive pulmonary disease (COPD)—a large population-based cohort study," *Health Policy*, September 2016, Volume 120, Issue 9; Ülkü Aka Aktürk et al., "Influenza and pneumonia vaccination rates and factors affecting vaccination among patients with chronic obstructive pulmonary disease," *Balkan Medical Journal*, 2017, Volume 34, Issue 3; Global Initiative for Chronic Obstructive Lung Disease (GOLD), "Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease," *2018 report*, 2018; Sylvia Hartl et al., "Risk of death and readmission of hospital-admitted COPD exacerbations: European COPD audit," *European Respiratory Journal*, January 2016, Volume 47, Number 1; Peter Lange et al., "Danish register of chronic obstructive pulmonary disease," *Clinical Epidemiology*, October 2016, Volume 8; M. A. H. Mezquita et al., "Real-life effectiveness data on prevention of COPD and asthma exacerbations with 13-valent pneumococcal conjugate vaccine (PCV13)," *European Respiratory Journal*, September 2016, Volume 48, Issue Supplement 60; Eric M. Mortensen et al., "Antibiotic therapy and 48-hour mortality for patients with pneumonia," *American Journal of Medicine*, October 2006, Volume 119, Issue 10; Kristin L. Nichol et al., "The health and economic benefits associated with pneumococcal vaccination of elderly persons with chronic lung disease," *JAMA Internal Medicine*, November 1999, Volume 159, Number 20; Ghislaine Rosa et al., "Assessing the impact of water filters and improved cook stoves on drinking water quality and household air pollution: A randomised controlled trial in Rwanda," *PLoS One*, March 2014, Volume 9, Issue 3; Gregory W. Ruhnke et al., "Marked improvement in 30-day mortality among elderly inpatients and outpatients with community-acquired pneumonia," *American Journal of Medicine*, February 2011, Volume 124, Issue 2; D. D. Sin et al., "Inhaled corticosteroids and mortality in chronic obstructive pulmonary disease," *Thorax*, December 2005, Volume 60, Issue 12; Pauline V. van Hirtum et al., "Long term survival after admission for COPD exacerbation: A comparison with the general population," *Respiratory Medicine*, April 2018, Volume 137; A. Vila-Córcules et al., "Protective effect of pneumococcal vaccine against death by pneumonia in elderly subjects," *European Respiratory Journal*, December 2005, Volume 26, Issue 6; and Jan Zielinski et al., "Causes of death in patients with COPD and chronic respiratory failure," *Monaldi Archives for Chest Disease*, February 1997, Volume 52, Number 1.

# 47%

reduction in the disease burden for low-income countries

identification of the areas where scientific research and innovation are most critically needed—the topic of the next chapter. Our aspirational yet realistic healthy growth scenario indicates that two-thirds of this could be delivered over a 20-year time frame.<sup>109</sup>

The drop in the disease burden translates into significant, tangible benefits in global health. First, the impact of reducing ill health and improving survival chances at this scale would have a major impact on an individual's quality of life. Most people could enjoy a longer, healthier middle age, adding ten years to middle age and making 65 the new 55 (Exhibit 7).<sup>110</sup> The impact varies by region; for example, a 65-year-old in Western Europe has a higher probability of surviving in good health than a 65-year-old in sub-Saharan Africa. However, in every region, an additional ten healthy, active years could be expected for people in their 50s and 60s. According to our analysis, over 100 million more people under age 70 would be alive by 2040, and child mortality globally would decline by 65 percent. Further, for every person, another 21 healthy days would be added each year.

Low- and lower-middle income countries could see a drop in the disease burden of up to 47 percent and 44 percent, respectively. In upper-middle- and high-income countries, the impact is lower because of the higher prevalence of chronic conditions—which are harder to prevent and treat—at 37 percent and 33 percent, respectively. We also identify many country- and regional-specific benefits (see “A regional view of health gains,” later in this chapter).

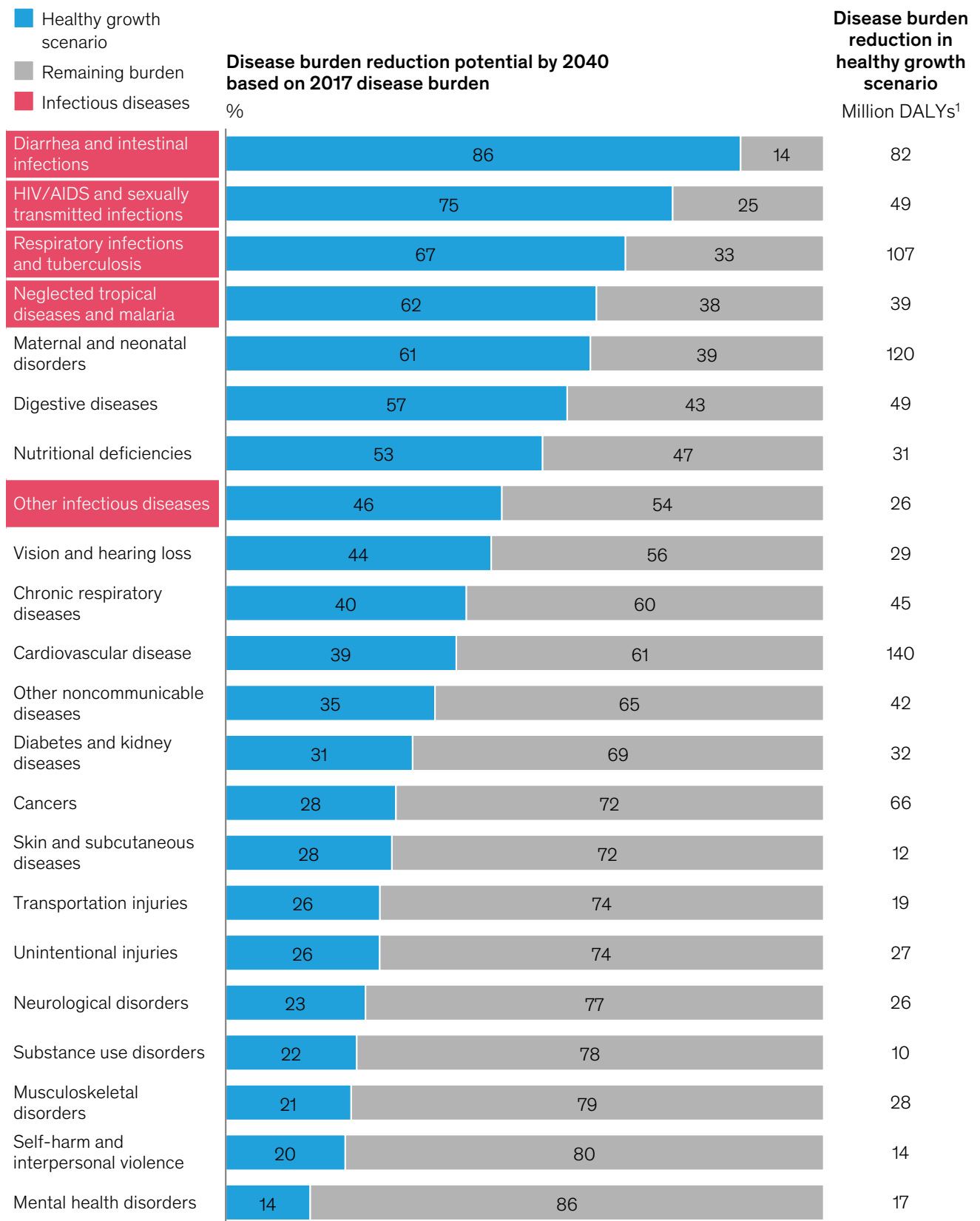
**According to our analysis, over 100 million more people under age 70 would be alive by 2040, and child mortality globally would decline by 65%. For every person, another 21 healthy days would be added each year.**

<sup>109</sup> We recognize that innovation will also be needed to reach optimal levels of adoption and adherence to existing interventions, and that new scientific breakthroughs may emerge that would alleviate this need. For example, a once-only therapy could reduce the need for people to take daily pills for long periods of time. These types of innovations would be very popular and value adding.

<sup>110</sup> A similar recent analysis looking at avoidable poor health in the UK population and focused on a sub-set of high-impact diseases found that healthy life expectancy could be extended by five years by 2035 through more consistent adoption of preventive approaches. For more information see *The health of a nation: A strategy for healthier, longer lives*, All Party Parliamentary Group on Longevity, 2020.



**The potential to reduce the disease burden varies significantly by disease type; chronic conditions are more challenging to tackle.**



1. DALY = disability-adjusted life year.

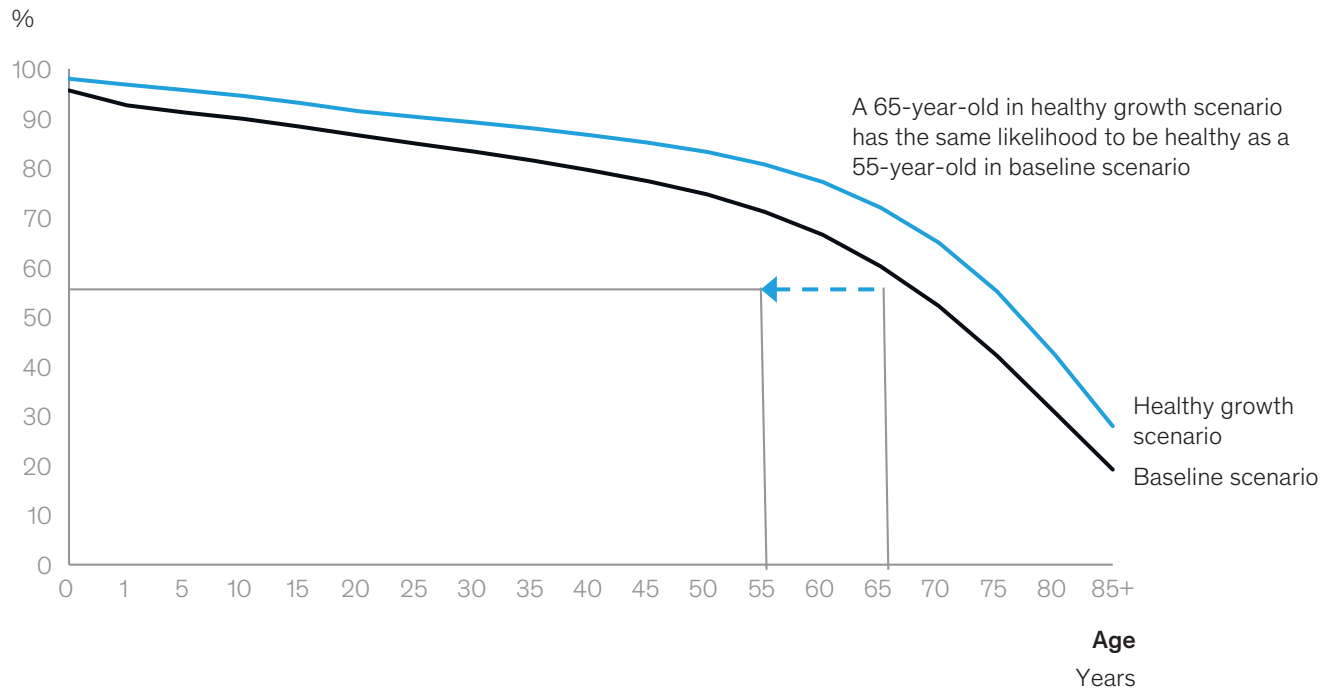
Note: Figures may not sum to 100% because of rounding.

Source: Global Burden of Disease Database 2017, Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Given the magnitude of estimated health benefits, 65 would be the new 55.

The healthy survival curve represents the probability of survival to a selected age in good health

### Healthy survival curve, global view<sup>1</sup>



1. The healthy survival curve shows the impact resulting from decreased mortality (more people within the cohort surviving to a given age) and reduced disability. It is calculated for each age bracket as probability of survival × (1 – disability prevalence rate).  
 Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; WHO; McKinsey Global Institute analysis

## Prevention is the key to about 70 percent of health gains from known interventions

While prevention plays a well-known role in delivering health benefits, our analysis shows how critical prevention really is. The vast majority of health benefits, about 70 percent, come from reducing underlying environmental, social, and behavioral risks and increasing access to high-quality preventive care (Exhibit 8).<sup>111</sup> The remaining 30 percent constitute therapeutic interventions such as surgery, medical devices such as hearing aids, a range of medicines including antibiotics, respiratory and neuroactive agents, and physiotherapy, psychological therapies, and counseling. To understand the difference, think of heart disease. Preventive interventions would include dietary guidance and support, group exercise classes, smoking cessation tools and services, and other support for lifestyle choices that lower the risk of heart disease. Prevention could also include antihypertensive and cholesterol-lowering drugs that can help individuals with elevated blood pressure or high levels of cholesterol manage their risk. Therapeutic approaches in this case might include interventional cardiology operations and postoperative medicines and support for people with more advanced heart disease.

Our analysis builds on an extensive body of research that concludes that delivering health improvement at scale would require a much stronger emphasis on environmental, social, and behavioral interventions, together with comprehensive delivery of often-basic preventive treatments, such as vaccinations.<sup>112</sup> If well-designed and -targeted preventive interventions

<sup>111</sup> Our approach was to estimate the impact of preventive interventions (including environmental, social, behavioral, and primary prevention) first. To avoid double counting, the impact of therapeutic interventions was estimated only for the remaining disease burden.

<sup>112</sup> "The Alma-Ata Declaration," WHO, [https://www.who.int/publications/almaata\\_declaration\\_en.pdf](https://www.who.int/publications/almaata_declaration_en.pdf); *World Development Report 1993: Investing in health*, World Bank Group, 1993; *Macroeconomics and health: Investing in health for economic development*, WHO, 2001; Dean T. Jamison et al., *Disease control priorities in developing countries*, World Bank, 2006.

were adopted more widely and throughout populations (rather than opportunistically), they could contribute substantially to reducing the disease burden in many areas. Evidence is emerging that promoting healthy behaviors and prevention earlier in life will have positive effects beyond those identified in this study.<sup>113</sup> The real question is why these changes have not been adopted already. There are at least three connected reasons that may explain this inertia: misaligned incentives, implementation challenges, and stakeholder complexity (see Box 6, “Obstacles to be overcome in prioritizing prevention”).

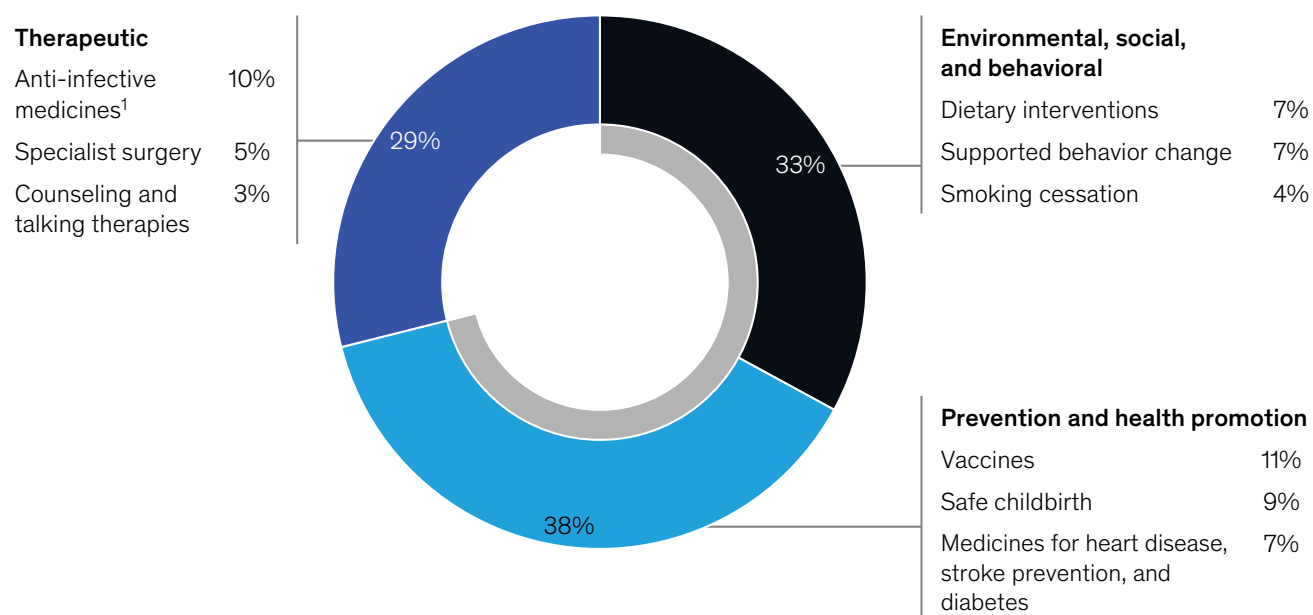
While our findings suggest that a prevention focus for healthcare systems would have many benefits, there will always be a role and a need for therapeutic treatments for established diseases even where prevention is a theoretical possibility. This will be particularly important early in the transition, because many people will live with the health consequences of gaps and inadequacies in past and current prevention policies. As a result, we expect acute and surgical treatment will continue to be important, particularly in middle-income countries. It accounts for about one-third of the overall improvement opportunity in high-income countries and about one-quarter in low-income countries.

Exhibit 8

## Over 70 percent of the health improvement potential from known interventions would come from environmental, behavioral, and social interventions, and preventive health measures.

### Disease reduction potential by intervention type

100% represents the 41% reduction in disease burden



1. 84% of impact comes from low- and lower-middle-income countries.

Note: Figures may not sum to 100% because of rounding.

Source: McKinsey Global Institute analysis

<sup>113</sup> There is emerging evidence, not included in this study, to suggest that behavioral and social factors play a significant role in the development of a number of common conditions that are not widely viewed as preventable today, including a wide range of mental health disorders, and neurological conditions such as Alzheimer's and dementia. As scientific knowledge grows in these areas, it is possible and probable that the relative importance of environmental, social, behavioral, and preventive interventions will grow. Also, a significant part of the benefits of these preventive interventions will accrue over many decades, beyond the scope of this study. For more see Ilianna Lourida et al., "Association of lifestyle and genetic risk with incidence of dementia," *JAMA*, 2019; James Fries, Bonnie Bruce, and Eliza Chakravarty, "Compression of morbidity 1980–2011: A focused review of paradigms and progress," *Journal of Aging Research*, 2011; Nicholas Allen et al., "Favorable cardiovascular health, compression of morbidity, and healthcare costs: Forty-year follow-up of the CHA Study (Chicago Heart Association Detection Project in Industry)," *Circulation*, Volume 135, Issue 18, 2017.

## Obstacles to be overcome in prioritizing prevention

A reorientation to prevention will not be easy for policy makers, healthcare institutions, and individuals. We outline some of the main challenges here.

**Misaligned incentives.** Prevention initiatives typically yield benefits in the medium to long term. Where competition for policymaking exists, those initiatives with short-term benefits are often more attractive to decision makers.<sup>1</sup> Many healthcare systems do not offer payers and providers sufficient incentives to promote prevention.<sup>2</sup> In fee-for-service and other activity-based funding systems, providers are rewarded for the volume, rather than outcomes, of care and are offered the greatest revenue when providing acute care.

**Implementation challenges.** Studies of the impact of preventive interventions require long time frames, which bring with them costs and complexity. Combined with the lack of a clear pathway to monetization, the result is too often a paucity of high-quality research in this area. We may understand the scale, scope, and nature of risks, but we know much less about how to modify them in the real world. This lack of research leads to challenges in designing and implementing effective, evidence-based behavior change programs. Further, societies tend to invest more in healthcare systems and hospitals, rather than community resilience and social services, despite the strong connections between them. We have seen significant behavioral changes arise in response to the COVID-19 crisis. Looking ahead, it is key to find ways to ensure the continuation of these positive behavioral changes—for example, hand hygiene, structured daily exercise, and perhaps most importantly the realization that health matters and that we all have a role to play.

**Stakeholder complexity.** Preventive interventions take many forms and involve a wide range of stakeholders. Strategies to improve road safety or air quality are likely to require cross-departmental government action. Programs to increase physical activity and improve health literacy are likely to be organized and delivered at the community level. Behavior is shaped by social environments, education, and opportunity. Without changing environments to make healthy choices the default—available, convenient, affordable—option for everyone, and especially those from disadvantaged and vulnerable communities, it will be hard to change behaviors in individuals.<sup>3</sup> In some instances, cultural barriers may hinder the rollout of certain interventions such as those relating to women's health. Addressing this challenge requires cross-departmental work within governments as well as broader collaboration with different sectors of society.

<sup>1</sup> Paul Cairney and Emily St Denny, "Prevention is better than cure, so why isn't government policy more preventive?" *Political Insight*, 2015.

<sup>2</sup> David Kindig, *Purchasing population health: Aligning financial incentives to improve health outcomes*, Health Services Research, 1998.

<sup>3</sup> Carlos Dobkin et al., "The economic consequences of hospital admissions," *American Economic Review*, Volume 108, Issue 2, 2018; Fabrizio Ferretti, "Unhealthy behaviors: An international comparison," *PLOS One*, Volume 10, Issue 10, October 2015; Thomas J. Bollyky et al., "Lower-income countries that face the most rapid shift in noncommunicable disease burden are also the least prepared," *Health Affairs*, Volume 36, Issue 11, November 2011; Michael P. Kelly and E. Doohan, "The social determinants of health," M. H. Merson, R. E. Black, A. J. Mills, eds., *Global Health: Diseases, Programs, Systems and Policies* (3rd ed.), Burlington, MA: Jones & Bartlett, 2012; Brad Stulberg, "The key to changing individual health behaviors: Change the environments that give rise to them," *Harvard Public Health Review*, Fall, 2014.



Many health conditions are affected by a wide range of risk factors and require a range of different treatments. Even where a single risk factor is particularly important—such as obesity—the range of interventions required to address it effectively can be substantial and complex.<sup>114</sup> There is only rarely a “silver bullet” that will resolve a health problem with one action. Instead, a comprehensive set of disease prevention and management programs will be needed to tackle risks before the disease develops and to delay and diminish the risk of disease progression after occurrence (see illustration, “To tackle most diseases, a combination of interventions will be necessary”). Two challenges in particular play an important role, but healthcare systems tend to overlook them.

First, sustaining adherence to treatment of long-term conditions over time is critical, particularly for those with relatively mild symptoms. Medical advances are already beginning to provide solutions to this problem, with, for example, much longer-acting and more effective cholesterol-lowering therapies soon to be available to reduce cardiovascular health risk. Alongside scientific advances, healthcare systems are looking at innovative strategies to deliver therapies to patients at speed and at scale.<sup>115</sup> This is also true for some infectious diseases that require strict adherence to treatment, such as TB. Although low-cost, effective treatments are available, many healthcare systems face challenges in reaching those at risk and in ensuring continuity of treatment over a prolonged period. Recent rapid advances in the availability and affordability of mobile phones and improvements in network coverage provide an opportunity to address this challenge.<sup>116</sup>

Second, underlying these high-impact interventions are a set of enablers that form the foundation of an effective and equitable healthcare system and are an essential part of managing the disease burden in populations. While these are likely in place in some healthcare systems, they may be inadequate in others. These include surveillance and monitoring infectious diseases, reducing the stigma associated with mental health and substance use disorders, accurate and timely diagnostic testing for a wide range of conditions, and a robust system to maintain and appropriately share health records. In addition to higher levels of access to treatments, this would require better use of technology and information systems to ensure that eligible people are treated and followed up over time. While these foundational elements alone do not directly reduce the disease burden, they are critical to achieving the high levels of adoption this report forecasts.

In addition to these interventions, the world’s recent experience with the coronavirus has demonstrated the value of investing in broader preparedness, resilience, surveillance, and tools to allow a more rapid and effective response to a broad range of health risks that are known yet unpredictable. Effective preparedness builds on, and benefits from, primary care and community public health infrastructure, and therefore will be both more effective and cheaper in societies that have invested in these core elements of health improvement (see Box 7, “Pandemic preparedness”).

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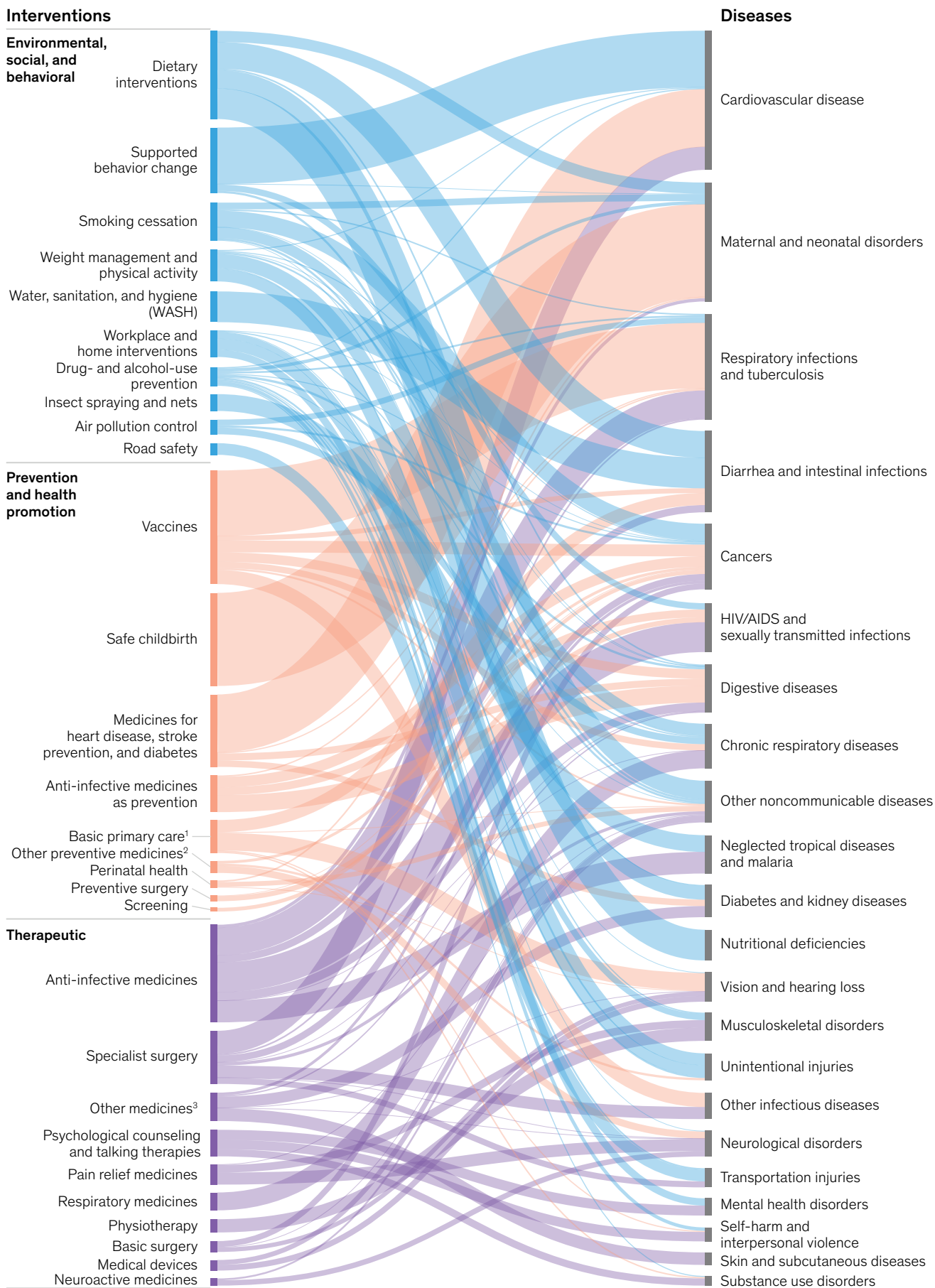
<sup>114</sup> *Overcoming obesity: An initial economic analysis*, McKinsey Global Institute, 2014.

<sup>115</sup> “New heart disease drug to be made available for NHS patients,” HM Government press release, January 2020.

<sup>116</sup> *Handbook for the use of digital technologies to support tuberculosis medication adherence*, WHO, 2017.

Illustration

# To tackle most diseases, a combination of interventions will be necessary.



1. Basic primary care includes primary care for dentistry and eye health and primary care screening, brief interventions, and referral.

2. Other preventive medicines includes preventive medicines for migraine, osteoporosis, and other conditions.

3. Other medicines includes selected pharmacological treatments for cancer, osteoarthritis, gastrointestinal conditions, and ophthalmic conditions.

Source: Global Burden of Disease Database 2017, IHME; McKinsey Global Institute analysis

## Pandemic preparedness

Around the world, countries are rethinking their capacity and expertise in emergency response to monitor, contain, and mitigate serious disease outbreaks when they occur, and learning from weaknesses exposed during the COVID-19 crisis.<sup>1</sup> Reducing the risk of new outbreaks would require global coordinated action and investment in several areas, as well as more robust national response systems, including:

- **Prevention:** Setting and enforcing minimum standards in relation to animal health to reduce the risk of animal-to-human transmission of novel pathogens within the context of food production.
- **Surveillance:** Concentration of surveillance resources and expertise in areas where new infectious diseases are most likely to occur, using advanced analytics and AI to predict locations at particularly high risk—for example, where the interface between humans and wildlife is most acute or rapidly changing.
- **Preparedness and healthcare response:** Coordination and support for preparedness, early recognition and emergency response, mitigation, and recovery, alongside national and local preparedness planning and simulation exercises.
- **Research and development:** Investment in R&D to develop broad-based vaccines and drugs, as well as resources for accelerated development of diagnostics and therapies for new and emerging pathogens with international collaboration and coordination, multisector partnerships, and global financing mechanisms.<sup>2</sup> See chapter 3 for more details on innovation.
- **Resilience:** Investment in the health of vulnerable and disadvantaged communities that may be less able to protect themselves from future pandemics, as well as broader policies to build broader socioeconomic resilience.

In addition to investment in expertise, systems, and infrastructure, effective preparedness will require a mindset shift in all areas of government to break the cycle of “panic and neglect” that tends to characterize the response. This would include five critical elements: creating “always on” systems within the existing health infrastructure that can be scaled at times of crisis; working across national borders to control outbreaks; nurturing cross-sector partnerships in areas such as supply chains and R&D; preparing for knock-on socioeconomic consequences alongside outbreak control; and recognizing the connectedness of pandemic risk, climate change, and antimicrobial resistance in a globalized world.

<sup>1</sup> *Essential steps for developing or updating a national pandemic influenza preparedness plan*, WHO, 2018; McKinsey & Company, *Not the last epidemic: Investing now to reimagine public health systems*, forthcoming.

<sup>2</sup> *WHO R&D Blueprint*, WHO.

## Over 40 percent of health improvements could be achieved with interventions that cost less than \$100 for each additional healthy life year

The levels of adoption envisioned in this analysis are clearly ambitious, yet they are grounded in real-world examples from a range of different and challenging environments. We have included brief summaries of some of these examples in this section to illustrate what is possible with holistic, thoughtful planning and sustained commitment. While the design of all health improvement initiatives, and most critically complex, multisectoral environmental and behavioral strategies, will need to be tailored to the local context, and resource availability, including workforce, budget, and infrastructure, we hope that these brief illustrations will provide insight into what it takes to deliver health improvement at scale.

# 40%

of health improvements globally could be achieved with interventions under \$100

In our analysis, we estimate the incremental cost of delivery for each intervention, according to four country archetypes based on the World Bank categorization of income levels. Cost curves make it possible to compare the relative cost-effectiveness and health impact for each intervention (see Box 8, “Cost curve methodology, interpretation, and limitations”).<sup>117</sup> We find that in all four income archetypes, some interventions like cardiovascular disease prevention are among the largest and lowest-cost interventions, while more commonly, high-impact and cost-effective interventions vary significantly because the underlying disease burden differs. Globally, over 40 percent of health improvements could be achieved at under \$100 for every additional healthy life year and almost 80 percent at under \$1,000.

## Almost 60 percent of health gains in high-income countries will cost less than \$1,000 for each additional healthy year

In high-income countries, cardiovascular disease prevention, diabetes prevention programs, and aggressive smoking cessation strategies have the potential for very high impact (see Box 9, “How Australia reduced smoking”). Greater access to prevention and treatment for low back pain, migraines and headaches, and substance use disorders would also have a substantial impact on the overall disease burden. For low back pain, there is a particular need for more research into effective treatment strategies and the risks of overmedicalization (a particular problem in the treatment of low back pain, though not unique to it), and sustained action on prevention through multimodal approaches including awareness, education, and physical exercise.<sup>118</sup> At the same time, there is a need to address overuse of some therapies and in particular antibiotics, where there is a risk that patterns of use today will create new health threats in the future, increasing the risk of antimicrobial resistance and depleting the arsenal of treatments available for serious infections.<sup>119</sup> Many of the highest-impact interventions are relatively low cost, with 60 percent of the health improvement opportunity identified from interventions with incremental (net) costs falling below \$1,000 per year of healthy life gained (Exhibit 9).<sup>120</sup>

## We find that in all four income archetypes, some interventions like cardiovascular disease prevention are among the largest and lowest-cost interventions.

<sup>117</sup> We are aware that cost-effectiveness is not the same as affordability, and while many interventions are attractive economic prospects in the long run (and even more so given the intrinsic value of human life), they may still require substantial up-front investment, which can be hard to find. We look at this question of overall affordability in more detail in chapter 4.

<sup>118</sup> Rachelle Buchbinder et al., “Low back pain: A call for action,” *The Lancet*, Volume 391, Issue 10137, 2018; Adrian C. Traeger et al., “Care for low back pain: Can health systems deliver?,” *Bulletin of the World Health Organization*, 2019.

<sup>119</sup> *Global action plan on antimicrobial resistance*, WHO, 2015.

<sup>120</sup> Analysis based on average costs across all high-income countries. Note that costs may be higher or lower in some countries.

## Box 8

### Cost curve methodology, interpretation, and limitations

Cost curves help identify the interventions with the biggest potential impact at the lowest unit cost in a specific setting. We identified a set of gold-standard sources from which to collect data on cost per DALY averted for the interventions identified in the detailed disease reviews for each of the four income archetypes. They are the *WHO global action plan for the prevention and control of noncommunicable diseases 2013–2020*, Appendix 3; *Disease Control Priorities*, third edition (DCP3); and the Tufts Medical Center Health Economics Database, which covered two-thirds of interventions. In other cases, we used close analogies of interventions. (For more details, see the technical appendix.)

All interventions are ordered on the vertical axis by the unit cost of improving health, measured as a net cost per each DALY averted.<sup>1</sup> The net unit cost takes into account both the costs of delivering the intervention to the target population and the savings in treatment costs that are avoided as a result. The horizontal axis shows the scale, or volume, of the disease burden reduction achievable through effective implementation of the intervention in the specific setting (for example, in low-income countries). Unit costs and the avertable disease burden are specific to the local context. Interventions on the left-hand side of the cost curve are more cost-effective (cheaper per unit of health impact) than interventions on the right-hand side. Interventions with a larger horizontal area or width have greater potential for impact because they address a larger local disease burden than interventions with a smaller or narrower horizontal area. Interventions are color coded according to whether they are environmental, social, behavioral, preventive, or therapeutic. Only the ten highest-impact interventions are identified by name for each country archetype.

#### Limitations

Estimates of cost per DALY averted cannot easily be translated from one context to another. The exact methodology varies between sources and includes many complex variables that could differ between and within countries, such as price levels of products and supplies, salary levels of healthcare workers, and societal costs of informal caregiving or lost productivity. In addition, the calculation requires a number of methodological assumptions, including but not limited to the scope of costs and savings, the approach to discounting future costs and benefits, and the comparator used. A relatively small difference in any of these inputs can have a large impact on the ultimate calculation.

For these reasons, these cost curves should be interpreted as indicators of likely areas of higher and lower cost-effectiveness for all health interventions in a region. They can be a useful tool to assess overall priorities, yet would require thorough further investigation to adapt for a local context by any individual healthcare system. This is especially true for any specific organizations, given both the time delay between costs incurred and savings accrued, and the fact that costs and savings may be realized in different parts of the system or the wider economy.

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<sup>1</sup> Data on cost per DALY averted was collected from the literature including: WHO Global NCD Action Plan 2013–2020, Appendix 3, Technical Annex, 2017, [https://www.who.int/ncds/governance/technical\\_annex.pdf](https://www.who.int/ncds/governance/technical_annex.pdf); Disease Control Priorities, DCP-3, <http://dcp-3.org/>; Tufts, Center for the Evaluation of Value and Risk in Health, Cost-Effectiveness Analysis Registry, <https://cevr.tuftsmedicalcenter.org/databases/cea-registry>.



Box 9

## How Australia reduced smoking

Australia's approach to reducing smoking demonstrates that dramatic reductions in tobacco use are possible with a sustained and comprehensive strategy.<sup>1</sup> Smoking prevalence in adults fell from 35 percent in 1980 to 14 percent in 2016, with similar sharp decreases in tobacco consumption by teenagers. National efforts continue, with the goal of reaching and even exceeding current OECD best practices, of about 8 percent (observed in Iceland). Australia has gradually increased tobacco reduction measures over time, starting with low-key interventions and gradually increasing the rigor and severity of controls. These include: awareness and educational campaigns spanning the entire media landscape, from billboards to digital channels, with targeted approaches for high-risk groups, including teenagers; a comprehensive ban on tobacco advertising, including branded packaging; assistance programs to quit smoking; comprehensive smoking bans in public places, including public buildings, playgrounds, public transit, bars, pubs, clubs, and outdoor locations including bus stops, specific streets and neighborhoods, and sightseeing spots; and prohibitive pricing with progressive taxation. Since 2010, the cigarette tax has increased by about 12.5 percent a year. The federal government plans to continue tax increases with the explicit goal of making smoking unaffordable. Many other countries have introduced some elements of an effective smoking cessation strategy, yet there are regions where there continues to be scope to reduce smoking-related health risks with more comprehensive programs.

<sup>1</sup> Elizabeth Greenhalgh, Michelle Scollo, and Margaret Winstanley, *Tobacco in Australia: Facts and issues*, Cancer Council Victoria, 2020.

80%

OECD's best practice for share of the population that smokes

## In high-income countries, cardiovascular disease prevention and smoking cessation have the most potential to improve health.

High-income countries

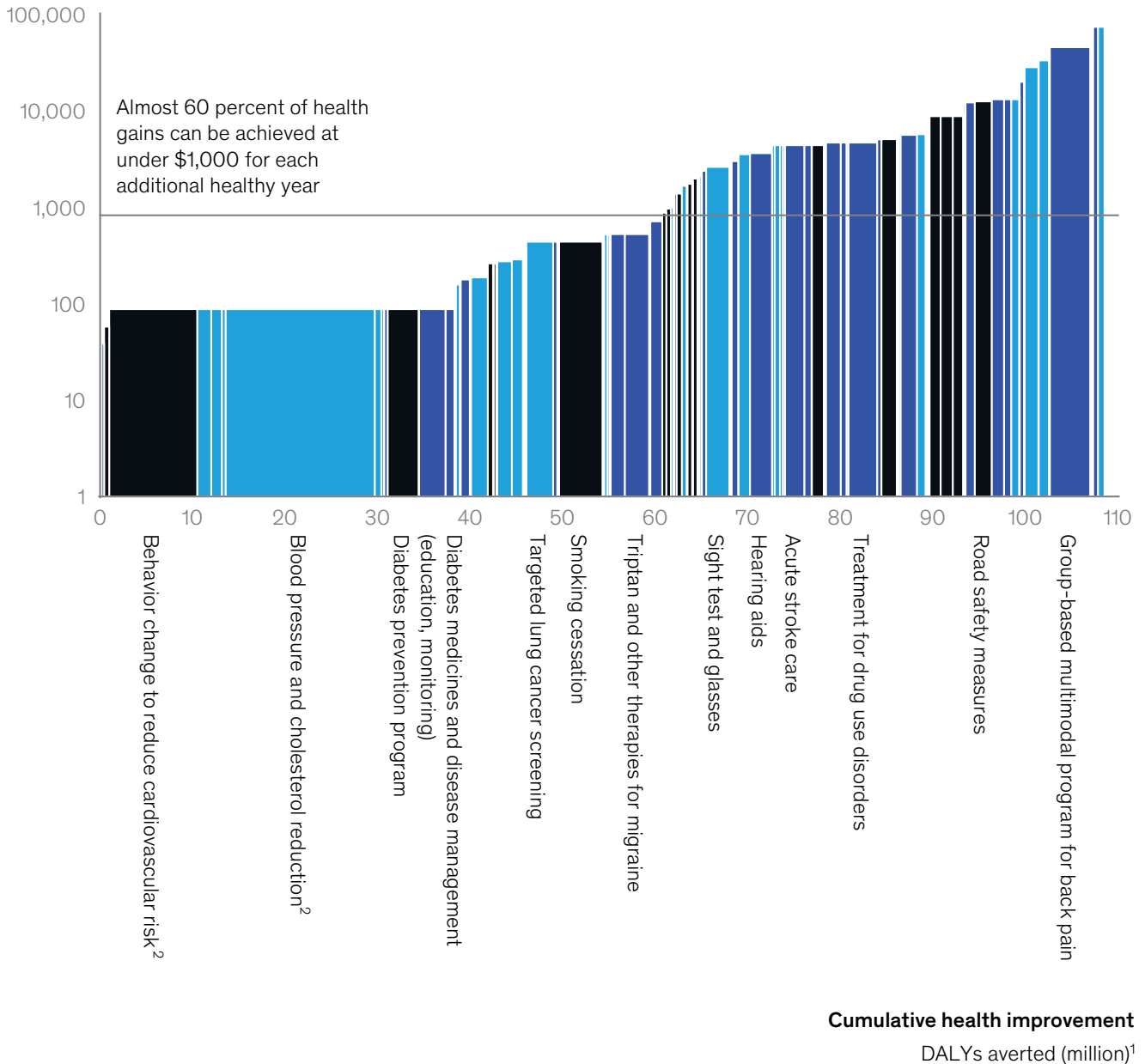
■ Environmental, social, and behavioral

■ Prevention and health promotion

■ Therapeutic

### Cost-effectiveness

Cost per DALY averted (\$, log scale)<sup>1</sup>



1. DALY = disability-adjusted life year.

2. Pharmacological prevention of cardiovascular disease includes use of antihypertensives and statins (and/or other cholesterol-lowering medicines). Cardiovascular lifestyle education includes physical activity, diet, smoking cessation, and alleviation of other risks. These interventions are delivered as a combined program.

Note: Interventions are ordered in ascending order of cost for every healthy life year. The higher the disease burden reduction potential, the larger the width under each intervention.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; WHO, *Updated Appendix 3 of the WHO Global NCD action plan 2013–2020*, April 2017; “Disease Control Priorities 3 (DCP-3): Economic evaluation for health,” University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

## Over 60 percent of health improvements in upper-middle-income countries could cost less than \$1,000 per additional healthy life year

In upper-middle-income countries, the greatest health improvement is from greater use of preventive strategies for cardiovascular disease and diabetes, and smoking cessation (Exhibit 10).<sup>121</sup> Preventive cardiovascular medication (including antihypertensives and statins) combined with lifestyle education could address 3 percent of the addressable disease burden in upper-middle-income countries and would account for only 0.02 percent of the total additional costs (see Box 10, “How to deliver high-impact, low-cost cardiovascular disease prevention”). Many other high-impact interventions are very low cost, with over 60 percent of the health improvement opportunity identified having incremental (net) costs of less than \$1,000 per year of healthy life gained and over 40 percent under \$100 per year of healthy life gained.

### Box 10

#### How to deliver high-impact, low-cost cardiovascular disease prevention

It is possible to deliver high-impact, low-cost cardiovascular disease prevention programs in low- and middle-income countries using a combined polypill and lifestyle education intervention.<sup>1</sup> The cost curves for all regions demonstrate the high potential impact from cardiovascular disease prevention using a combination of medicines and lifestyle change. One challenge of delivering these programs is sustaining adherence to an often complex and potentially costly drug regimen. However, these medicines can be delivered in a once-daily, low-cost pill containing a number of pharmaceutical agents (including atorvastatin, hydrochlorothiazide, and either enalapril or valsartan). Supportive lifestyle education spans the full range of major lifestyle risks, tailored to the local cultural and social context, and delivered by health educators to groups of patients twice a year. Large-scale studies in Iran demonstrate that it is possible to deliver this type of strategy at scale in middle-income countries with infrastructure challenges and to sustain high levels of adherence over time. Adherence is a key success factor for this type of strategy, and the evidence suggests that the simplicity of the polypill mitigates several problems caused by complex medication regimes and multiple-pill regimes.<sup>2</sup>

In higher-income countries, multiple strategies have been shown to improve adherence. One example is team-based care. In this model, physicians, pharmacists, and nurses deliver personalized care with high levels of continuity to support self-care, including daily home monitoring of blood pressure when required.<sup>3</sup>

<sup>1</sup> Khoshnia Roshandel et al., “Effectiveness of polypill for primary and secondary prevention of cardiovascular diseases (PolyIran): A pragmatic, cluster-randomised trial,” *The Lancet*, 2019, Volume 394, Issue 10199.

<sup>2</sup> Robby Nieuwlaat et al., “Interventions for enhancing medication adherence,” *Cochrane Database of Systematic Reviews*, 2014, Issue 11.

<sup>3</sup> *Best practices for cardiovascular disease prevention programs: A guide to effective health care system interventions and community programs linked to clinical services*, Centers for Disease Control and Prevention, US Department of Health and Human Services, 2017.

<sup>121</sup> Over time, this will increasingly include a range of newer, more effective, longer-acting cholesterol-lowering therapies.

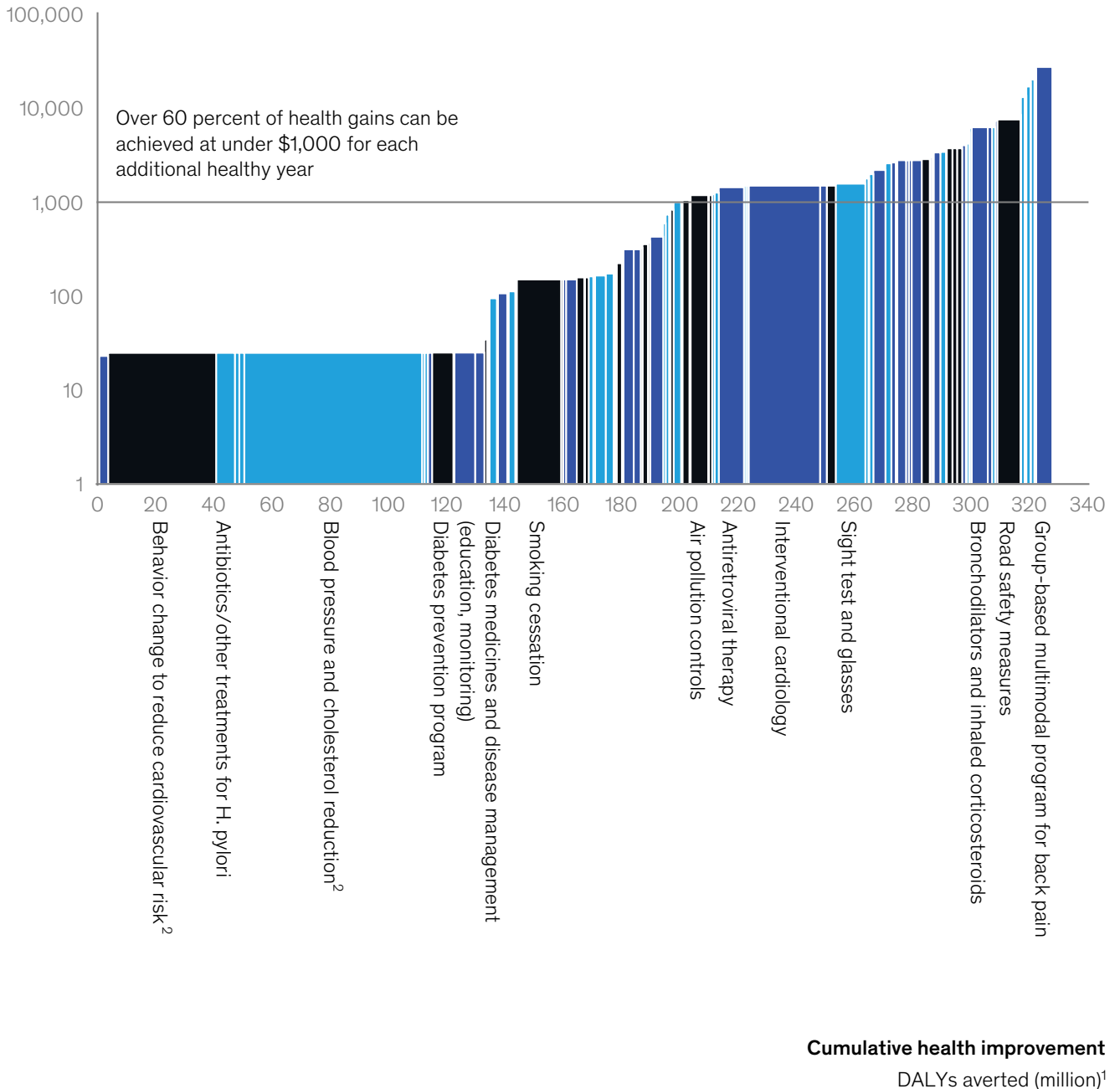
**In upper-middle-income countries, cardiovascular disease prevention, treatment for advanced heart disease, and smoking cessation have been shown to have the most potential to improve health.**

Upper-middle-income countries

■ Environmental, social, and behavioral   ■ Prevention and health promotion   ■ Therapeutic

**Cost-effectiveness**

Cost per DALY averted (\$, log scale)<sup>1</sup>



Note: Interventions are ordered in ascending order of cost for every healthy life year. The higher the disease burden reduction potential, the larger the width under each intervention.

1. DALY = disability-adjusted life year.  
 2. Pharmacological prevention of cardiovascular disease includes use of antihypertensives and statins (and/or other cholesterol-lowering medicines). Cardiovascular lifestyle education includes physical activity, diet, smoking cessation, and alleviation of other risks. These interventions are delivered as a combined program. Interventional cardiology includes percutaneous coronary intervention and coronary artery bypass graft.  
 Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; WHO, *Updated Appendix 3 of the WHO Global NCD action plan 2013–2020*, April 2017; "Disease Control Priorities 3 (DCP-3): Economic evaluation for health," University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

**More than half of health benefits in lower-middle-income countries are from interventions that cost less than \$100 per year of healthy life gained**

In lower-middle-income countries, midwife-assisted safe childbirth could deliver 1 percent of the total addressable disease burden for 0.1 percent of the total additional costs. Water, sanitation, and hygiene, treatment for TB, and prevention of cardiovascular disease with support and education for lifestyle change and pharmacological prevention are also very important (see Box 11, “What a difference water, sanitation, and handwashing can make”). More than half of total health improvement opportunity identified could be delivered through interventions with incremental costs of less than \$100 per year of healthy life gained (Exhibit 11).

Box 11

**What a difference water, sanitation, and handwashing can make**

Water, sanitation, and handwashing (WASH) can make a big difference in health outcomes in many low-income countries.<sup>1</sup> Diarrhea is a leading cause of preventable childhood mortality worldwide, causing 10 percent of deaths in children under five, of which 90 percent could be averted with basic interventions including oral rehydration solutions and oral zinc supplementation, and almost all of which could be prevented with adequate sanitation and comprehensive childhood immunization. While handwashing and safe food processing are comparatively easy to introduce, adherence is a challenge. Basic sanitation remains a cornerstone of efforts and requires investment in infrastructure. Yet even in the least developed areas of the world, countries like Cambodia are making tremendous progress in this regard. Others, like Mozambique, are improving coverage but lag behind in equal access.<sup>2</sup> The expected positive demographic and economic effects shown by our model render this a high-yield, sustainable investment.

The recent coronavirus pandemic has highlighted the importance of basic hygiene measures, and handwashing in particular, to reduce the spread of infectious diseases.<sup>3</sup>

<sup>1</sup> *Childhood diseases: Malaria, pneumonia, diarrhoea, HIV and tuberculosis are preventable and treatable. But they are still killing children in large numbers*, UNICEF; *Progress on household drinking water, sanitation and hygiene, 2000–2017*, UNICEF, 2019.

<sup>2</sup> *Ibid.*

<sup>3</sup> *Coronavirus Disease 2019: Prevention and Treatment*, Centers for Disease Control and Prevention.

90%

of children's deaths under five from diarrhea are preventable



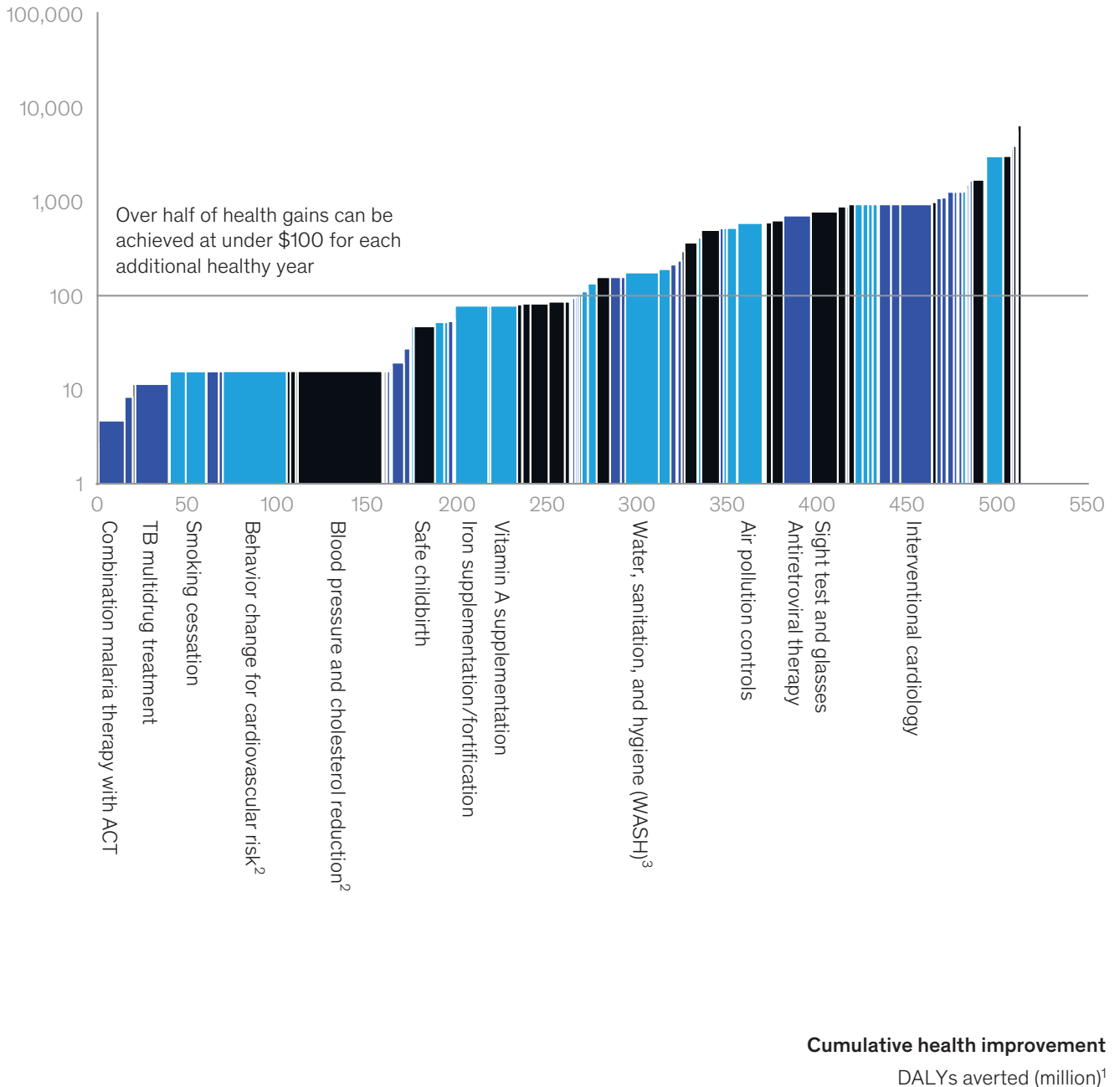
# In lower-middle-income countries, perinatal care, cardiovascular disease prevention, and sanitation have the most potential to improve health.

Lower-middle-income countries

■ Environmental, social, and behavioral   ■ Prevention and health promotion   ■ Therapeutic

## Cost-effectiveness

Cost per DALY averted (\$, log scale)<sup>1</sup>



Note: Interventions are ordered in ascending order of cost for every healthy life year. The higher the disease burden reduction potential, the larger the width under each intervention.

1. DALY = disability-adjusted life year.
2. Pharmacological prevention of cardiovascular disease includes use of antihypertensives and statins (and/or other cholesterol-lowering medicines). Cardiovascular lifestyle education includes physical activity, diet, smoking cessation, and alleviation of other risks. These interventions are delivered as a combined program.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; WHO, *Updated Appendix 3 of the WHO Global NCD action plan 2013–2020*, April 2017; “Disease Control Priorities 3 (DCP-3): Economic evaluation for health,” University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

## Lack of infrastructure in low-income countries increases the cost of care compared to slightly higher-income countries

In low-income countries, the most cost-effective, high-impact interventions include childhood immunizations, safe childbirth, nutrition and sanitation, cardiovascular disease prevention, and prevention and treatment of malaria and TB (see Box 12, “How digital technologies are improving adherence to treatment for people with tuberculosis (TB)”). More than 35 percent of the current disease burden can be averted by interventions with incremental costs falling below \$100 per DALY averted (Exhibit 12). In these countries, a smaller share of health improvement can be delivered at lower unit costs than in slightly wealthier countries, because the base level of infrastructure—for transport and logistics as well as healthcare—increases the challenge and costs of getting care to the people who could benefit.

### Box 12

## How digital technologies are improving adherence to treatment for people with tuberculosis (TB)

One of the major challenges in delivering effective treatment for people with TB is ensuring strict adherence to a daily multidrug regimen over many months, and sometimes years. Erratic adherence not only affects treatment outcomes for the individual concerned, but also increases the risk of transmitting the infection to others and opens the door to the development and spread of drug resistance, making the disease much more difficult to control and expensive to treat. It is not possible to quantify the level of nonadherence globally today, but a recent study in the United Kingdom found that about two-thirds (64 percent) of people treated for TB had characteristics that indicated additional nonadherence risks.<sup>1</sup>

Monitoring adherence through direct observation is challenging for patients and providers. Patients may find daily clinic attendance over a prolonged period disruptive, expensive, and intrusive. Observation is also resource-intensive for providers, requiring daily allocation of physical space and staff, both of which are in short supply in many geographies.

Digital technology offers a range of potential solutions that may be more convenient, lower cost, and more effective.<sup>2</sup> However, TB is widespread in many low-income countries, where the availability, affordability, and reliability of technical infrastructure such as broadband and smartphones cannot be taken for granted. The following three options have been explored most fully:

- **Interactive text messages** have the widest potential applicability. They are low cost, low tech,

and comparatively simple for both providers and patients. While they have been found to be effective in improving adherence in treatment of other health conditions, for example by providing information on family planning and maternal health in low-income countries, so far there is insufficient evidence to indicate which approaches would be most effective for TB.<sup>3</sup>

- **Electronic medication monitoring systems**

usually involve battery-operated, digitally enabled packaging that informs the provider if the blister pack or box holding medications has been opened (or not) within a given time window. This can be a direct message sent by the device or a revealed code that the patient has to relay (for example, by text message) to the provider to indicate that they have opened the device. Studies have shown a high correlation between device recordings and levels of the relevant medication in participant urine samples.<sup>4</sup> This approach is being tested in a number of countries including China, India, and Myanmar, and evidence is emerging that it improves levels of adherence compared to conventional approaches.<sup>5</sup>

- **Video-observed treatment** is similar to directly observed treatment but may cost less and be much more convenient and acceptable for the patient and provider because the interaction takes place via a smartphone. It is in use in many healthcare systems, including in the United States, Mexico, and Belarus, where the technical infrastructure—broadband and smartphones—is already in place.

<sup>1</sup> Including language barrier (no shared language between clinical team and patient), homelessness, co-morbid substance use disorder, co-morbid mental health disorder, clinical complexity, drug resistance, history of nonadherence, and imprisonment. Angela Tucker et al., “Quantifying the need for enhanced case management for TB patients as part of TB cohort audit in the North West of England: A descriptive study,” *BMC Public Health*, Volume 17, Issue 881, 2019.

<sup>2</sup> *Handbook for the use of digital technologies to support tuberculosis medication adherence*, WHO, 2017.

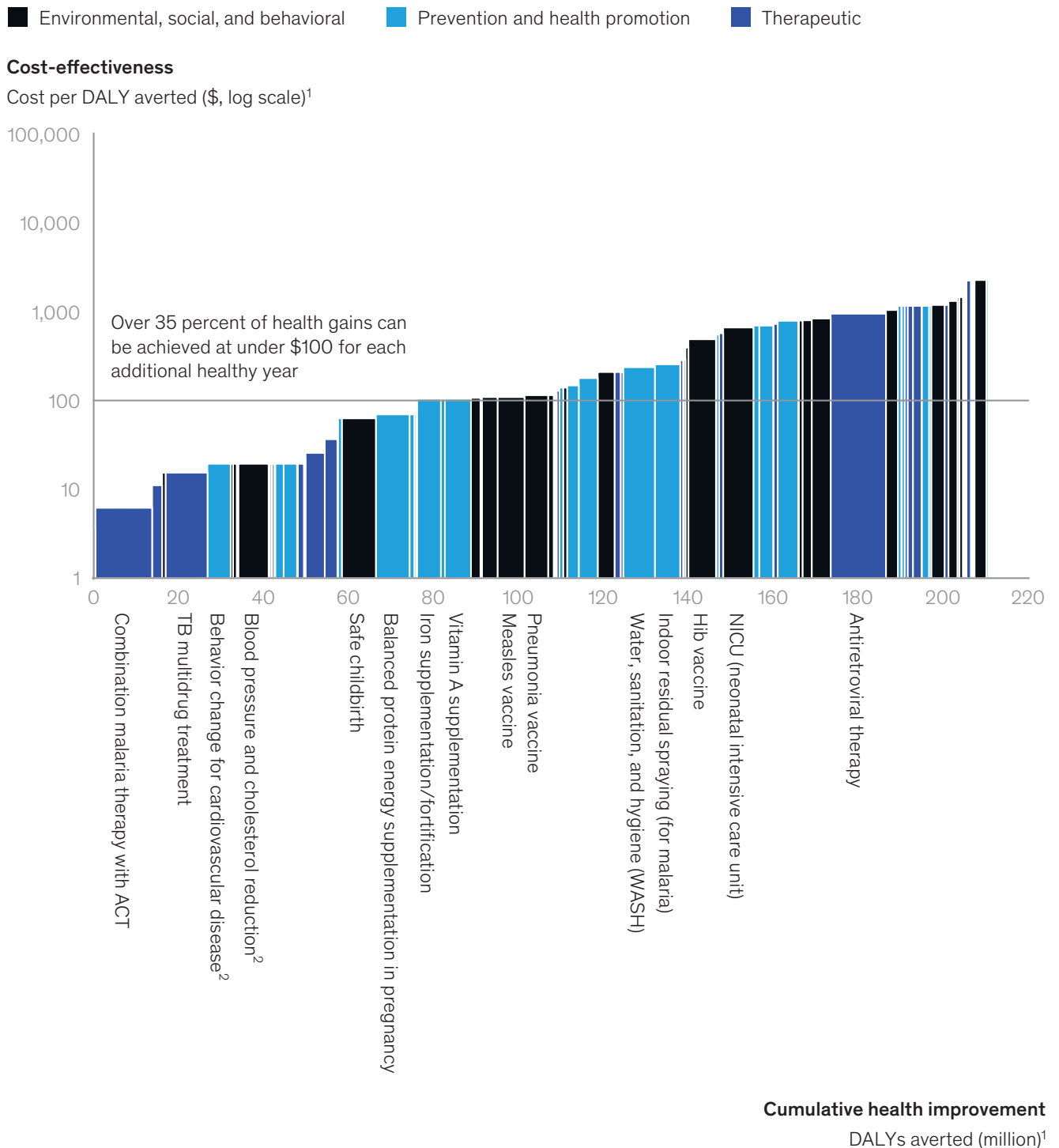
<sup>3</sup> David Wald et al., “One-way versus two-way text messaging on improving medication adherence: Meta-analysis of randomized trials,” *American Journal of Medicine*, Volume 128, Issue 10, 2015; Shama Mohammed, Rachel Glennerster, and Aamir Khan, “Impact of a daily SMS medication reminder system on tuberculosis treatment outcomes: A randomized controlled trial,” *PLOS One*, Volume 11, Issue 11, 2016; Georges Bediang et al., “SMS reminders to improve the tuberculosis cure rate in developing countries (TB-SMS Cameroon): A protocol of a randomised control study,” *Trials*, Volume 15, January 2014; Georgetown University’s Institute for Reproductive Health website.

<sup>4</sup> Shi-tong Huan et al., “Operational feasibility of medication monitors in monitoring treatment adherence among TB patients,” *Chinese Journal of Antituberculosis*, Volume 34, 2012.

<sup>5</sup> Xiaoqiu Liu et al., “Effectiveness of electronic reminders to improve medication adherence in tuberculosis patients: A cluster-randomised trial,” *PLoS Med*, Volume 12, Issue 9, 2015.

## In low-income countries, perinatal care, childhood immunizations, malaria and TB treatment, and sanitation have the most potential to improve health.

Low-income countries



Note: Interventions are ordered in ascending order of cost for every healthy life year. The higher the disease burden reduction potential, the larger the width under each intervention.

1. DALY = disability-adjusted life year.
2. Pharmacological prevention of cardiovascular disease includes use of antihypertensives and statins (and/or other cholesterol-lowering medicines). Cardiovascular lifestyle education includes physical activity, diet, smoking cessation, and alleviation of other risks. These interventions are delivered as a combined program.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; WHO, *Updated Appendix 3 of the WHO Global NCD action plan 2013–2020*, April 2017; “Disease Control Priorities 3 (DCP-3): Economic evaluation for health,” University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

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Ill health continues to be a huge burden on societies and individuals even in countries with strong healthcare systems. However, almost half of that burden—about 40 percent—could be avoided or addressed with known preventive actions and treatments. While uptake and adherence are tough challenges, real-world evidence shows that higher levels of achievement are possible and can add a decade of healthy, active life to the lifespan of an average global citizen. Yet capturing the potential from known interventions goes only so far. In the next chapter, we examine the role that innovation could play in improving the health of the world's population.

**While prevention plays a well-known role in delivering health benefits, our analysis shows how critical prevention really is. The vast majority of health benefits, about 70 percent, come from reducing underlying environmental, social, and behavioral risks and increasing access to high-quality preventive care.**


## A regional view of health gains

Regional views illustrate how increasing access to and uptake of known interventions could reduce the burden of disease and improve the lives and livelihoods of people in different parts of the world. We have selected a diverse mix of age and gender profiles to highlight different areas of impact. The profile selected is not necessarily the group with the highest addressable needs in the region. For each of the selected profiles in each region, we identified the highest causes of the avoidable disease burden and a nonexhaustive selection of interventions with high potential for impact on those conditions in that location.

Exhibit 13

### Illustrations of health improvement potential across regions: North America.

#### The lives of young adults in North America could be improved by preventing and treating substance use and mental health disorders, self-harm, and violence

20- to 24-year-old man in United States and Canada	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Substance use disorders	0.9	Comprehensive program to limit excess substance use including access to psychological and pharmacological therapies	29
	Mental health disorders	0.7	Access to psychological and talking therapies in a range of community settings	18
	Self-harm and interpersonal violence	0.5	Screening, education, referral, and treatment for adolescents and adults	28


Note: These regional views were chosen to represent a diverse mix of age and gender profiles to highlight different areas of impact and do not necessarily represent the group with the highest addressable needs in the region. DALY = disability-adjusted life year. Reduction potential = Region- and age group-specific share of disease burden that is avertable by 2040.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis




## Illustrations of health improvement potential across regions: Australasia.

### Adults in Australasia could look forward to a longer period of healthy middle age

55- to 59-year-old woman in Australasia	Disease burden, 2017		Selected interventions	Reduction potential %
	Top health risks	DALYs, million		
	Cancers	0.10	Smoking cessation and hepatitis B vaccination	27
	Musculoskeletal disorders	0.08	Group-based education, weight management, and physiotherapy for back and neck pain	34
	Cardiovascular disease	0.06	Comprehensive cardiovascular prevention, including medicines and support for lifestyle and behavioral changes	34


## Illustrations of health improvement potential across regions: Western Europe.

### The most common diseases among 50-year-old men in Western Europe could be significantly decreased

50- to 55-year-old man in Western Europe	Disease burden, 2017		Selected interventions	Reduction potential %
	Top health risks	DALYs, million		
	Cancers	1.7	Smoking cessation	28
	Musculoskeletal disorders	1.3	Group-based education, weight management, and physiotherapy for back and neck pain	31
	Cardiovascular disease	0.8	Comprehensive cardiovascular prevention including medicines and support for lifestyle and behavioral changes	34

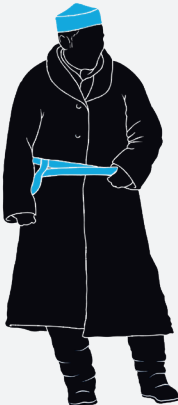
**Illustrations of health improvement potential across regions:  
East Asia.**

**Working adults in East Asia could be less likely to develop a serious health condition**

40- to 44-year-old woman in East Asia	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Cardiovascular disease	4.5	Cardiovascular polypill plus lifestyle education, and specialist cardiac care (eg, interventional cardiology)	39
	Cancers	4.2	Vaccine/treatment for hepatitis B and hepatitis C; screening, early diagnosis, and treatment for breast cancer	36
	Musculoskeletal disorders	4.1	Group-based education, weight management, and physiotherapy for back and neck pain; workplace health and safety	41


**Illustrations of health improvement potential across regions:  
Eastern Europe and Central Asia.**

**Working-age adults in Eastern Europe and Central Asia could be better protected from lifestyle-related health issues**

35- to 39-year-old man in Eastern Europe and Central Asia	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Cardiovascular disease	1.1	Cardiovascular polypill plus lifestyle education, and specialist cardiac care (eg, interventional cardiology)	35
	Musculoskeletal disorders	0.8	Group-based education, weight management, and physiotherapy for back and neck pain; workplace health and safety	33
	Self-harm and interpersonal violence	0.8	Screening, intervention, and onward referral for alcohol use disorders; psychological counseling and support	26


### Illustrations of health improvement potential across regions: Middle East and North Africa.

#### Young adults in the Middle East and North Africa could have lower levels of disability

30- to 34-year-old woman in Middle East and North Africa	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Mental health disorders	1.0	Pharmacological and psychological therapy delivered in the community	15
	Musculoskeletal disorders	0.9	Group-based education, weight management, and physiotherapy for back and neck pain; workplace health and safety	32
	Self-harm and interpersonal violence	0.9	Screening, education, referral, and psychological treatment for adolescents and adults	41


### Illustrations of health improvement potential across regions: Latin America.

#### Older people in Latin America could be more active because of improved health

75-year-old man in Latin America	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Cardiovascular disease	2.1	Cardiovascular polypill and support for lifestyle and behavioral changes	40
	Cancers	1.2	Smoking cessation	29
	Diabetes and kidney diseases	0.9	Diabetes prevention program, including education, weight management, and peer support	33


## Illustrations of health improvement potential across regions: South Asia.

### Five-year-olds in South Asia could grow up physically and cognitively healthier

5-year-old in South Asia	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Respiratory infections and tuberculosis	24	Comprehensive childhood immunization program; access to specialist acute treatment	<b>81</b>
	Diarrhea and intestinal infections	13	Provision of clean water supplies and sanitation facilities	<b>91</b>
	Meningitis and hepatitis	10	Vaccines; access to specialist acute treatment	<b>44</b>

## Illustrations of health improvement potential across regions: Sub-Saharan Africa.

### Pregnant women in sub-Saharan Africa could feel more certain that their children would be born healthy

Pregnant woman in sub-Saharan Africa	Top health risks	Disease burden, 2017 DALYs, million	Selected interventions	Reduction potential %
	Maternal and neonatal disorders	6.4	Safe childbirth in a clean setting with trained midwife support and evidence-based care	<b>74</b>
	HIV/AIDS and sexually transmitted infections	4.4	Antiretroviral therapy	<b>74</b>
	Congenital birth defects	2.1	Dietary supplements in preconception period and during pregnancy	<b>41</b>







# 3. The role of innovation

Cardiovascular disease is the leading cause of death globally, yet fully curative treatments for most people are not available. For many mental health and neurological disorders, including Alzheimer's disease and dementia, the understanding of the underlying biology is at a relatively early stage. And while the risk factors for diabetes and lung cancer are understood, how to make the needed behavioral changes easier to maintain is not. We find that 40 percent of the global disease burden could be addressed with known interventions, but that leaves 60 percent unaddressed. It is clear that innovation—in the form of new medicines, procedures, medical devices, technologies, and delivery models—will be critical to continuing to improve the health of the world's population.

# 60%

remaining share of the disease burden without effective treatment

How innovations could develop and what their potential impact might be is challenging to predict. A medical breakthrough for dementia or certain cancers, for example, could transform the global health landscape, much as the discovery of penicillin did. Tackling the underlying biology of aging could significantly extend healthy lifespan by postponing the onset of several age-related conditions.<sup>122</sup> At the same time, the scale and pace of innovation could be both larger and faster if collaborations inspired by COVID-19 and more open ways of working are incorporated. However, new threats to human health may emerge at any time, placing new and unexpected demands on the scientific community.

In this chapter, we explore how innovations could affect the disease burden by conducting an extensive and systematic review of the visible health innovation pipeline. In consultation with experts in the field, we identify ten promising technologies that could have a material impact on health by 2040. By identifying and estimating the potential scope of innovations in the pipeline, we find that these technologies could reduce the disease burden by a further 6 to 10 percent, assuming aspirational yet realistic adoption rates by 2040. To identify any gaps in the innovation pipeline, we analyze current efforts in research and development and find that several areas, including mental and neurological disorders, may be underrepresented. We also identify the need to innovate in healthcare delivery to help sustain behavioral change and ensure access and affordability.

## **Innovation is necessary to tackle the remaining 60 percent of the disease burden**

Innovation can help improve the health of the world's population by broadening access to known interventions, improving the cost-effectiveness of today's treatments, finding new ways to prevent diseases, slowing the aging process, and improving the delivery of healthcare.

Our quality of life today is enabled by the tremendous past innovations advancing human health and longevity. In the 20th century alone, there were many true breakthroughs. Insulin was discovered in 1921 and used for the treatment of diabetes; penicillin was discovered in 1928, ushering in the so-called golden age of antibiotics; the first successful bone marrow transplant occurred in 1968, followed by many advancements in surgery; and the Human Genome Project was launched in 1990, sequenced the first complete human genome in 2003, opened huge new areas for medical research, and paved the way for a range of new treatments for cancers and other conditions. Recent advancements, such as the latest

<sup>122</sup> Carlos López-Otín et al., "The hallmarks of aging," *Cell*, Volume 153, Issue 6, 2013; Jay S. Olshansky et al., "Pursuing the longevity dividend: Scientific goals for an aging world," 2007; Robert N. Butler et al., "New model of health promotion and disease prevention for the 21st century," *The BMJ*, Volume 337, Issue 7662, 2008.

generation of highly effective and well-tolerated hepatitis C treatments, reflect the time, resources, and dedication put toward research and development.

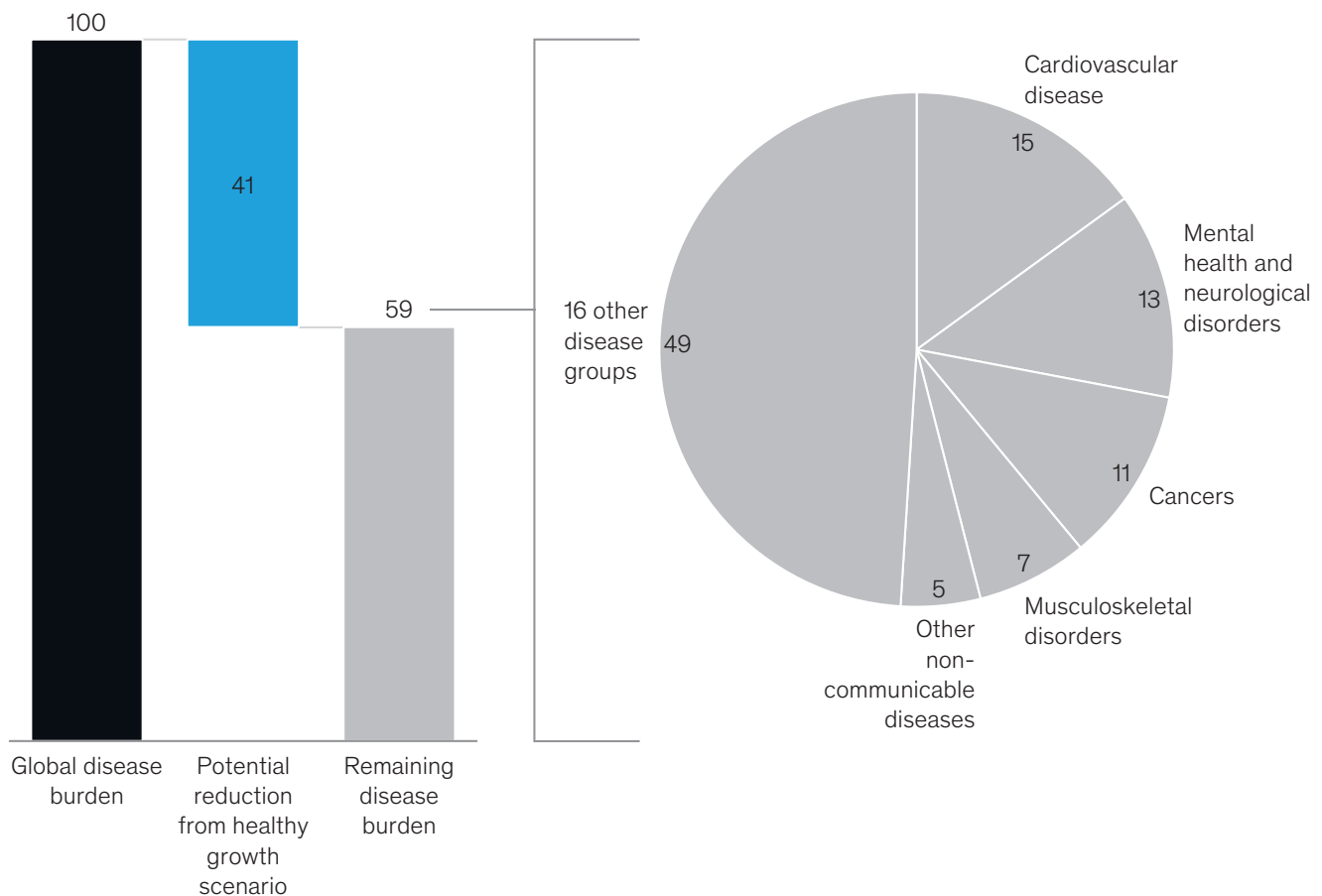
Despite these achievements, about 60 percent of the global disease burden has limitations in effective prevention or cure. Leading the list are cardiovascular disease, mental health disorders, neurological disorders (dominated by dementia), and cancers, which together count for almost one-third of today's disease burden without treatment (Exhibit 22). The underlying biology of many diseases, such as some types of cancers, mental health disorders, and dementia, is not understood in depth. Much room remains for further innovation to expand and enhance the range of treatments available and to improve existing treatments by making them easier, more acceptable, and affordable to people who could benefit. Nonadherence to medication regimens is a worldwide problem that may halve the potential benefits of treatment for a wide range of chronic conditions, leading to avoidable suffering and loss.<sup>123</sup> Behavioral change in general is difficult to sustain. As a result, understanding and helping to sustain behavioral change, through better and more thoughtful product design and delivery, would increase the impact of innovation.

Exhibit 22

**Some diseases have limited effective prevention and therapeutic interventions, for example, cardiovascular diseases, cancers, and mental and neurological disorders.**

**Disease burden impact**

%



Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

<sup>123</sup> World Health Organization, "Adherence to long-term therapies: Evidence for action," 2003.

Many conditions with limitations in effective treatments are diseases associated with aging.<sup>124</sup> Biological aging is a risk factor common to cancers, cardiovascular disease, and neurological disorders such as dementia, among other conditions. At older ages, tackling an individual disease rarely extends healthy life years substantially, because the risk of other age-related diseases remains high.<sup>125</sup> To make further gains in healthy lifespans possible, the underlying biology of aging, which is responsible for many of the diseases in the elderly, must be addressed or slowed down directly; targeting the biology of aging rather than individual diseases will likely require a new innovation paradigm. The world needs innovation to develop treatments for diseases currently without effective cures and to slow the process of cellular aging.

Scientific and technological innovation also play an important role in improving the ways in which care is delivered. One major challenge today is making treatments, whether aimed at preventing ill health or managing chronic conditions, more acceptable, convenient, and affordable for those who could benefit. This will require higher levels of experimentation and evaluation in a broader set of technologies and social interventions. In parallel, these insights into product and service design must be embedded much earlier in the process. Technological innovation also offers the promise of better planning and preparing for healthcare, for both one-off crises and longer-term problems, using real-world data and analytics to predict risks, provide early warnings, and monitor and map the effectiveness of different responses in real time and over the long term.

### **We identify ten technology categories that have the potential to reduce the total disease burden by a further 6 to 10 percent by 2040**

We systematically surveyed current pipelines in clinical research and development to understand future innovations. We did this to identify the most promising technologies and quantify their potential to reduce the global disease burden by 2040 (see Box 13, “Our methodology for determining the ten most promising innovations and their impact on the disease burden”).

# 6–10%

reduction in the disease burden from innovation

We found ten categories of technologies that our analysis suggests could reduce the total disease burden by a further 6 to 10 percent, assuming aspirational yet realistic adoption rates by 2040.<sup>126</sup> These categories include: omics and molecular technology, next-generation pharmaceuticals, cellular therapy and regenerative medicine, innovative vaccines, advanced surgical procedures, connected and cognitive devices, electroceuticals, robotics and prosthetics, digital therapeutics, and tech-enabled care delivery (see “Ten promising innovations”).

In each of these areas of innovation, small-scale pilots and applications already exist. For instance, surgical robots are being used successfully for a variety of surgeries, especially treatments for prostate cancer. Roughly 20 advanced therapies based on omics and molecular technologies as well as cell therapy are on the market in the United States, including gene therapies targeting muscular atrophy and a genetic vision disorder, and a cell therapy targeting leukemia.<sup>127</sup>

<sup>124</sup> Aging is defined as “a persistent decline in the age-specific fitness components of an organism due to internal physiological deterioration” by Michael R. Rose, *Evolutionary biology of aging*, Oxford University Press, 1994.

<sup>125</sup> Jay S. Olshansky et al., “Pursuing the longevity dividend: Scientific goals for an aging world,” 2007; Robert N. Butler et al., “New model of health promotion and disease prevention for the 21st century,” *The BMJ*, Volume 337, Issue 7662, 2008.

<sup>126</sup> Assuming between 50 and 80 percent adoption rate across the range of innovation in upper-middle- and high-income countries and between 5 and 20 percent in low- and lower-middle-income countries.

<sup>127</sup> “Approved cellular and gene therapy products: Approved products,” US Food and Drug Administration.

## **Our methodology for determining the ten most promising innovations and their impact on the disease burden**

To identify the most promising technologies to further reduce disease burden by 2040, we focused on technologies with potential to impact diseases with the greatest remaining unmet need and assessed current biological understanding of the disease and the effort and excitement surrounding each, measured by research funding. To estimate the potential impact of innovations, we focused on initiatives that are already in early stages of development or being piloted at a small scale. Efforts in this visible pipeline are more likely to be approved and adopted broadly enough to make a material impact on health over 20 years.

Our first step was to identify promising technologies with potential to further reduce the disease burden that remains after applying established interventions discussed in chapter 2. We examined pharmaceutical research, consulted several academic journals, and spoke to experts in fields of research, for example, in omics and molecular technologies, and in specific disease areas like Alzheimer's and dementia. We identified more than 200 innovations likely to have an impact by 2040, including innovations to cure and prevent diseases and innovations that could improve healthcare efficiency and accessibility.<sup>1</sup>

To size the potential impact of these innovations, we assessed the current biological understanding of the disease and the extent of research effort (in the form of clinical trials) currently under way. We asked experts in the field to assess the probability that the innovation would reach the market by 2040, and interviewed experts in each of the major disease groups to understand the potential impact that these innovations could have on the remaining disease burden. We used the intelligence gathered in these interviews to assess the probable scale of impact for each innovation.

For example, cancer experts we interviewed said they believe that the success in treating chronic myeloid leukemia with targeted immunotherapy could be replicated in solid tumors. Cell therapies for solid tumors are one technology that could make this happen. We identified solid tumors with high remaining disease burden that could benefit most and applied the cure rates seen in cancers of the blood today to estimate the potential impact of innovations in cell therapy by 2040.

For each disease area, we assumed a combined adoption rate for all innovations with potential to reduce remaining burden of that disease. For high- and upper-middle-income countries, we assumed between 50 and 80 percent adoption; in low- and lower-middle-income countries, we assumed a lower rate of between 5 and 20 percent.

We recognize that forecasting the impact of future innovations is inherently uncertain. While our estimates reflect our best assessment of the potential at the time of the report writing, they should not be considered a forecast of 2040 outcomes.

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<sup>1</sup> We focused on innovations that have a direct impact on health outcomes, like drugs, digital therapies, devices, and medical technologies. This is not an exhaustive list but includes the most promising innovations that are in the pipeline or have been piloted at a small scale today. We recognize that there is a certain level of overlap between these categories, for example, some innovative vaccines like RNA vaccines may rely on omics and molecular technologies. Innovations that enhance nonclinical efficiency—like robotic process automation, the automation of repetitive tasks (including the majority of claims processing) via simple rules—have the potential to rapidly enhance productivity. We cover some of these in chapter 4.

The next generation of innovations we identify differs from the most common medical interventions introduced in the past few decades in two ways. First, many are preventive in nature, rather than intended to manage difficult and chronic conditions. For instance, omics—specifically genetic profiling—can help people assess their risk of developing diseases like Alzheimer’s and certain types of cancers. Even though cures may not exist, tailoring treatments or having future treatments that tackle the disease at an earlier stage would significantly improve chances of survival and quality of life.<sup>128</sup> Some 70 innovations, over one-third of those we studied, can be categorized as preventive or for diagnostic uses.

Second, many of these innovations are digitally enabled. Artificial intelligence and data analytics increase the productivity of clinical trials and enhance drug discovery, and the exponential progress enabled by AI and advancing biotechnologies could unleash innovations that are in very early stages of research today.<sup>129</sup> Discoveries of new therapies in the past relied on a reductionist approach of narrowing down to individual parts with specific functions and properties to overcome biological complexity. However, more sophisticated computational methods such as AI and access to longitudinal patient data can enable a better understanding of the underlying biological complexities and help develop more holistic and reproducible disease models that could lead to more specific and scalable therapeutic innovation.<sup>130</sup> AI systems are also foundational for omics and molecular technologies, for example, by making techniques such as gene editing faster and more accurate.<sup>131</sup> AI can also improve treatment design, creating more personalized and targeted approaches for individuals, for example with personalized therapies, self-care tools, and connected and cognitive devices.

We find that the impact of each technology to reduce the disease burden varies by disease. For instance, innovations such as vaccines and gene drives may well be able to significantly reduce the prevalence of malaria or even eradicate it.<sup>132</sup> In other areas, like mental health, a lot remains to be done, and innovations in the visible pipeline may have only limited impact. This variation led us to analyze R&D investment in diseases. We turn to that analysis in the next section.

### **Today’s R&D investment lags behind in mental and neurological disorders, cardiovascular diseases, and communicable diseases**

>\$40B

annual R&D budget of the  
National Institutes of health in the US

Considering these risks and current innovation efforts, we analyzed healthcare R&D spending to assess whether current resource allocation reflects unmet health needs. Globally, R&D spending in the pharmaceuticals industry is about \$300 billion today, with about \$170 billion coming from the private sector and \$130 billion from the public and nonprofit sectors and academia.<sup>133</sup> The National Institutes of Health in the United States is one of the largest funders globally, with an annual budget of more than \$40 billion.<sup>134</sup> We analyzed clinical development efforts, measured with R&D spending in various diseases, and compared them to the unmet health need, measured by the remaining disease burden after applying the known interventions discussed in the previous chapter.<sup>135</sup>

We found only a weak correlation between the remaining disease burden and R&D efforts. For example, cancer research constituted 35 percent of clinical trials in 2017, a higher share

<sup>128</sup> Marta Crous-Bou et al., “Alzheimer’s disease prevention: From risk factors to early intervention,” *Alzheimer’s Research & Therapy*, 2017, Volume 9, Issue 1; Ruth Etzioni et al., “The case for early detection,” *Nature Reviews Cancer*, 2003, Volume 3, Issue 4.

<sup>129</sup> *The Bio Revolution: Innovations transforming economies, societies, and our lives*, McKinsey Global Institute, May 2020.

<sup>130</sup> Nic Fleming, “How artificial intelligence is changing drug discovery,” *Nature*, 2018, Volume 557, Issue 7706.

<sup>131</sup> See *The Biological Revolution: new capabilities, profound risks*, McKinsey Global Institute, April 2020.

<sup>132</sup> Richard Feachem et al., “Malaria eradication within a generation: Ambitious, achievable, and necessary,” *The Lancet*, 2019, Volume 394, Number 10203; and Luke Alphey, “Can CRISPR-Cas9 gene drives curb malaria?,” *Nature Biotechnology*, Volume 34, Issue 2, 2016.

<sup>133</sup> *Parexel Biopharmaceutical R&D Statistical Sourcebook 2017/2018*, Barnett International, 2019.

<sup>134</sup> *Budget*, National Institutes of Health, US Department of Health and Human Services.

<sup>135</sup> We recognize that our analysis based on clinical trials looks only at one part of health-related R&D. The spending share between diseases is different for digital health or medical technologies development. For example, cardiovascular disease has several medical technology innovations in the pipeline such as stents; see Anubhav Bussooa, Steven Neale, and John R. Mercer, “Future of smart cardiovascular implants,” *Sensors*, Volume 18, Issue 7, 2018. Also addressing diabetes represents a large share digital health investments. See David C. Klonoff et al., “Is digital health for diabetes in an investment bubble?,” *Journal of Diabetes Science and Technology*, Volume 14, Issue 1, 2020.

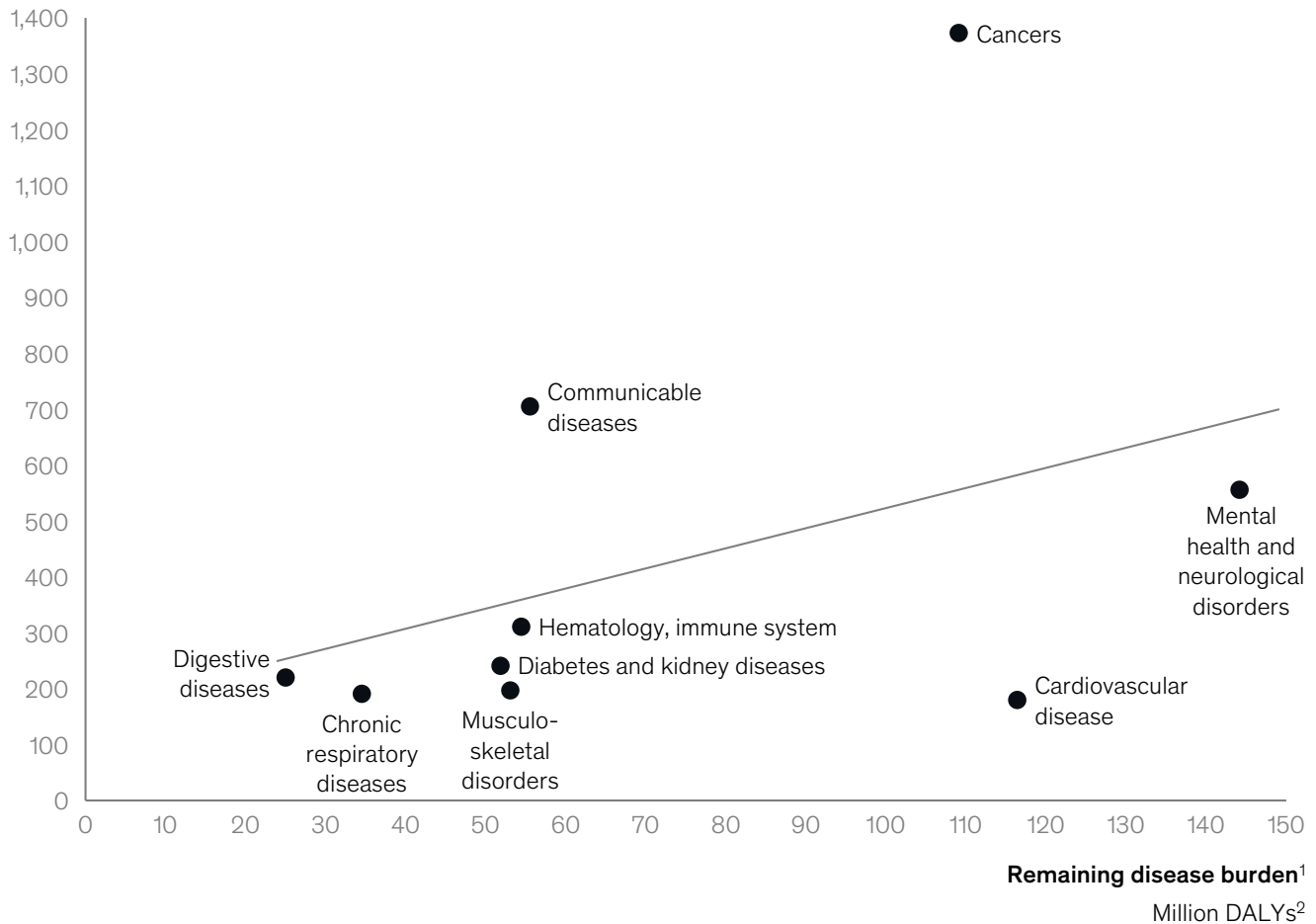


than its 12 percent share of the unaddressed disease burden, reflecting recent scientific breakthroughs, the discovery of new targets, and favorable economic incentives for the pharmaceutical industry to develop drugs.<sup>136</sup> Less research effort is invested in other diseases than might be expected based on the disease burden (Exhibit 23).

Exhibit 23

**There is a mismatch in research efforts: Mental health and neurological disorders and cardiovascular disease are underrepresented.**

**Total number of compounds in clinical development (Phase I–III), 2017**



1. Remaining disease burden in the theoretical maximum scenario (represents 100% adoption of known interventions).  
 2. DALY = disability-adjusted life year.

Source: Pharmaprojects 2019; Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

Among the gaps we find are the following:

- **Mental and neurological disorders.** For mental disorders and neurological disorders, particularly dementia, scientific understanding of the underlying causes is lacking.<sup>137</sup> Bridging the gap in resource allocation may require concerted investment in basic research to continue building the scientific understanding of disease.<sup>138</sup> This gap may need to be filled by public or philanthropic funding since more research in the preclinical phase is required, making the development process long and uncertain, particularly in dementia.

<sup>136</sup> Six out of the ten top-selling drugs worldwide in 2018 are oncology drugs, according to the EvaluatePharma database.  
<sup>137</sup> See Alzheimer's association; for schizophrenia, see "Harvard Mental Health Letter: The negative symptoms of schizophrenia," 2006.  
<sup>138</sup> This includes a better understanding of biomarkers and identification of targets.

Additionally, in the case of mental health, innovation may be needed outside medicine, specifically in better understanding and addressing social determinants of health.<sup>139</sup>

- **Cardiovascular disorders.** The sheer burden of the disease globally warrants an increase in research activity. However, the private-sector incentives for cardiovascular disease innovation are limited given that there already are several well-established generic therapies (for example, antihypertensive drugs and statins).<sup>140</sup> The low cost of existing approaches to prevent and manage symptoms like high blood pressure discourages the prescribing of more expensive interventions, even if they are more effective. This may require rethinking financial incentives—for example, price-volume guarantees with payers and governments—to overcome the incentive challenges. Given the lifestyle-related risk factors, addressing cardiovascular disease could benefit from increasing focus on behavioral interventions, such as enabling healthy behaviors and improving adherence to medication.
- **Communicable diseases.** As the COVID-19 pandemic rampages through the world, it has become clear that innovation is the answer to infectious diseases, which are some of the great health risks for the future (see Box 14, “The vital role of innovation in the fight against pandemics”). Though we find that communicable diseases receive more funding than the share of their remaining disease burden projected for 2040, our theoretical maximum scenario does not account for the additional health risks from AMR and pandemics.<sup>141</sup> Investment in R&D for infectious diseases is required on two fronts—vaccines to prevent diseases and antibiotics to treat them.
  - **Vaccines** have been and continue to be an important contributor to health improvements. Yet until the COVID-19 pandemic, vaccine development had been slowing.<sup>142</sup> Many diseases do not have an effective vaccine. Some, like malaria and HIV, affect millions of people, and others, like the respiratory syncytial virus, or RSV, have potential to spread rapidly. Scientific complexity and, in some cases, commercial uncertainty about these infectious diseases make it unattractive for companies to invest in the long, costly vaccine development process.<sup>143</sup> Collaboration through public-private partnerships and data sharing as well as facilitating funding for emerging threats and low-income market needs may fuel the next wave of innovation.<sup>144</sup> The unprecedented number of initiatives under way to find a vaccine for COVID-19 demonstrate the potential for broader innovation in vaccines.
  - **Antibiotics.** Antimicrobial resistance poses a serious threat to human health. The pathogens that cause infectious disease continuously mutate and evolve, both organically and in response to the use—and in some cases the overuse—of the treatments developed to contain them. Over time, this leads to resistance. Resistance is a growing problem globally, particularly in the field of antibiotics (used to treat bacterial infections), but it also affects medicines used to treat infections caused by viruses, parasites, and fungi. Private funding in antibiotics research has been declining steadily in recent years because economic incentives for companies to invest in new antibiotics are weak. Unlike drugs that treat chronic conditions and are taken for years, antibiotics are often taken for just a week or two, diminishing their market potential for drug makers. Moreover, payers and healthcare systems may aim to limit the use of any new antibiotic by prescribing it for only the most severely drug-resistant

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<sup>139</sup> Celso Arango et al., “Preventive strategies for mental health,” *The Lancet Psychiatry*, 2018, Volume 5, Number 7; Ingrid Torjesen, “Childhood trauma doubles risk of mental health conditions,” *The BMJ*, 2019; Volume 364; *Risks to mental health: An overview of vulnerabilities and risk factors*, WHO, 2012.

<sup>140</sup> Generic preventive medication is available for some types of cardiovascular disease, such as ischemic heart disease and stroke. However, for others, like idiopathic dilated and hypertrophic cardiomyopathy, researchers have made few scientific breakthroughs that lend themselves to drug discovery.

<sup>141</sup> As we discussed in chapter 2, many infectious diseases included in the 2040 forecasts have cost-effective preventive interventions and treatments, making the remaining disease burden, the denominator in our exhibit, low.

<sup>142</sup> *Refueling the innovation engine in vaccines*, McKinsey & Company, May 2019.

<sup>143</sup> “Encouraging vaccine innovation: Promoting the development of vaccines that minimize the burden of infectious diseases in the 21st century,” United States Department of Health and Human Services, Report to Congress, December 2017.

<sup>144</sup> *Refueling the innovation engine in vaccines*, McKinsey & Company, May 2019; Michael Kremer et al., “Advance market commitments: Insights from theory and experience,” Stanford Institute for Economic Policy Research working paper, 2020.

infections, with the goal of delaying the development of resistance to the new therapy. Today, only 13 antibacterial agents are in the Phase III pipeline targeting the WHO priority pathogens. WHO recently called for concerted action from public funders and pharmaceutical companies to address the gap.<sup>145</sup> Incentives to stimulate research in antibiotics may include increased funding from the public, private, and philanthropic sectors as well as changes to pricing and reimbursement.<sup>146</sup> For example, the National Health System in the United Kingdom is testing a subscription model to pay for new classes of antibiotics on an annual value basis, irrespective of the amount used, in order to reward research.<sup>147</sup>

## Innovations in the delivery of healthcare and preventive science offer great potential to improve health

In addition to investing in R&D for diseases and novel pathogens, there is a need to improve preventive interventions. Innovation is critical in finding ways to sustain behavioral change, to increase access to healthcare, particularly in low- and middle-income countries, and to reduce the cost of future medical advancements.

As we point out in chapter 2, environmental, social, and behavioral factors are key determinants of health outcomes and constitute up to one-third of the opportunity. However, creating effective interventions to change behavior has not been easy given the complex socioeconomic factors and multiplicity of interdependent contributors involved. Some promising fields of preventive science research, such as combining digital health and behavioral economics to engage people and encourage them to make decisions that positively contribute to health, could influence behavior like weight loss or better adherence.<sup>148</sup> Several small-scale ongoing clinical trials could significantly affect population health if replicated at a large scale. Yet only 7 to 9 percent of the US National Institutes of Health budget goes to research on behavioral interventions to prevent chronic conditions.<sup>149</sup>

# 7–9%

share of the US National Institutes of Health budget for research on behavioral interventions for chronic conditions

Low- and middle-income countries lack access to known health interventions and will continue to lag behind more prosperous countries in the adoption of future healthcare innovations. While several organizations are advancing social innovations in healthcare delivery that address the challenges of affordability and access, much remains to be done.<sup>150</sup> Innovation in access and affordability can take different forms: redesigned processes—for example, reorganized care pathways, such as one-stop-shop mobile surgery units and integrated, strengthened pharmacy supply chains; design of products, for example low-cost dialysis machines and ventilators, or medicines that don't require refrigeration, for safe and affordable use in low-resource locations where electricity and running water may not be reliable; new market mechanisms, such as community and microfinance initiatives and global procurement models; and innovative workforce models such as peer-to-peer services and cascaded clinical training programs. In many cases, the most effective delivery innovation may involve a combination of these forms. An important imperative will be identifying some of these social innovations and scaling them across regions.

<sup>145</sup> 2019 antibacterial agents in clinical development: An analysis of the antibacterial clinical development pipeline, WHO, 2019.

<sup>146</sup> Elias Mossialos et al., "Policies and incentives for promoting innovation in antibiotic research," WHO, 2010.

<sup>147</sup> Rebecca E. Glover et al., "Subscription model for antibiotic development," *The BMJ*, 2019.

<sup>148</sup> Richard Thaler and Cass R. Sunstein, *Nudge: Improving Decisions About Health, Wealth, and Happiness*, Yale University Press, 2008; George Loewenstein, David A. Asch, and Kevin G. Volpp, "Behavioral economics holds potential to deliver better results for patients, insurers, and employers," *Health Affairs*, Volume 32, Issue 7, 2013.

<sup>149</sup> Chris Calitz et al., "National Institutes of Health funding for behavioral interventions to prevent chronic diseases," *American Journal of Preventive Medicine*, Volume 48, Issue 4, 2015.

<sup>150</sup> See Social Innovation in Health Initiative (<https://socialinnovationinhealth.org/>) and Center for Health Market Innovations (<https://healthmarketinnovations.org/>) for case studies from Asia, Latin America, and sub-Saharan Africa.

## The vital role of innovation in the fight against pandemics

Scientific innovation holds the key to responding rapidly and effectively to future pandemics and health crises. Every pandemic is different and presents new challenges that can only partially be prepared for in advance. However, the speed of response, the range of tools available, and new and more collaborative approaches to funding, data and knowledge sharing, and collecting and using evidence are all critical. In any pandemic, innovative technologies will be needed in at least four areas:

**Diagnosis.** Advances in omics and molecular medicine mean that the genome of novel pathogens can be sequenced in days or weeks rather than months—a meaningful and critical difference in the context of a rapidly spreading disease outbreak. Rapid sequencing means that nucleic acid–based diagnostics for earlier and more accurate detection and surveillance can now be developed, though the costs and challenges of distribution can be prohibitive to mass testing.

**Disease suppression and transmission reduction.** Smartphones, location tracking, and analytics provide the means to create low-cost and widely accessible tools to predict, monitor, and interrupt disease transmission through populations. They allow for highly targeted and intelligent social distancing and other measures, confining disruption to only those individuals and communities where they would have highest impact.

**Prevention through vaccines.** Broad-spectrum or universal vaccines create a potential mechanism to rapidly suppress future pandemics, while pathogen-specific vaccines developed after a new disease emerges can protect populations at risk of exposure. The speed of vaccine development is accelerating with each pandemic. In July 2020, six months after COVID-19 was identified, almost 180 vaccines were in development.<sup>1</sup> This compares to the year it took to reach a similar stage after the Zika epidemic began in 2015. Vaccine development is accelerated by AI-powered R&D, nucleic acid–based manufacturing platforms, and universal approaches that address a family of pathogens rather than a specific strain. Further, the refined methodologies for collection, analysis, and interpretation of real-world evidence enhance the understanding of how medications work outside clinical trials and allow developers to rapidly study both rare and newly identified diseases. These improvements in vaccine development will not only increase the speed and efficiency with which new vaccines enter the market but could also help reinvent the way in which vaccines work. Research is already under way to develop a universal flu vaccine, which could transform the response to any future influenza pandemic by acting on newly discovered surface molecules, which do not seem to mutate seasonally. Similar broad-spectrum strategies could also be developed against other high-risk families of pathogens.

**Treatment.** In any pandemic, there is a race to find therapies that can improve clinical outcomes and survival chances. Collaborative efforts to repurpose existing medicines, using artificial intelligence and high-throughput screening against huge chemical libraries of medicines, make this process much faster, because it is possible to leapfrog the early stages of development to ensure safety in humans. Advances in antibody therapy, using genetically engineered animals, also hold promise for future pandemics and the potential to develop a treatment that could be effective against a family of viruses rather than a single strain.<sup>2</sup> Other technologies, based on siRNA, RNAi, T-cells, and stem cells, further expand the “tool kit” where treatments for future pandemics might be found.

<sup>1</sup> See “COVID-19 treatment and vaccine tracker,” Milken Institute, July 2020.

<sup>2</sup> Monoclonal antibodies are antibodies made using identical immune cells that are clones of a parent cell.

To ensure that access to these innovations is not restricted to wealthy individuals or nations, costs of innovations in the pipeline will need to fall. This is already happening, as with the cost of gene sequencing dropping more than 100,000-fold over the past 20 years.<sup>151</sup> However, this process typically takes time, extending the full health benefits beyond the 2040 time frame of our research. This exponential progress can also expand areas of application of innovations across disease types, enable personalized therapies, and drive costs down to boost adoption beyond advanced economies.

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Innovations continue to be a critical piece of the puzzle for improving the health of the world's population. We identify an exciting pipeline of ten innovations that could reduce the health burden by 6 to 10 percent in the next 20 years. Yet we can do more to prioritize research in areas with the largest unmet need and to overcome some of the incentive barriers. Could some of the renewed energy in vaccine research and cross-country collaboration be sustained beyond COVID-19? In the next chapter, we use our estimates from known interventions and innovations to size the economic and social impact of health improvements by 2040.

**A medical breakthrough for dementia or certain cancers could transform the global health landscape, much as the discovery of penicillin did. Tackling the underlying biology of aging could significantly extend healthy lifespan by postponing the onset of several age-related conditions.**

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<sup>151</sup> National Human Genome Research Institute.



# Ten promising innovations

(continued on following pages)

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## Omics and molecular technologies

A therapeutic or diagnostic that harnesses the various types of molecules within a cell (eg, DNA, RNA, proteins). This includes engineering of these intra-cellular components (eg, genome editing) and well as analysis (eg, proteomics, transcriptomics).

Example: **CRISPR and curbing malaria**

### Current treatment

Includes antimalarial prophylactics and nonpharmaceutical measures (indoor residual spraying, insecticide-treated bed netting, etc) and antimalarial medications.

### Innovation

Genetic modification of malaria-carrying mosquitoes using gene-editing technologies (eg, CRISPR); this may potentially enable significant disease reduction by propagating the modified genes across the mosquito population.



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## Next-generation pharmaceuticals

Newer iterations of traditional chemical compounds (small molecules) and classes of molecules used as medicinal drugs, possibly with multiple and concurrent target structures.

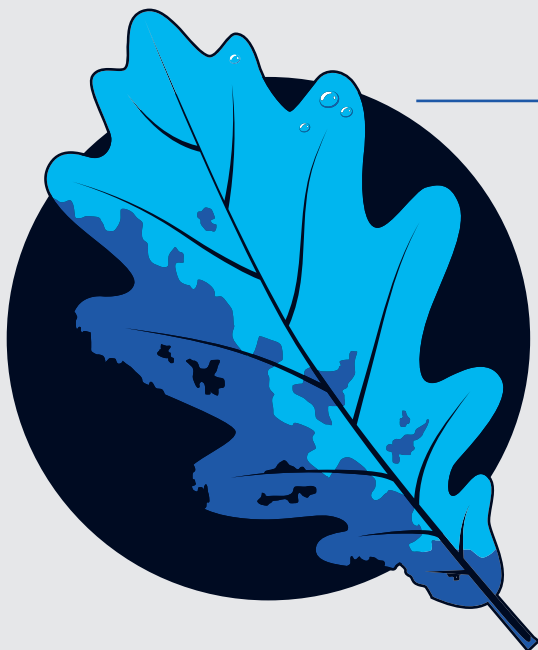
Example: **Senolytics and regulation of cellular aging**

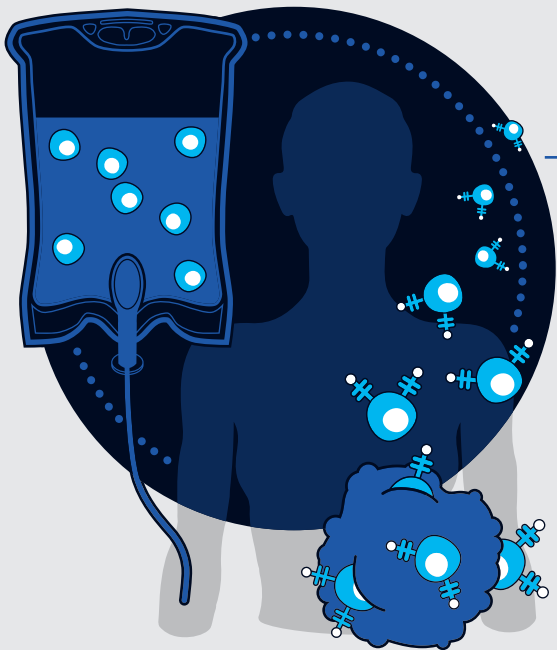
### Current treatment

Cellular aging (senescence) is considered an unavoidable physiological process. It is not believed to be a viable field for drug development.

### Innovation

Senolytics (a class of small molecules) may decrease or eliminate aging cells that can cause cellular inflammation, dysfunction, and tissue damage. This has implications for delaying the occurrence of age-related diseases.





## Cellular therapy and regenerative medicine

*Cellular therapy:* A biological product, derived from living cells, that is used for therapeutic purposes to replace or repair damaged cells and/or tissue.

*Regenerative medicine:* A therapy with the power to restore diseased and/or injured tissues and organs, potentially decreasing reliance on transplantation.

Example: **CAR T-cell therapy and treatment of solid tumors**

### Current treatment

Primarily based on unspecific radiotherapy and chemotherapeutic agents plus surgical interventions; in many cases, this is ineffective.

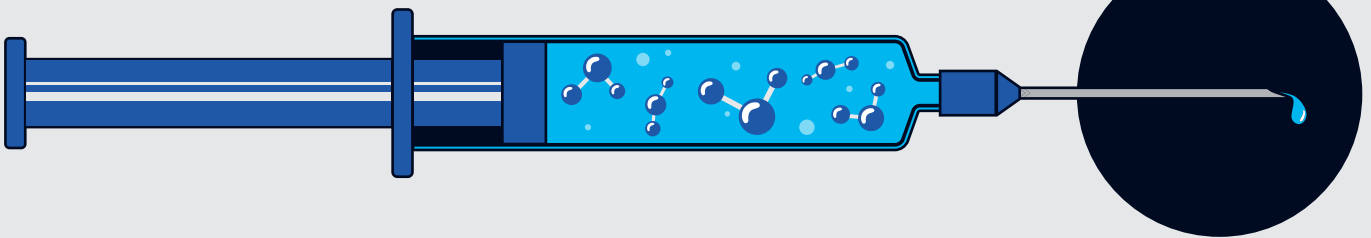
### Innovation

CAR T-cell therapy reprograms a patient's T-cells (immune system cells) to target tumor cells; when infused into the patient, the T-cells bind to an antigen on tumor cells, attacking and destroying them.

## Innovative vaccines

Substances that stimulate the immune system to respond to and destroy a bacterium or virus. Historically, vaccines have eradicated and/or controlled the spread of infectious diseases around the world.

In the future, vaccines may be used to target noncommunicable diseases (eg, cancer).



Example: **The AT04A vaccine and the lowering of cholesterol**

### Current treatment

Statins (lipid-lowering medicines) are used to control and/or lower high cholesterol levels in the blood; patients with cardiovascular disease must take these daily, but adherence is often poor.

### Innovation

AT04A is a vaccine made up of molecules that bind to blood cholesterol and degrade it. The vaccine would be required only once a year, potentially improving outcomes.

## Advanced surgical procedures

Treatments for injuries or disorders of the body with minimally invasive incisions and/or small instruments, including robotic surgery. Also includes any technique that improves surgery-related processes outside the operating room.

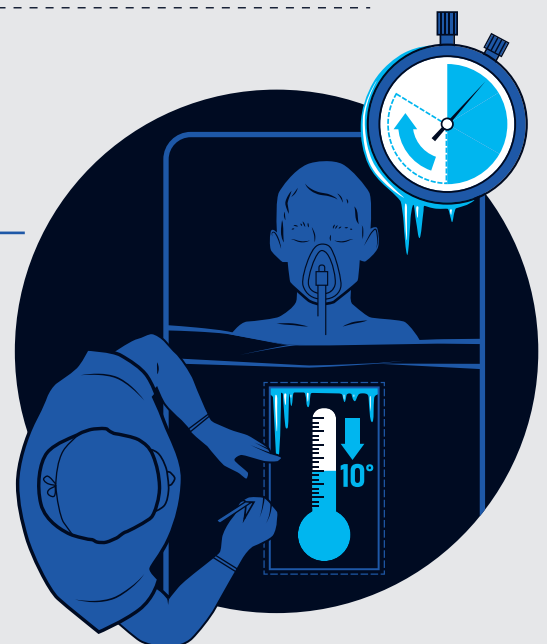
Example: **Suspended animation for severe trauma patients**

### Current method

After a patient suffers acute trauma (eg, an accident), getting to the hospital for surgery may take time, which significantly decreases the chance of survival.

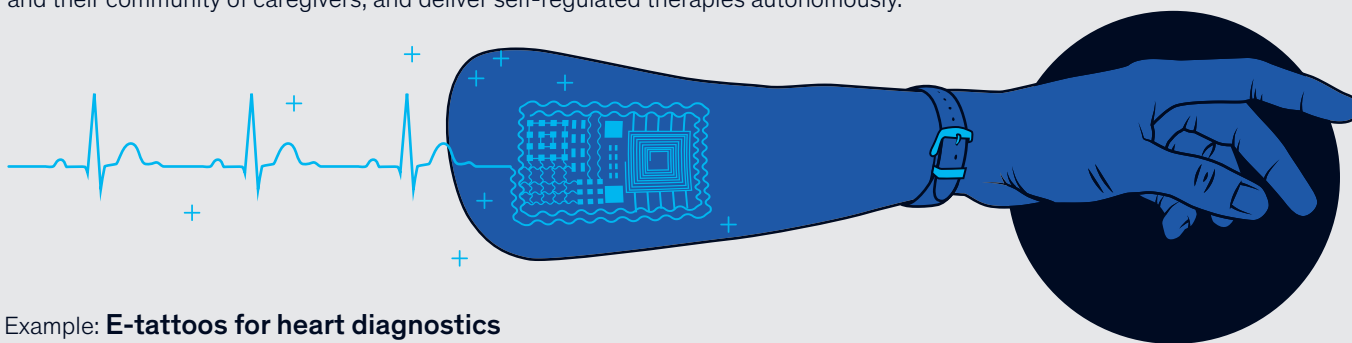
### Innovation

A cold saline solution could be injected in the first contact with the patient to cool the body to 10–15°C and stop its normal functions. This would allow time for the surgeon to operate before resuscitating the patient.



## Connected and cognitive devices

Portable, wearable, ingestible, and/or implantable devices that can monitor health and fitness information, engage patients and their community of caregivers, and deliver self-regulated therapies autonomously.



Example: **E-tattoos for heart diagnostics**

### Current method

A Holter monitor (a battery-operated device) is used for continuous heart monitoring; its batteries last for up to 48 hours, and the procedure can cause immense patient discomfort.

### Innovation

Ultra-thin e-tattoos can provide longer periods of heart monitoring and increase patient comfort while providing a wider range of data to enhance clinical decision making.

## Electroceuticals

Small therapeutic agents that target the neural circuits of organs. Therapy involves the mapping of neural circuitry with neural impulses (administered via an implantable device) delivered to these specific targets.

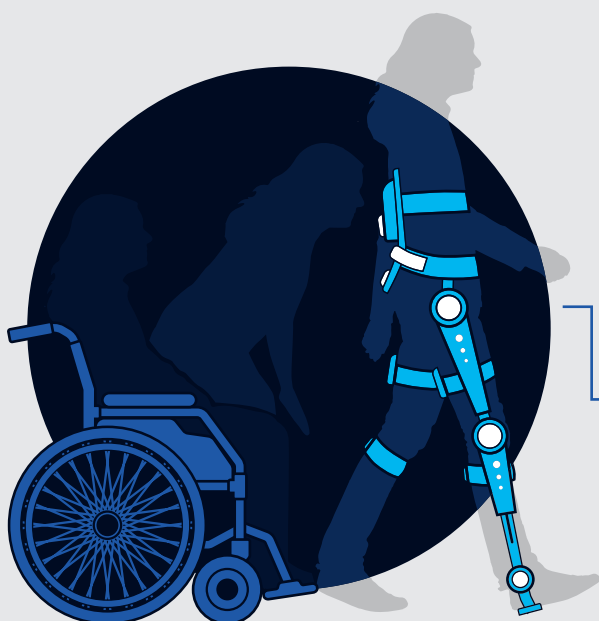
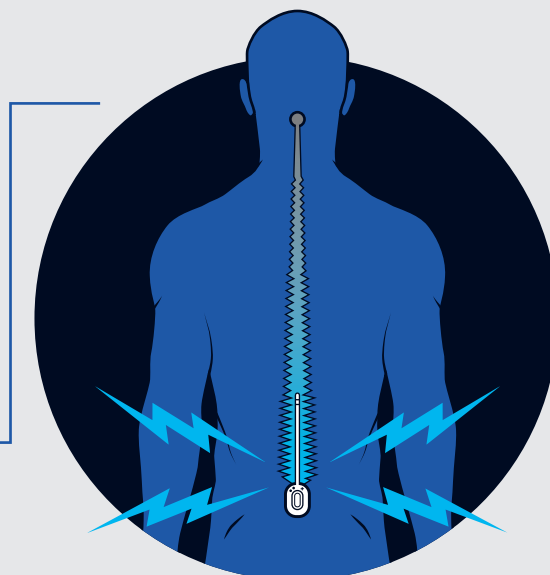
Example: **Implantable microchips and the mitigation of chronic pain**

### Current treatment

Chronic pain management uses nonindividualized treatment with multiple drugs (including opioids) and late-stage surgery with low levels of effectiveness.

### Innovation

Spinal cord stimulation can improve patient quality of life, allowing increased mobility, enhanced sleep, and reduced need for pain medication.



## Robotics and prosthetics

A wide variety of programmable, self-controlled devices consisting of electronic, electrical, or mechanical units and artificial substitutes or replacements for a part of the body.

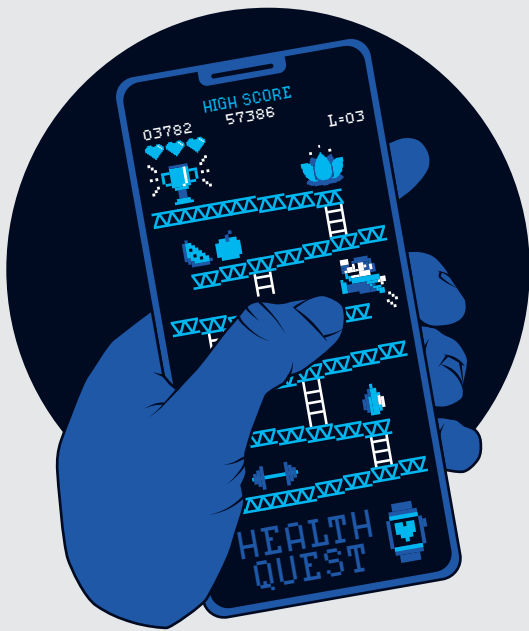
Example: **Next-generation exoskeletons and mobility support**

### Current method

Mobility aids are mechanical and do not fully restore movement in the elderly, leading to loss of independence and increased risk of accidental injuries.

### Innovation

Next-generation exoskeletons, powered by small motors that mimic human muscles, could allow older patients to recover their autonomy while reducing the likelihood of accidents and falls.



## Digital therapeutics

Preventive and therapeutic evidence-based interventions driven by software for a broad spectrum of physical, mental, and behavioral conditions.

Example: **AI-powered app to enable behavior change**

### Current treatment

Doctors have few tools at their disposal, apart from brief consultations, to help patients with chronic conditions adopt a healthy lifestyle.

### Innovation

Digital therapeutics, powered by AI, patient data, and behavioral science, can help patients adopt and sustain healthy behaviors through gamification and other forms of engagement.

## Tech-enabled care delivery

Technology-enabled care delivery that incorporates new and larger data sets applies new analytics capabilities to determine insights, and applies those insights to providers and patients to improve care outcomes, experience, and efficiency.

Example: **Multichannel care delivery**

### Current method

Inefficient data management and poor patient-payor-provider communication hinder continuity of care, resulting in significant treatment inefficiencies.

### Innovation

Multichannel care delivery using online platforms may facilitate data sharing and improve treatment efficiency. Particularly relevant for chronic diseases like diabetes because patients' glucose levels and other vital signs are continuously shared with the clinician.



Note: See technical appendix to understand how we chose these technologies and to see the sources that informed the analysis.









# 4. The economic prize

While health has long been recognized as a crucial determinant of well-being and a basic human right, the economic case for investing in health is less well understood. When it comes to what drives growth, economists typically focus on inputs such as labor and capital and how efficiently they are used. What are often left out are factors that may determine the quality of those inputs, such as health in the case of labor.<sup>152</sup> Better health has been a critically important enabler of global growth over the past century, catalyzing labor force growth and increasing productivity. Yet in recent years, health has largely been absent from economic debates about how to promote prosperity and growth. Instead the focus has been on rising healthcare costs, particularly in developed countries where a growing share of the population is elderly. Today, the COVID-19 pandemic has made the link between health and the economy painfully clear. Beyond overcoming the pandemic, we have a unique opportunity to invest in global health and reap significant social and economic rewards for decades to come.

# 8%

the boost to global GDP  
in 2040 from better health

In this chapter, we trace the pathways through which better health contributes to prosperity and growth. Taking a labor market view, we assess the economic impact of healthier populations by determining how many more people would enter the labor force if we reduced premature deaths and disabilities, and what would be the productive gains if workers suffered fewer health conditions. We also estimate the broader social benefits of transitioning to a healthy growth scenario as well as the investment required.

## **Health improvements identified would be a powerful shot in the arm for the economy, adding \$12 trillion to global GDP in 2040**

We estimate that a growing labor force resulting from the healthy growth scenario described in chapter 2 could add 8 percent to global GDP in 2040, a \$12 trillion uplift. This would mean 0.4 percent faster global GDP growth annually over the next 20 years, on top of the roughly \$2 trillion GDP boost from health improvements that are already under way today and thus included in IHME's baseline health improvements by 2040.<sup>153</sup> The health impact of innovations will also take time to flow through but could be worth an additional \$5 trillion to annual GDP after 2040.

A larger, healthier, and more productive global workforce would counter slowing labor force growth. The GDP gains we size derive from changes in the labor force as better health increases the number of people in the labor force, how much they work, and how efficiently they work (see Box 15, "Our methodology for assessing the economic and social benefits of better health").

<sup>152</sup> Education is the most commonly included measure of labor quality.

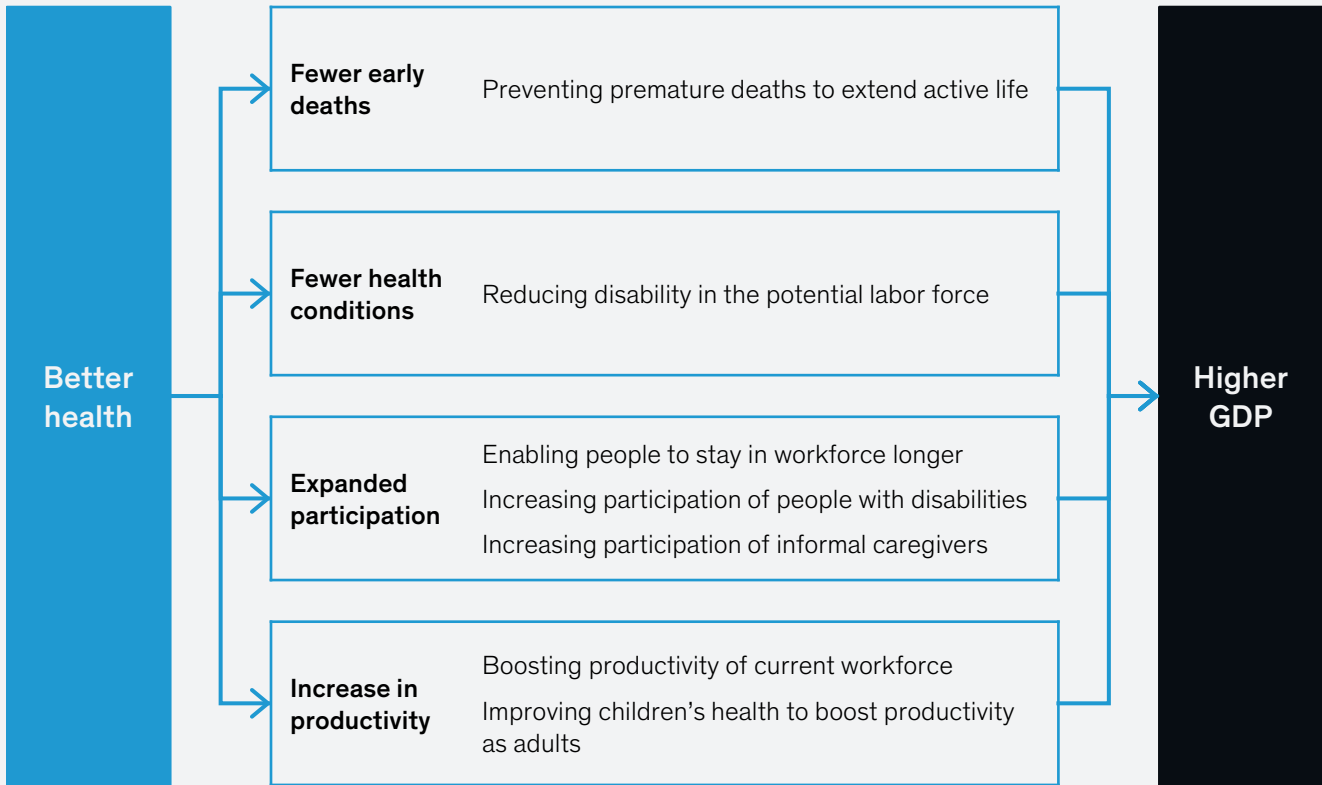
<sup>153</sup> Baseline health improvements projected in 2040 include fewer deaths from infectious diseases such as malaria and diarrhea, better maternal and child health, and fewer deaths from chronic conditions such as heart disease in some countries. We discuss the baseline health projections in more detail in chapter 2.

### Our methodology for assessing the economic and social benefits of better health

Our labor supply and GDP model quantifies the incremental economic impact of a healthier population on labor supply and of productivity for almost 200 countries globally, and we aggregate the impact regionally and globally. We quantify the economic impact of improved health through four channels (Exhibit 24).

Exhibit 24

**We quantify the impact of health on GDP along four channels.**



Source: McKinsey Global Institute analysis

The four channels are:

- **Fewer early deaths.** Improved health expands employment by the number of people who can continue to work because their early death was averted. We estimated the number of additional healthy people alive in each country by five-year age group, every year from 2020 to 2040, based on the scale of mortality reduction calculated in our disease burden model. We then applied IHME's life expectancy projections for each group. For each country, we then applied age-specific labor force participation rates and national unemployment and average labor productivity levels to quantify the GDP impact of the additional employed persons. For people whose death was averted by treatment, we adjusted productivity and participation rates to reflect their post-treatment likelihood to return to work in the way described below in the section on fewer health conditions.

- **Fewer health conditions.** We calculated the reduction in disability in the working population based on the reductions in years lived in disability from the disease burden model. We assessed the economic impact separately for health conditions avoided because of preventive interventions and for health conditions improved because of better treatment. For diseases prevented, we applied labor market participation rates, unemployment, and productivity levels as we did for early deaths averted. For diseases treated, we adjusted these estimates with reduced ability to reenter the labor force after therapy, as well as lower productivity to reflect lower average education among people with health conditions.<sup>1</sup>
- **Expanded participation.** Healthier populations can choose to work more or longer because of better health, further contributing to economic prosperity. We sized the potential additional impact for three groups of people: older populations that will be in better physical and mental health until later in life; informal caregivers who are no longer needed when fewer people suffer from health conditions; and people with disabilities who can increase their participation in the labor force. For each group, we used the following approach to size the GDP impact over the next 20 years. We assumed that in high- and upper-middle-income countries, the labor force participation rate of people aged 65 to 69 could rise to the same level as that of people aged 60 to 64; we assumed that OECD countries could reduce the number of daily informal caregivers in proportion to the reduction in the disease burden; and for people with a disability, we looked at best-practice examples of labor force participation to identify a target rate relative to labor force participation of the general population for each income archetype, and assumed that all countries not already at this level could reach the target over time. For all groups, we applied the national average productivity level to working hours.
- **Increase in productivity.** We reviewed the economic literature to identify health conditions with a disproportionate impact on productivity at work and the size of the productivity loss.<sup>2</sup> From this, we calculated the potential productivity improvement that would ensue as a result of the disease burden reduction (for these disease areas) quantified in our disease reduction model, adjusted for prevalence rates in the working-age population. We also estimated the impact on labor productivity from improving health promotion through workplace practices for all employees. Finally, we also looked at the productivity boost from improving children's health, which affects cognitive development and future earnings potential, for example in the case of malnutrition, anemia, and mental health disorders.

Previous MGI research has found that low expectations of future demand growth are a key constraint on business investment and productivity growth. Transitioning to the healthy growth scenario would help lift growth expectations by countering demographic headwinds over the coming decades. Furthermore, the larger and healthier pool of older citizens, with the capacity to continue to be active consumers, would increase consumption growth over time. This could account for a lion's share of the \$1.8 trillion in consumption increase globally in 2040 from a healthier and larger population. Raising future demand expectations would encourage investment and help expand productive capacity over two decades.

<sup>1</sup> For example, in the case of treatment for breast cancer, we assume a 50 percent chance of returning to work. For malaria, we assume a 100 percent chance of returning to work. Data from high-income countries suggest that lower educational attainment is associated with chronic disease, estimated to explain wage penalties of up to 5 percent for workers with chronic health conditions.

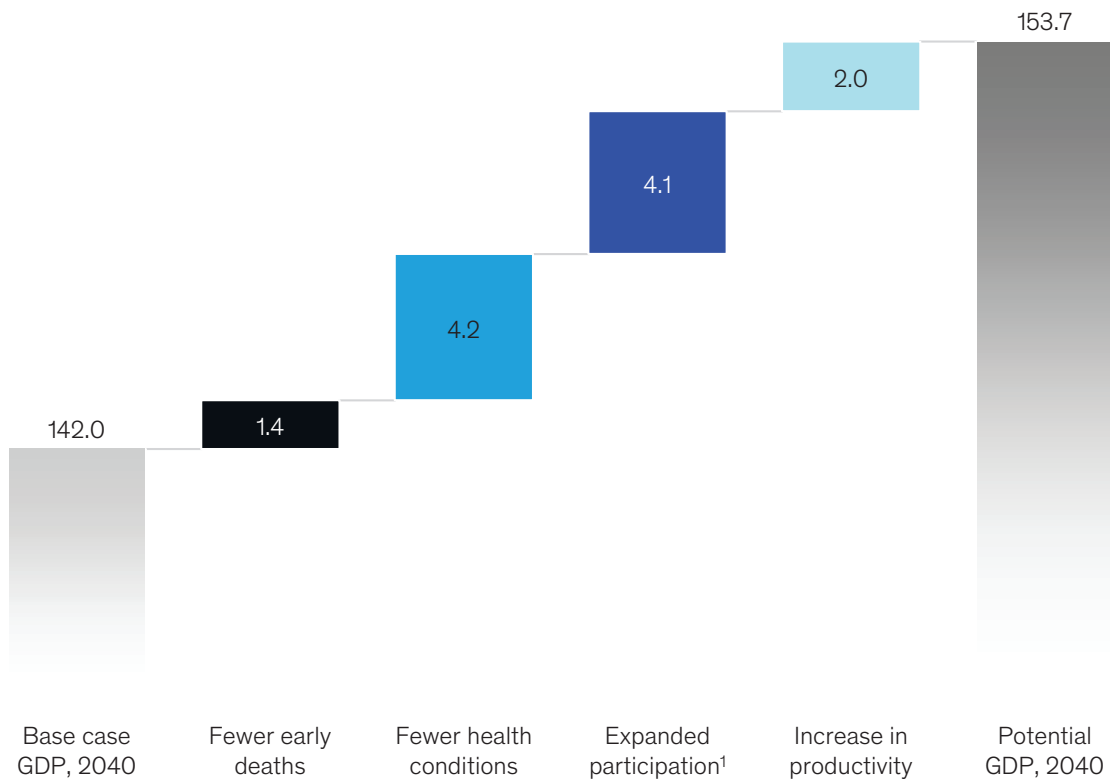
<sup>2</sup> For example, low back pain, mental health disorders, and migraines are the largest drivers of presenteeism, or working when sick, that leads to productivity loss; see Donna Allen et al., "Four-year review of presenteeism data among employees of a large United States health care system: A retrospective prevalence study," *Human Resources for Health*, 2018, Volume 16.

The \$12 trillion in economic gains comes from more people in the labor force as a result of fewer early deaths, a healthier workforce with fewer health conditions, expanded participation, and an increase in productivity (Exhibit 25).

Exhibit 25

**Global GDP could rise by about \$12 trillion in 2040, an 8 percent increase, mainly from fewer health conditions and expanded participation in the labor force.**

**GDP, 2040**  
\$ trillion



**Annual growth rate, 2020–40**

**2.6%**

**3.0%**

1. Includes impact on older adults (only high- and upper-middle-income countries), informal caregivers (only in OECD), and people with disabilities (global).

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; OECD; Eurostat; National Transfer Accounts project; McKinsey Global Institute analysis

Breaking down our \$12 trillion global estimate, having fewer early deaths among the labor force could add \$1.4 trillion. In high-income countries, preventing early deaths from heart and lung disease plays a big role. In lower-income countries, preventing infectious diseases like malaria and HIV/AIDS would also add to the working population. By averting early deaths, we estimate, there would be 60 million more workers globally, two-thirds of them in low- and lower- middle-income economies with younger populations.<sup>154</sup>

About \$4.2 trillion comes from healthier people being able to work instead of not participating in the labor force because of ill health. The major drivers of disability that could be at least partially prevented and treated among the working-age population include low back pain,

<sup>154</sup> The full economic potential of these larger pools depends on access to capital and investment to expand more productive employment opportunities.



# \$600B

GDP impact from addressing health conditions among children

mental health disorders, and, in some countries, vision loss. Addressing these causes could add about 120 million full-time equivalent workers to the working population globally.

Expanding the participation of older people, informal caregivers, and people with disabilities could add nearly \$4.1 trillion by 2040. About 40 million healthier older people who want to work longer could add up to \$2.4 trillion in high- and upper-middle-income countries.<sup>155</sup> This would mean that the labor force participation rate of 65- to 69-year-olds would reach to levels of 60- to 64-year-olds today, from 20 to 30 percent globally. Western Europe has the potential to experience the biggest increase in labor force participation of this group, from 7 percent to 35 percent. This impact would come from removing disincentives to drop out of the workforce, providing more support and flexibility to workers, eliminating barriers to employment like age discrimination, and offering lifelong learning opportunities.<sup>156</sup> We have seen countries do this successfully in the past. New Zealand raised the labor force participation of older people by almost 20 percentage points in less than three decades by introducing some of these policies.<sup>157</sup>

In OECD countries, 7 percent of people aged 50 and over provide daily care to the sick, a majority of them women, who tend to quit paid work or reduce their work hours as a result.<sup>158</sup> Improved health would free up about 12 million informal caregivers to more fully participate in the labor force in OECD countries, accounting for about \$1.2 trillion of our \$12 trillion global GDP gain. Addressing barriers to work for people with disabilities could boost GDP globally by \$400 billion. The United Nations estimates that 15 percent of people live with disabilities that act as a barrier to full participation in the labor force.<sup>159</sup> For the working-age population, the share is closer to 10 percent. This is the share we use in our calculations, because the share of people living with disabilities increases with age.<sup>160</sup> Creating inclusive work environments and assistive technologies would enable greater participation among people with disabilities, adding about eight million people to the workforce. This would also require offering flexibility to workers.

Better health could also raise productivity, accounting for about \$2 trillion out of our \$12 trillion total. The productivity gains accrue from three sources. First, workers with fewer health conditions can use their time more productively and suffer less from presenteeism, or being at work but not performing up to their full potential. Chronic conditions such as low back pain and migraines are major drivers of presenteeism. We estimate that reducing these conditions to the healthy growth scenario projections could contribute up to \$700 billion in productivity gains. Second, in the healthy growth scenario, healthier societies and workplaces are likely to help all workers, not just those in poor health, to be more productive and achieve more, which could add another \$700 billion.<sup>161</sup> This would come from large companies in advanced economies that adopt healthy workplace practices such as ensuring access to nutritious food during meal breaks, providing education and support for sleep health and management of stress, and offering more flexible policies that can improve employee physical and mental health and performance. Finally, children who experience better health show better cognitive development and earning capacity as adults. Reducing malnutrition and behavioral health conditions among children would contribute to this gain. We estimate that this impact may amount to more than \$600 billion in 2040 but would be far higher in the longer term as the investments in children's health pay back over their full lifetime.<sup>162</sup>

<sup>155</sup> In lower-income countries, labor force participation rate among older people is already relatively high, hence we assumed no increase in the share of healthy people 65–69 choosing to work.

<sup>156</sup> *EEO review: Employment policies to promote active ageing 2012*, European Commission, 2012.

<sup>157</sup> Natalie Jackson, Bill Cochrane, and Rachael McMillan, "Workforce participation of older workers as an element of New Zealand's Retirement Income Framework. A report commissioned by the Commission for Financial Literacy and Retirement Income, Wellington," New Zealand National Institute of Demographic and Economic Analysis, University of Waikato, 2013.

<sup>158</sup> "Informal careers," in *Health at a Glance 2017: OECD Indicators*, OECD, 2017; *Help Wanted? Providing and Paying for Long-Term Care*, OECD, 2011.

<sup>159</sup> *Good practices of accessible urban development*, United Nations, 2016.

<sup>160</sup> We base this on statistics on distribution of people with disabilities with age. See technical appendix for details.

<sup>161</sup> *The health and productivity advantage: Staying@work report, 2009/10*, National Business Group on Health/Towers Watson, 2010.

<sup>162</sup> For example, for mental health and malnutrition see: James Patrick Smith and Gillian C. Smith, "Long-Term economic costs of psychological problems during childhood," *Social Science & Medicine*, July 2010, Volume 71, Issue 1; and Sue Horton, Harold Alderman, and Juan A. Rivera, "The challenge of hunger and malnutrition," Copenhagen Consensus Center, 2008.

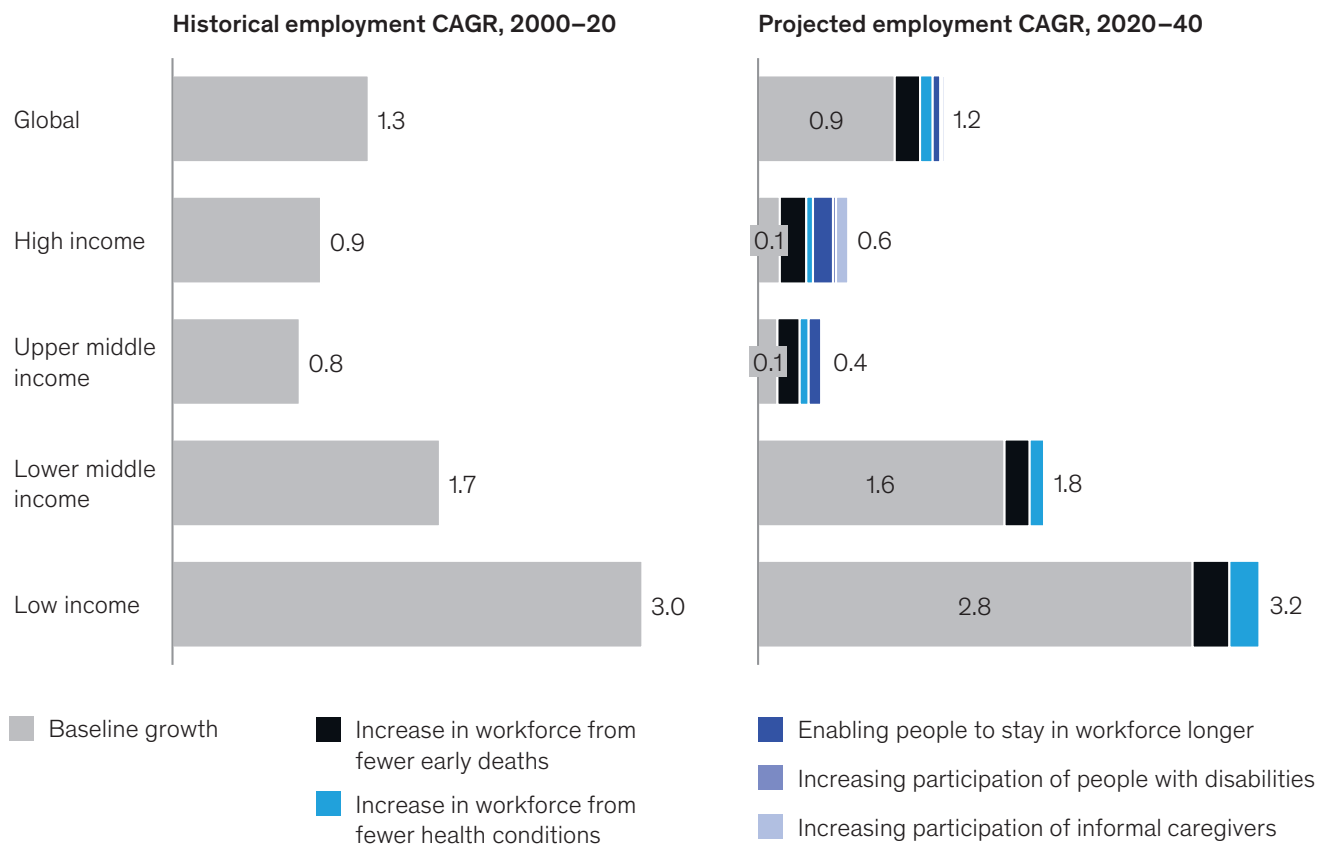
Fewer early deaths, fewer health conditions, and expanded participation could add 245 million people to the global labor supply by 2040. This would be enough to counter the current demographic headwinds facing the global economy, particularly in mature economies where growth in labor supply is slowing the most (Exhibit 26). The number of people working is expected to grow by 0.9 percent a year globally in the next 20 years, down from an annual rate of 1.3 percent in the past 20 years.<sup>163</sup> Better health would add 0.3 percentage point to employment growth annually over the next 20 years, helping to counter slowing employment growth. This matters for upper-middle- and high-income countries, where health could boost labor supply growth to 0.4 percent and 0.6 percent, respectively, in the next 20 years, up from a projected baseline growth of a mere 0.1 percent.

Exhibit 26

**In high- and upper-middle-income countries, improving health could counter the projected labor force growth slowdown.**

**Compound annual growth rate (CAGR)<sup>1</sup>**

%



1. Oxford Economics forecast, McKinsey Global Institute analysis.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; OECD; Eurostat; National Transfer Accounts project; McKinsey Global Institute analysis

The productivity boost would add 0.1 percent to global labor productivity growth from 2020 to 2040. This would mean that by 2040, every employed person would generate \$600 more output on average. This varies from 0.02 to over 0.1 percent across country income archetypes, with low-income countries experiencing the biggest boost.

<sup>163</sup> Oxford Economics.

**Better health has similar potential to boost growth across regions, although the ways to achieve that depend on the underlying disease burden and labor market structures**

The healthy growth scenario could add between 0.3 and 0.5 percent to economic growth in every region over the next two decades. So while the absolute GDP dollar impact varies between regions depending on the size of their economies, the change in the rate of growth is broadly similar. One of the factors that play into the variation is the underlying age structure (see Box 16, “Age distribution of health gains and economic contribution”).

Box 16

**Age distribution of health gains and economic contribution**

Contrary to conventional wisdom that associates poor health with old age, health improvements increase quality of life at all ages. The economic impact is largest when better health improves

the physical and mental development of children as well as the health of those who are economically active. So while almost 70 percent of the healthy life years added would accrue to those

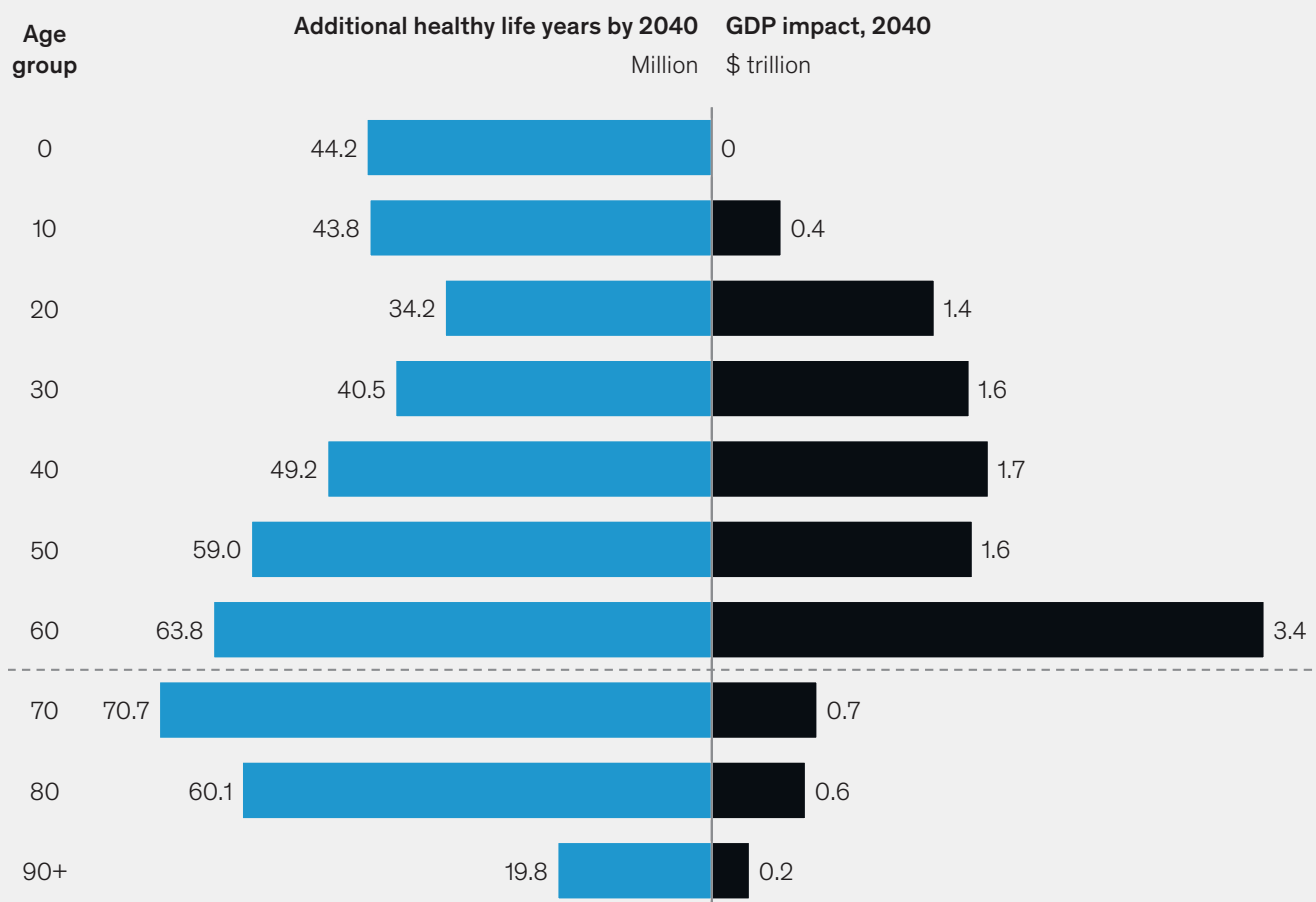
under the age of 70, those gains would translate into almost 90 percent of the \$12 trillion addition to global GDP, because their contribution to the economy is higher (Exhibit 27).

Exhibit 27

**Almost 70 percent of the estimated healthy life years are gained by people under 70, whose economic contribution is the highest.**

**Additional healthy life years<sup>1</sup> lived in 2040 and respective GDP impact by age group**

Global perspective, healthy growth scenario



1. Additional healthy life years from averting deaths and reducing disability.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; OECD; Eurostat; National Transfer Accounts project; McKinsey Global Institute analysis

While a larger labor force is the key driver of economic gains across regions, health variations create different underlying dynamics and opportunities (Exhibit 28).

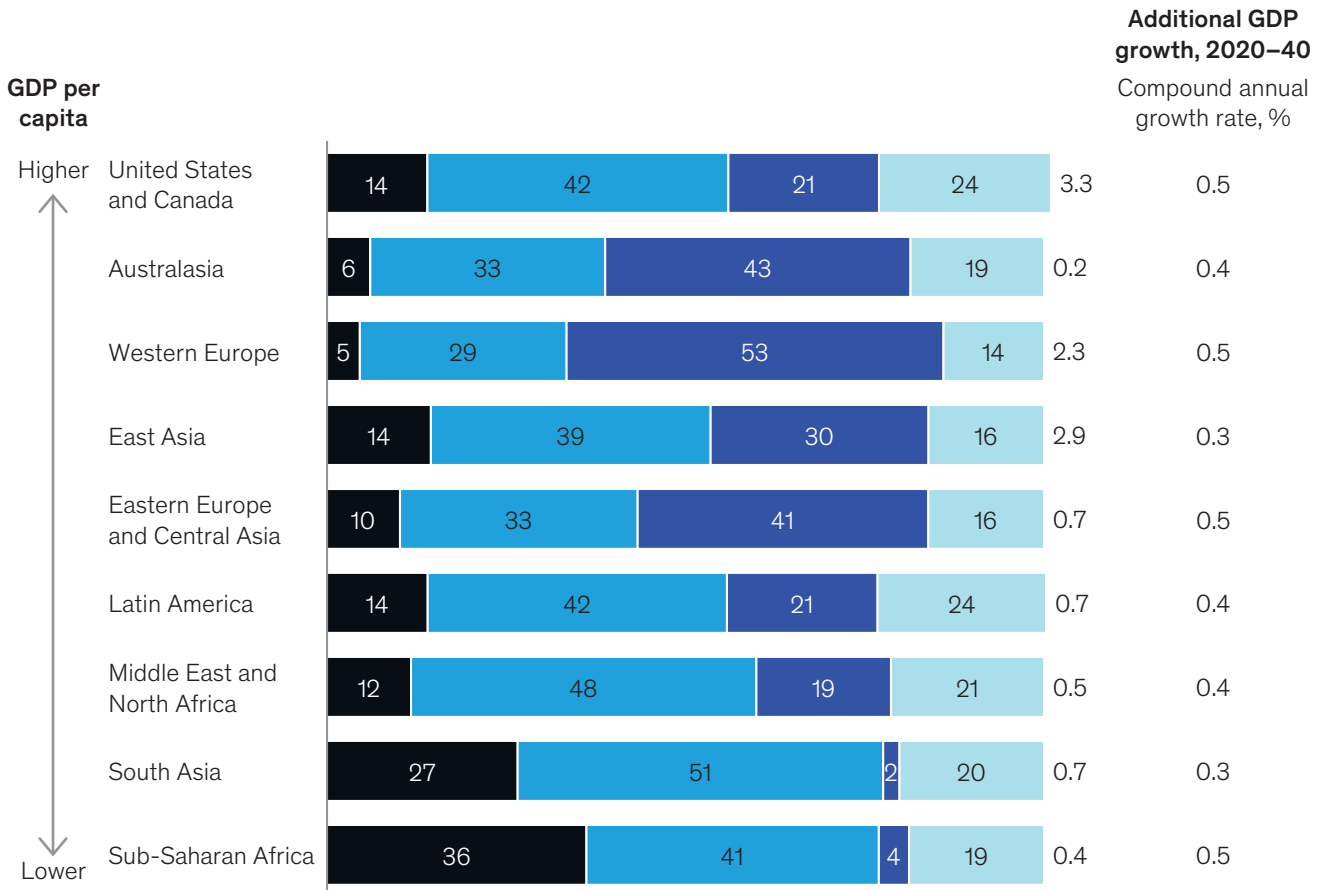
Exhibit 28

**Across regions, the economic benefits of better health are driven by differences in the underlying disease burden and labor market structures of countries.**

**GDP impact breakdown, 2040**

Healthy growth scenario  
%; \$ trillion

■ Fewer early deaths ■ Fewer health conditions ■ Expanded participation ■ Increase in productivity



Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; OECD; Eurostat; National Transfer Accounts project; McKinsey Global Institute analysis

Highlights of these regional variations include the following:

- In the **United States and Canada**, we estimate that improved health would boost GDP growth by 0.5 percentage point a year to 2040. A large share of economic benefit comes from ensuring that people of prime working age, defined as 15 to 64 years old, remain healthy and active. The impact from preventing early deaths is relatively large, especially in the United States, where the rate of deaths in the 15-to-49 age group is almost double that of Western Europe.<sup>164</sup> The area with the biggest difference is substance use disorders, where mortality is six times higher in the United States than in Western Europe, while the mortality rate of cardiovascular disease among 15- to 49-year-olds is twice as high. The impact in Canada of preventing premature deaths is lower and more in line with Western Europe. Older people in North America are already working at a three times higher rate than in Western Europe, thus the impact of the older population staying longer

<sup>164</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

# 6X

more people in the US die  
from substance use  
than in Western Europe

in the labor force is less prominent. The impact on productivity of providing psychological support is also exceptionally high compared to the effect in other regions, because the rates of mental health conditions among 15- to 49-year-olds are highest in the United States and Canada. In line with other high-income countries, the other major drivers are prevention and treatment of low back pain and migraines.

- In **Western Europe**, we estimate that better health would boost GDP growth by 0.5 percentage point a year. By far the biggest driver is extending the time people remain in the workforce, adding about \$800 billion to GDP, since effective retirement age remains low in many countries relative to life expectancy. We estimate labor force participation rates of those between 65 and 69 years of age could increase from 7 percent to 35 percent by 2040.<sup>165</sup> Interventions for musculoskeletal disorders account for an exceptionally high share of impact compared to other regions (Western Europe has the highest rates of low back pain globally among 15- to 49-year-olds), alongside prevention and treatment for migraines and depressive disorders through pharmacological and psychological support.<sup>166</sup>
- In **Australasia**, we estimate that GDP growth would increase annually by 0.4 percentage point. Mortality rates of those below 70 are among the lowest in the world (about 20 percent lower than the high-income average), and as a result, the relatively higher share of economic impact comes from making the workforce healthier by addressing chronic issues such as low back pain and migraine. Expanding participation of informal caregivers would also have a major positive impact on labor supply. Australia has one of the highest rates of informal caregiving in the OECD.<sup>167</sup> Expanding participation of older populations would also affect GDP since the labor force participation rates of 65- to 69-year-olds could increase by as much as 20 percentage points.
- In **East Asia**, we estimate that while the overall economic impact is second highest in absolute terms among regions, at approximately \$3 trillion, the impact on growth is at the lower end of the range, an increase of 0.3 percentage point annually. This region already has a very large economy, and the share of the elderly in the population is increasing rapidly. Preventing deaths due to cardiovascular disease would be the single most effective health intervention. Averting deaths from chronic obstructive pulmonary disease would also have a major impact in the coming decades, given the high rates of smoking and outdoor air pollution in these countries.<sup>168</sup> Increasing participation of older people is also expected to be a driver of future growth, since the share of people over 65 is expected to rise rapidly in South Korea and China and is already high in Japan.
- In **Eastern Europe and Central Asia**, preventing and treating cardiovascular disease could have a significant economic impact. Eastern Europe has the highest mortality rate in the world from all causes among males aged 15 to 49—double the global rate—and addressing many of the underlying risks like smoking and excess alcohol use would have an exceptionally high economic benefit.<sup>169</sup> Making the workforce healthier by preventing and treating chronic conditions, like low back pain and migraine, could also play a big role. The other major impact from expanding the labor supply would derive from enabling older workers to stay in the workforce longer, since the labor force participation of those over 65 is projected to be the lowest among all regions at 6 percent.
- In **Latin America**, the highest economic impact comes from improving the health of populations, mainly by reducing low back pain and vision impairment—all major constraints on economic activity. The prevalence of blindness is among the highest

<sup>165</sup> In New Zealand, for instance, labor force participation rates for people older than 65 increased from 6 percent in 1990 to 24 percent in 2017, mostly because of employment practices and the abolishment of a mandatory retirement age, which does not disincentivize people from staying in the workforce beyond retirement.

<sup>166</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>167</sup> Health at a Glance 2017, OECD Indicators.

<sup>168</sup> W. C. Tan and T. P. Ng, "COPD in Asia: Where East meets West," *Chest*, 2008, Volume 133, Issue 2.

<sup>169</sup> Mortality rates from alcohol use-related deaths are the highest in Eastern Europe compared to other regions. The death rate from alcohol use as an underlying risk is five times as high in Eastern Europe compared to the global average among males in the 15-49 age band. Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.



in the world, especially in Brazil. According to our own and external research, 43 to 88 percent of all blindness in Latin America is treatable, caused mainly by cataract and refractive errors.<sup>170</sup> Studies have shown that cataract surgery increases participation in productive activities by ten to 20 percentage points and contributes to alleviating poverty.<sup>171</sup> Preventing and treating cardiovascular disorders as well as diabetes would have an impact in preventing early deaths. We estimate that Latin America would see an impact from weight management and physical activity interventions that is higher than average for regions in its income category.

# 3.3M

more young adults alive in 2040  
in sub-Saharan Africa

- In the **Middle East and North Africa**, we find a boost to labor supply and productivity from preventing low back pain, treating vision impairment, and addressing anemia and other dietary health-related problems. The range of priorities reflects the different stages of development among the countries in this region. Weight management would be a key intervention, primarily to combat cardiovascular disease and the leading cause of premature death in the region, diabetes, the incidence of which is expected to rise significantly by 2040. Expanding participation of the older population will make a difference in the wealthier parts of the region, such as the Gulf countries.
- In **South Asia**, reducing premature deaths through improved health is an important lever: more than 61 percent of deaths occur in people under the age of 70, compared to 51 percent globally.<sup>172</sup> Even though preventing and treating cardiovascular disease is the largest lever to reduce premature deaths, the impact from water, sanitation, and hygiene interventions and nutritional supplementation is high compared to other regions. Dietary supplementation for adults with anemia is the most important lever to boost workforce productivity in South Asia. The region has the highest rates of iron deficiency globally, which decreases labor productivity in people involved in physical labor by 5 to 17 percent.<sup>173</sup>
- In **sub-Saharan Africa**, the lever of reducing early deaths through improved health is almost as important to improving the overall health of the workforce as reducing disability. Most impact comes from preventing and treating HIV/AIDS, diarrheal diseases, and lower respiratory infections, some of the top causes of deaths among the working-age population.<sup>174</sup> Investing in child health today will have a significant payoff. The region could have 3.3 million more young adults alive by 2040 if children's health is addressed by improved childbirth practice, treatment of lower respiratory diseases, and prevention of diarrhea and malaria, among others. A significant productivity boost could be expected from treating anemia in adults—more than 57 million people of working age could benefit from treatment of iron deficiency. Future earning capacity of 16 million children could be increased by treating malnutrition.

<sup>170</sup> Hans Limburg et al., "Review of recent surveys on blindness and visual impairment in Latin America," *British Journal of Ophthalmology*, Volume 92, Issue 3, 2008.

<sup>171</sup> Sarah Polack et al., "The impact of cataract surgery on time-use: Results from a longitudinal study in Kenya, Bangladesh and The Philippines," *PLOS One*, Volume 5, Issue 10913, 2010.

<sup>172</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

<sup>173</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved; Katinka Weinberger, "The impact of micronutrients on labor productivity: Evidence from rural India," Number 25897, 2003 Annual Meeting, August 16-22, 2003, Durban, South Africa, International Association of Agricultural Economists.

<sup>174</sup> Institute for Health Metrics and Evaluation. Used with permission. All rights reserved.

## The social benefits of improved health far exceed the economic benefits and could reach \$100 trillion by 2040

Health is first and foremost a factor of individual and societal well-being. Global surveys about well-being indicate how much value is placed on health. The insurer Cigna found that personal health was among the top three concerns for 35- to 49-year-olds, regardless of their income level.<sup>175</sup> Healthy life expectancy was ranked as the third-most-important driver of overall happiness.<sup>176</sup> Poor health diminishes the ability to enjoy life and all that it has to offer, creating a physical, emotional, and financial burden on individuals, families, dependents, and caregivers.

The chronically ill and their relatives invest much of their time in coping with and managing their diseases. Better health would allow these people to spend time on what they want to do most, which may not be working for pay but rather enjoying greater leisure, volunteering in the community, learning a new skill, or being more socially active. Particularly among older people, who gain a good share of the health benefits, some may choose not work but to give back to society in other ways.<sup>177</sup> We estimate that having a larger pool of healthier 65+ year-olds could add \$20 billion to \$30 billion in value to societies in 2040 through volunteering alone. The nonfinancial gains of better health may be large: the real value of stronger social relationships, happier retirees, and a potential virtuous cycle of health benefits from continued active life are not reflected in our value estimates.

Improving health could also help narrow health disparities within countries and across countries. This in turn could also contribute to reducing income inequality within countries and strengthen the social contract.<sup>178</sup>

Economists have tried to value these welfare or societal benefits by measuring “inclusive income,” as the Lancet Commission on Investing in Health did.<sup>179</sup> The idea, common to most approaches, is to use a financial value for health gains (reduction in being sick or increase in life expectancy) that is based on the “willingness to pay.” This value is typically determined by surveys that include monetary and health trade-offs. The resulting financial value that incorporates this full picture is called “economic welfare.”

Applying this approach to our analysis of the health improvement opportunity, we estimate the total combined value of deaths averted and reduced ill health could reach \$100 trillion globally when all human lives are valued equally. This approach, which does not adjust the value of life by income, feels instinctively right. The potential welfare benefits are over eight times larger than our estimated GDP contribution alone, indicating how critical good health is to human well-being.<sup>180</sup>

## We find the benefits of better health outweigh the costs, although a dramatic shift to prevention would be required

The economic benefits from our healthy growth scenario are significantly higher than the cost of delivering them, making a strong case for societies to invest in better health and consider pivoting their spending toward prevention and early interventions. While

**\$20B**  
to  
**\$30B**

extra value created from healthier  
+65-year-olds volunteering

<sup>175</sup> 2019 Cigna 360 well-being survey: *Well and beyond*, Cigna, March 2019. Personal finance and workload were also among the top three concerns.

<sup>176</sup> *World Happiness Report 2020*, March 2020: based on 156 countries. Income and social support were ranked as the top drivers of happiness.

<sup>177</sup> The health benefits that accrue to those younger than 70 years by 2040 will pay further dividends in later decades as the healthier cohorts age, adding to the individual lifetime benefits.

<sup>178</sup> Angus Deaton, “Health, inequality, and economic development,” *Journal of Economic Literature*, Volume 41, Number 1, March 2003; Social contract is the arrangements and expectations, often implicit, that govern exchanges between individuals and institutions. See: *The social contract in the 21st century: Outcomes so far for workers, consumers, and savers in advanced economies*, McKinsey Global Institute, February 2020.

<sup>179</sup> Dean Jamison et al., *Investing in health: The economic case: Report of the WISH Investing in Health Forum 2016*, World Innovation Summit for Health (WISH), 2016.

<sup>180</sup> Willingness to pay approach in healthcare is a commonly used method to estimate benefits from interventions. When using willingness to pay for a year of good health valued at \$200,000, a standard figure, the global welfare of better health would be \$100 trillion. When using willingness to pay based on global GDP per capita average, the welfare would be about \$35 trillion (for more details on sensitivity analysis see technical appendix). Although widely used, the limitations of willingness to pay approach are also well known. See Richard Cookson, “Willingness to pay methods in health care: A sceptical view,” *Health Economics*, Volume 12, Issue 11, 2003.

prevention is typically cheaper than treatment, we do not underestimate the effort required to make the shift. Most of the health improvement identified in this report is achieved by higher levels of adoption of environmental, social, behavioral, and preventive interventions creating healthier cities, communities, and workplaces, alongside high-quality primary and community-based care services. This transition implies a dramatic reorientation of health and other services that would require major changes in current practices and priorities. Our economic analysis should not be interpreted as the need for additional healthcare funding as it is currently delivered.

**We estimate that investing in better health could deliver economic benefits of \$2 to \$4 for every \$1 invested over a 20-year horizon**

To assess the cost of achieving the healthy growth scenario, we focus our analysis on the two-thirds of the economic benefits—roughly \$8 trillion—that come from reducing early deaths and ill health, and the associated productivity benefits.<sup>181</sup> We chose this focus because these gains reflect the health improvement that affects healthcare costs directly, and rising healthcare costs are a major economic concern as populations age. We want to understand what the potential impact of the healthy growth scenario would be on future healthcare costs.

We estimate that implementing the health improvements required to transition to our healthy growth scenario would cost about \$2.2 trillion a year globally in addition to the projected \$17 trillion in 2040 health expenditure under current models of care.<sup>182</sup> Implementation costs fall into two categories. First are the net additional costs of adopting the interventions required to transition to the healthy growth scenario, measured as sustained annual incremental costs expected in 2040.<sup>183</sup> This takes into account both the costs of delivering the intervention to the target population and the savings in treatment costs that are avoided as a result. Second, to be conservative, we included an estimate of the additional health costs that could result from more people living longer and developing health conditions they would not experience if their lives had been cut short. These “longevity costs” could potentially account for up to 28 percent of the total net costs we calculate.<sup>184</sup> These costs could be substantially lower in the long term, given the evidence that improving healthy behaviors in younger people can significantly reduce healthcare expenditure over a lifetime even as people live longer (see Box 17, “What if health costs declined with longevity?”).

Our estimates do not include the costs of preparing for health risks. However, compared to the human and economic costs of pandemics and the amount spent by governments on healthcare each year, the investment required for more structured and coordinated pandemic preparedness, particularly at the international level, is very low.<sup>185</sup>

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<sup>181</sup> This estimate takes into account the net “steady-state” costs of the interventions required and the additional economic benefits that would be generated in 2040. The costs and benefits will vary year-by-year with lower benefits in the initial years, and higher benefits in later years, relative to costs.

<sup>182</sup> Measured in constant 2015 USD; for details see: Joseph L. Dieleman et al., “Future and potential spending on health 2015–40: Development assistance for health, and government, prepaid private, and out-of-pocket health spending in 184 countries,” *The Lancet*, Volume 389, Issue 10083, 2017.

<sup>183</sup> We calculated the net cost for countries to implement the interventions identified in the disease impact model at scale. In order to identify the incremental or net steady-state cost of each intervention we identified the cost per DALY averted from the scientific literature (primarily WHO, DCP-3, and the Tufts Cost-Effectiveness Analysis Registry) for each intervention and income archetype, standardized in 2015 USD terms. To calculate the total cost for each country, we multiplied the unit cost (cost per DALY averted) by the volume of DALYs averted by that particular intervention in 2040. Further discussion of the strengths and limitations of this approach are provided in chapter 2 (Box 8: “Cost curve methodology, interpretation, and limitations”) and the technical appendix.

<sup>184</sup> For each additional person added to the population as a result of a death averted, we added to the net costs of interventions the average annual per capita healthcare spend for the country.

<sup>185</sup> McKinsey’s global public health practice estimates that an investment of \$50 billion to \$100 billion will be required over the next two years, followed by up to \$30 billion a year globally. This is slightly higher than the World Bank estimate of about \$16 billion a year. For details see *Not the last epidemic: Investing now to reimagine public health systems*, McKinsey & Company, forthcoming; *Investing in pandemic preparedness: Status Update*, World Bank, September 2019; *From Panic and Neglect to Investing in Health Security: Financing Pandemic Preparedness at a National Level*, World Bank and Wellcome Trust, International Working Group on Financing Preparedness, 2017; *Commission on a Global Health Risk Framework for the Future*, National Academy of Medicine Secretariat, *The Neglected Dimension of Global Security: A Framework to Counter Infectious Disease Crises*, National Academies Press, 2016.

### What if health costs declined with longevity?

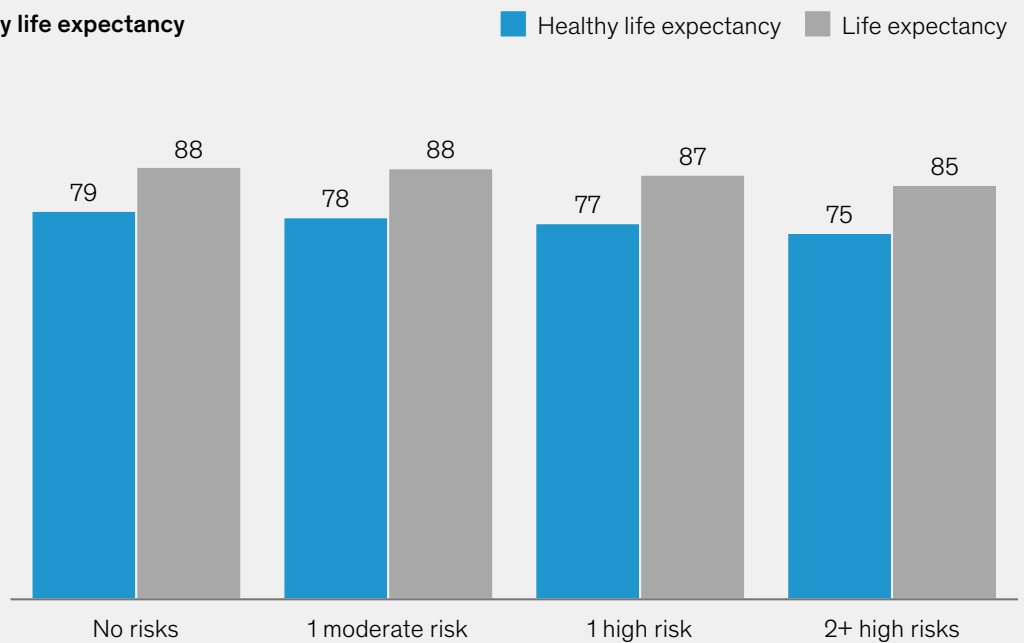
Contrary to the view that extending life will increase lifetime and end-of-life care costs, emerging evidence suggests that improving health over a lifespan will decrease lifetime costs of healthcare despite increasing longevity—a phenomenon known as morbidity compression (Exhibit 29). Several long-term studies have shown that reducing health risks (including obesity, smoking, limited physical activity, and unmanaged high blood pressure) could increase healthy lifespan significantly without extending the years spent in poor health.<sup>1</sup> As a result, the cumulative healthcare expenditure for healthier individuals (even though they live longer) can be significantly lower than for individuals with multiple risks. For example, a person who smokes, is overweight, and has high blood pressure can expect to live for three years less than a person without these health risks but, despite their shorter lifespan, will endure a longer span of poor health and incur higher cumulative healthcare costs over the course of their life.<sup>2</sup>

Exhibit 29

### Shifting health investment toward prevention and health promotion could reduce years spent in ill health and overall health costs in the long term.

Life expectancy and healthy life expectancy by health risk group

Years



	No risks	1 moderate risk	1 high risk	2+ high risks
<b>Total years of life spent in ill health</b>	9.0	10.0	9.9	9.8
<b>Lifelong morbidity score<sup>1</sup></b>	5.9	6.9	9.2	11.9
<b>Additional cumulative health costs</b> Compared to no risks	–	841	6,547	17,864
<b>\$</b>				

1. Represents the cumulative morbidity score (all causes) after age 65 measured in score year. Based on Gagne comorbidity score, it measures burden from several conditions that cause poor health in an individual (a higher score represents a greater burden from poor health).  
 Note: Risk factors assessed include BMI, smoking status, blood pressure, cholesterol, diabetes diagnosis. Based on follow-ups over a 40-year period for over 25,000 people in the United States.  
 Source: Norrina B. Allen et al., “Favorable cardiovascular health, compression of morbidity, and healthcare costs: Forty-year follow-up of the CHA Study (Chicago Heart Association Detection Project in Industry),” *Circulation*, May 2017; McKinsey Global Institute analysis

<sup>1</sup> James F. Fries, Bonnie Bruce, and Eliza Chakravarty, “Compression of morbidity 1980–2011: A focused review of paradigms and progress,” *Journal of Aging Research*, 2011; Norrina B. Allen et al., “Favorable cardiovascular health, compression of morbidity, and healthcare costs: Forty-year follow-up of the CHA Study (Chicago Heart Association Detection Project in Industry),” *Circulation*, Volume 135, Issue 18, 2017.  
<sup>2</sup> We recognize that certain costs, like pensions or long-term care costs, may increase if people’s lives were extended.

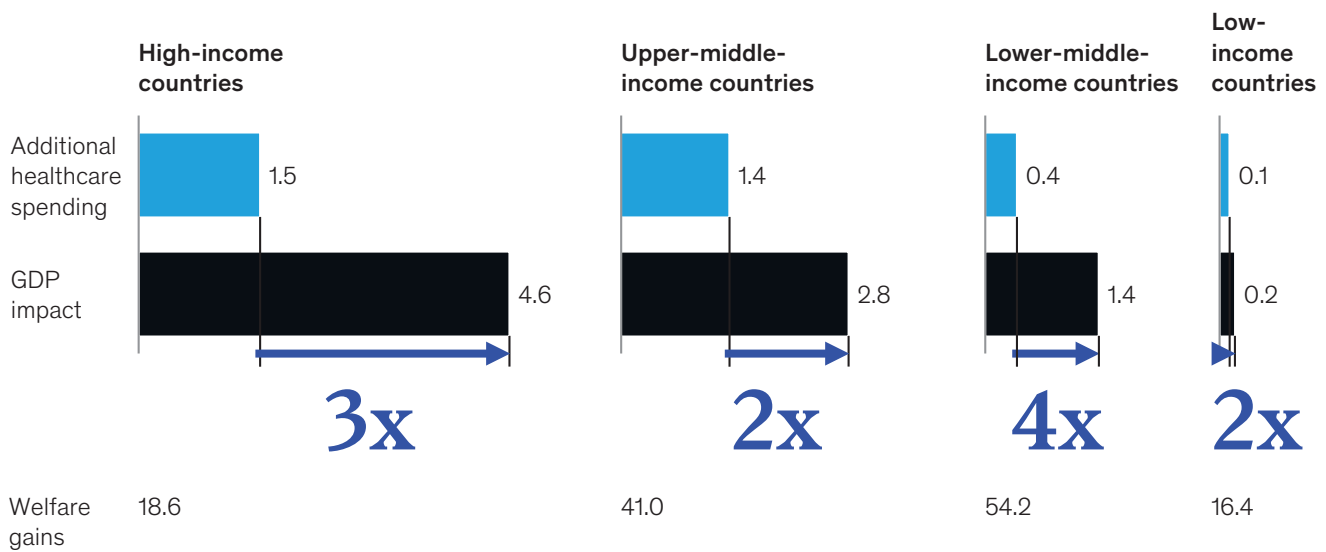
The \$2.2 trillion that we estimate would be needed to improve global health delivers economic benefits that range from two to four times the spending, depending on the income level of the country (Exhibit 30). We find higher ratios of economic benefits to costs in high- and lower-middle-income countries, where the earnings potential of a healthy working person is higher than for an otherwise similar person in a lower-income country; this differential is higher than the difference in the costs of maintaining their health. This effect is further exacerbated in low-income countries, where higher implementation costs reflect additional investment needed to develop healthcare infrastructure and systems that are currently too limited to deliver needed care. However, in every country, the social or welfare benefits far outstrip the economic benefits.<sup>186</sup>

Exhibit 30

**For each \$1 invested in improving health, an economic return of \$2 to \$4 is possible.**

**Healthy growth scenario, 2040**

\$ trillion



Note: Snapshot view of the healthy growth scenario in 2040. Additional healthcare spending, GDP impact, and welfare gains directly attributable to better health only (excluding expanded participation).

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; Oxford Economics; ILOSTAT; National Transfer Accounts project; WHO, *Updated Appendix 3 of the WHO global NCD action plan 2013–2020*, April 2017; “Disease Control Priorities 3 (DCP-3): Economic evaluation for health,” University of Washington Department of Global Health, 2018; Tufts Cost-Effectiveness Analysis Registry; McKinsey Global Institute analysis

**The investment needed could be largely offset by productivity improvements, except in low-income countries**

The challenge of the healthy growth scenario is more about implementation than financial costs. The cost is surprisingly small: a 1 to 1.4 percent increase in healthcare spending as a share of GDP in all countries except those with the lowest income, compared to the resulting 8 percent GDP boost. In low-income countries, spending on healthcare would need to rise from the current level of about 7 percent of GDP to almost 11 percent of GDP by 2040, a substantial increase but still below the GDP share in high-income countries today.<sup>187</sup>

<sup>186</sup> There are five countries where our estimated incremental costs needed to transition to a healthy growth scenario exceed the potential economic benefits in the 20-year time frame. These include Afghanistan, Burundi, Democratic Republic of Congo, Malawi, and Venezuela.

<sup>187</sup> In total, this amounts to additional funding for healthcare (excluding longevity costs) of around \$250 billion across all low- and lower-middle-income countries, a similar figure to the World Health Organization’s estimate of \$200 billion to \$370 billion required to deliver universal access to comprehensive primary care in low- and lower-middle-income countries. Income categories from the World Bank. See also *Primary health care on the road to universal health coverage: 2019 global monitoring report*, executive summary, WHO, September 2019.



The good news is that productivity improvements in healthcare delivery could more than compensate for the additional investment in all but the lowest-income countries. Robust evidence shows opportunities to reduce healthcare costs by 22 percent in all regions, without affecting health outcomes, of which half, or 11 percent, could be reasonably expected to be achieved over 20 years (see Box 18, “Productivity levers in healthcare”). We saw healthcare providers around the world respond to the surge in demand triggered by the COVID-19 pandemic by rapidly adopting new ways of working, suggesting that higher levels of productivity are not only possible but can be achieved rapidly in the right circumstances. Our analysis of interventions suggests that the overall cost of reaching the healthy growth scenario would not need to add anything to projected healthcare cost growth in high-income countries if half of the potential productivity savings (equivalent to 11 percent of total costs), were achieved. Productivity improvements at this scale would limit additional spending needed to one percentage point of GDP in middle-income countries. In low-income regions, additional investment of about two percentage points of GDP would be needed even after accounting for greater efficiency. Capital investment funds may be scarce in these countries, and investment in establishing the widest possible access to tech-enabled comprehensive primary care would reduce the amount of capital investment needed, compared to investment in specialist healthcare services.

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Improving health has the potential to be an economic game changer. After all, few investments deliver against so many of today’s social and economic needs, substantially improving well-being while also delivering an impressive shot in the arm to the global economy—and all without large additional spending. As the world looks to recover from the COVID-19 pandemic, it is hard to think of a better time to invest in health. In the next chapter, we turn to how that could be achieved, acknowledging that while the potential is great, the reality of reorienting the healthcare system to prevention, or finding additional funding for low-income countries, is not trivial.

**The economic return could be \$2 to \$4 for each \$1 invested in better health. In higher income countries, implementation costs could be more than offset by productivity gains in healthcare delivery. Low-income countries continue to need more investment in basic health infrastructure.**

## Productivity levers in healthcare

Healthcare expenditure is expected to grow globally by about 3 percent a year (adjusted for inflation) to 2040.<sup>1</sup> Yet all countries have large opportunities to reduce healthcare delivery costs from today's levels, which could achieve meaningful savings without reducing health outcomes. We found a range of productivity levers that could be activated, substantiated by an extensive body of our own and external research.<sup>2</sup> Many of the changes would benefit patients who could receive care closer to home and reduce time spent waiting or in duplicating paperwork or services. These include the following:

- Standardizing operational processes in clinical and nonclinical areas, such as organizing work flows and using assets and equipment (for example, diagnostic imaging machines and intensive care facilities) more effectively, and managing administrative costs efficiently.
- Transitioning to lower-intensity settings of care where appropriate. Examples include shifting care out of hospitals to community, retail, and home-based locations and, where care does require clinical facilities, optimizing use of day surgery and ambulatory centers.
- Reducing unnecessary duplication of services, such as needlessly repeating diagnostic tests, and reducing medical errors and

the complications that ensue as a result.

- Increasing levels of digitization in health services, in particular health records.
- In the longer term, introducing greater use of automation and artificial intelligence could create new opportunities in areas such as clinical decision support, interpretation of images, and clinical information.

Although the scale of inefficiency and the relative importance of each of these levers vary among healthcare systems, a review of the available evidence suggests that 22 percent would be a reasonable and conservative estimate of the total opportunity available; it may be substantially higher in some places (Exhibit 31).<sup>3</sup> We recognize that waste and inefficiency are easier to measure than to address, and therefore we have assessed the potential to offset the incremental costs of additional health investment if only half of this opportunity is realized over 20 years.

Our research suggests that no single healthcare system has yet achieved an optimally efficient operating model, despite numerous examples of efficiency improvement in individual services and processes. This indicates a high level of uncertainty surrounding whether productivity improvements even at the modest level we envision—

about 11 percent over 20 years—will be achieved at scale without substantial changes in underlying incentives and industry business models. However, the COVID-19 pandemic has demonstrated the potential for healthcare systems to shift rapidly when the need is critical. We have seen many services transition in a matter of days and weeks from in-person to digital channels, and workforce and broader operational models reviewed and revised to allow for the care of higher volumes of patients. For example, in March 2020 the UK government asked all primary care providers to shift to digital and phone-based appointments wherever possible to reduce providers' and patients' risk of exposure to the coronavirus. The national regulator fast-tracked assurance of video products, and 11 suppliers were selected to rapidly provide digital services. Within a few weeks, doctors in England were seeing only about 7 percent of patients face-to-face, compared with 80 percent the previous year, and 100 percent of patients were being triaged before booking an appointment, compared with 40 percent. As balance is restored, it is likely that a new and more efficient normal will emerge, one that exploits a wider array of potential delivery channels, triage tools, and operating models.<sup>4</sup>

<sup>1</sup> Joseph L. Dieleman et al., "Future and potential spending on health 2015–40: Development assistance for health, and government, prepaid private, and out-of-pocket health spending in 184 countries," *The Lancet*, Volume 389, Issue 10083, 2017.

<sup>2</sup> *Global growth: Can productivity save the day in an aging world?*, McKinsey Global Institute, 2015; *Digitization in healthcare: The opportunities for Germany*, McKinsey & Company, White Paper, 2018 (Similar scale of savings identified in equivalent analysis developed for the United Kingdom, Sweden, Canada, France, and other countries).

<sup>3</sup> William Shrank et al., "Waste in the US health care system: Estimated costs and potential for savings," *JAMA*, Volume 322, Issue 15, 2019; *Global growth: Can productivity save the day in an aging world?*, McKinsey Global Institute, 2015; *Digitization in healthcare: The opportunities for Germany*, McKinsey & Company, White Paper, 2018 (Similar scale of savings identified in equivalent analysis developed for the United Kingdom, Sweden, Canada, France, and other countries); *Harnessing data science and AI in healthcare: From policy to practice: Report of the WISH Data Science and AI Forum 2018*; *Productivity imperative for healthcare delivery in the United States*, McKinsey & Company, 2019; Donald M. Berwick et al., "Eliminating waste in US health care," *JAMA*, Volume 307, Issue 14, 2012; *Best care at lower cost: The path to continuously learning health care in America*, Institutes of Medicine, September 6, 2012; Tomas J. Philipson et al., "An analysis of whether higher health care spending in the United States versus Europe is 'worth it' in the case of cancer," *Health Affairs*, Volume 31, Issue 4, 2012; Alan M. Garber et al., "Is American health care uniquely inefficient?," *Journal of Economic Perspectives*, Volume 22, Issue 4, 2008.

<sup>4</sup> Nick Bostock, "Switch GP appointments to phone or digital where possible with 'immediate effect', says Hancock," *GP*, March 10, 2020; Jasmine Rapson, "Tech suppliers selected for pandemic digital appointments," *HSJ*, March 27, 2020; "Procurement of pre-approved suppliers of online and video consultation systems for GP practices to support COVID-19," NHS, March 28, 2020; Diane Baynham and Mary Hudson, "Rollout of video consultation across general practices," Gov.UK, March 26, 2020; Paul Lynch and Daniel Wainwright, "Coronavirus: How GPs have stopped seeing most patients in person," BBC, April 2020.

## The productivity opportunity is up to 22 percent across a wide range of health systems and income groups.

### Healthcare productivity levers and their relative impact

■ Low ■ Medium ■ High

Potential savings as share of total health spend (without reducing quality of care), %

	United States	China	India	Japan	Germany	France	United Kingdom	Nigeria
Operational best practices, including workforce, procurement, supply chain, and administrative	High	Medium	Medium	Medium	Medium	High	Medium	High
Optimized delivery setting and treatment duration (eg, length of stay)	Low	High	Medium	High	High	Medium	Medium	High
Reducing clinically ineffective procedures, errors, and unnecessary duplication	High	Medium	Low	High	Low	High	Low	Low
Digital, analytics, and healthcare information technology	Medium	High	High	Medium	High	Medium	High	Medium
Advanced technology and data, including robotics, artificial intelligence, machine learning, and natural language processing	High	High	Low	Low	High	High	High	Low

**Capturing some or all of the 22 percent productivity potential could release savings for reinvestment**

Source: JAMA, 2019; *Global growth: Can productivity save the day in an aging world?*, McKinsey Global Institute, 2015; *Digitization in healthcare: The opportunities for Germany*, McKinsey & Company, 2018 (similar scale of savings identified in equivalent analysis developed for Canada, France, Sweden, the United Kingdom, and other settings); *Harnessing data science and AI in healthcare*, WISH, 2018; *Productivity imperative for healthcare delivery in the United States*, McKinsey Center for US Health System Reform, 2019; Berwick et al., "Eliminating waste in US health care," *JAMA*, 2012; *Better Care at Lower Cost*, Institutes of Medicine, September 2012; Philipson et al., "An analysis of whether higher health care spending in the United States versus Europe is 'worth it' in the case of cancer," *Health Affairs*, 2012; Garber et al., "Is American health care uniquely inefficient?," *Journal of Economic Perspectives*, 2008; *Tackling Wasteful Spending on Health*, OECD, 2017; *Healthcare Value*, CNAMTS, 2012; McKinsey Global Institute analysis







# 5. Imperatives for healthy growth

Realizing the health opportunity that we size in this report would require a major effort to change by all stakeholders—governments, companies, and health institutions.<sup>188</sup> This will not be easy and cannot be achieved by healthcare systems alone. Governments play an important role. As policy makers and regulators, payers and providers, and funders of public health and research, governments can shape incentives, align stakeholders, and orchestrate change. Meanwhile, companies have much to gain from doing their part to improve the health of their workers and communities: more productive employees and lower levels of absence, a larger and healthier talent pool in the future, and potentially lower direct or indirect healthcare costs for the workforce. Ultimately, everyone has a role in creating healthy communities. Unpolluted air and water, affordable healthy food, safe neighborhoods, and connected social networks are critical to achieving the full social and economic benefits of better health.

Orchestrating a health transformation will be challenging, as past reform efforts have demonstrated. However, the many changes that have resulted from the COVID-19 crisis suggest that the world is at a unique juncture to reimagine how we promote better health for everyone. It has demonstrated that when the situation demands it, rapid transformation of the architecture of healthcare is possible. Rethinking patient and workforce flow in COVID-19 wards and the rapid transition to digital consultations are just two examples. In addition, billions of people around the world are demonstrating that under some circumstances behavior can readily change, for instance as they wear masks for the first time, prioritize handwashing, and reduce face-to-face interactions to curtail the spread of the virus. The many other pandemic-related changes include the increased speed of innovation and global collaboration, which if sustained could help the world achieve the healthy growth opportunity we identify in this report.

In this chapter, we set out four imperatives to capture the social and economic benefits of better health across countries: invest in health as a social and economic priority; keep health on everyone's agenda; transform healthcare systems; and double down on innovation. For each imperative, we provide examples of steps that stakeholders may consider, but it is important to recognize there is no one-size-fits-all formula. Finding the right tools will depend on the specific social and economic environments of individual communities and their populations. Throughout the chapter, we also provide examples of policies or practices stakeholders have implemented that are in keeping with the imperatives we set out. These examples are not exhaustive and are intended to be illustrative rather than prescriptive.

## **Make healthy growth a social and economic priority**

Our work shows that improving the health of the global population would have a substantial impact on economic growth prospects over the next 20 years and could increase resilience in the face of future health risks. Yet health is seldom part of the policy discussion about what can be done to accelerate economic growth. By moving away from a focus on the cost and sustainability of the current healthcare system, communities can make the right investments and shift to a healthier and more prosperous growth scenario. Governments around the world should consider developing and delivering a healthy life agenda in all areas and, at the same

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<sup>188</sup> We refer to three types of health institutions in this report: payors, the bodies that fund healthcare, including public and private insurers and governments; providers, the organizations that deliver healthcare including hospitals, clinics and online services, and the clinical workforce (including doctors, nurses, midwives, and others) working in them; and pharma and medtech, the industries that supply the healthcare sector with medical products, technologies, and other solutions (but do not directly deliver these to patients).



time, consider shaping employment and labor market policies to ensure that better health can deliver economic benefits.

### **Develop and deliver an integrated healthy life agenda**

Governments could reposition health as part of a holistic “healthy life for economic prosperity” agenda to deliver better health outcomes and promote economic growth. This could mean making health a core element of strategic decision making across the board—not just in health departments, but in government departments from transportation to commerce. This might include bringing together departments and budgets dedicated to public health, social services, and physical, mental, and behavioral health to harmonize investments, incentives, and services. Initiatives may include promoting employment policies to enable and protect a changing workforce, food regulations to enable and encourage healthy behaviors, and infrastructure investments to enable a growing healthcare system and promote healthy environments.

### **Prioritize rethinking labor and employment policies**

To enable economic growth from better health outcomes, governments should consider including health in developing policies relating to employment. These include the health and safety of formal and informal workers, and a review of work discrimination affecting older workers or people with disabilities as well as mandatory retirement ages or pension-related disincentives for healthy older workers to continue to work. The health and safety of informal workers could be particularly important in lower-income countries, where rights and protections may be bolstered. Some examples of current labor and employment policy initiatives include the following:

- **Protecting people with disabilities.** In Kuala Lumpur, Malaysia, social security programs provide people with disabilities with vocational rehabilitation and opportunities to engage in community and working life, financed by social insurance, tax-funded benefits, cash payments, and in-kind benefits. These programs, which encourage more positive attitudes toward people with disabilities and make society more “disability inclusive,” allow 60 percent of those enrolled to find or return to full employment.<sup>189</sup>
- **Encouraging the participation of older workers.** We estimate that increasing the participation of older workers could boost GDP by more than \$2.4 trillion by 2040. Policy makers could explore phased and flexible retirement policies that encourage workers to remain in the labor force while receiving pensions and offer training programs that improve employability.<sup>190</sup> Finland has a comprehensive national strategy, including training, research, and legislation to support employers to adopt age-sensitive policies and to address age discrimination in the workplace.<sup>191</sup> This has led to an increase in the average age of retirement of four years over a decade.<sup>192</sup>
- **Promoting occupational safety.** Governments set occupational health and safety regulations for workplaces, protecting employees from workplace hazards like toxic substances, adverse working conditions and psychosocial risk.<sup>193</sup> The International Labour Organization estimates that work-related injuries cause 2.3 million deaths annually. Many of them are preventable, particularly in developing countries, where rates of work-related injury are ten times higher than in developed countries.<sup>194</sup>

# 2.3M

deaths a year from  
work-related injuries

<sup>189</sup> *World Report on Disability*, World Health Organization, 2011 (Chapter 8: Work and employment).

<sup>190</sup> *Live longer, work longer*, OECD, 2006.

<sup>191</sup> *Towards age friendly work in Europe: A life course perspective on work and ageing from EU agencies*, Eurofound, 2017.

<sup>192</sup> Mary B. Young et al., *Grayskies, silver linings: How companies are forecasting, managing and recruiting a mature workforce*, The Conference Board, 2007.

<sup>193</sup> Marisol Concha-Barrientos et al., “Selected occupational risk factors,” in Majid Ezzati et al., eds., *Comparative Quantification of Health Risks*, Geneva, Switzerland: World Health Organization, 2004.

<sup>194</sup> Shengli Niu, “Ergonomics and occupational safety and health: An ILO perspective,” *Applied ergonomics*, Volume 41, Issue 6, 2010; G. Eijkemans, “WHO and ILO joint effort on occupational health and safety in Africa,” *African Newsletter on Occupational Health and Safety*, Volume 14, Issue 2, 2004.

## Keep health on everyone's agenda

The COVID-19 crisis has brought health to the forefront of everyone's minds, with hardly a government, business, or community unaffected. Given the human and economic burden of ill health, the role and value of health should not be allowed to slip down the agenda as societies and economies begin to recover and move forward. Our work shows that 70 percent of opportunities to improve health occur before anyone seeks acute care. Half of that potential comes from healthier environments, societies, and workplaces that encourage healthy behaviors and mindsets. Long-term prevention and health promotion cannot simply be left to healthcare providers or healthcare systems. It is quite literally everybody's business. Without concerted and collaborative efforts from multiple stakeholders, health improvement at scale will not be possible.

The health community has long been aware that prevention can be better than cure. Many of the solutions and innovations that sustain change will lie outside of the realm of health departments, requiring an understanding of design, communication, emotional connection, and behavioral nudges that are more commonly associated with marketing and social media. Two key areas to consider are advancing healthy communities and advancing healthy workplaces.

# 70%

share of the disease-burden  
reduction from prevention

### Advancing healthy communities

The advancement of community health matters because living environments fundamentally shape health opportunities, choices, and behaviors. Healthier communities are also more resilient in the face of health shocks and crises. As national governments make and enforce policies and local authorities design, fund, and sometimes deliver frontline programs, a focus on two areas is important: policies to promote healthier behavior and environments, and investment in the social determinants of health.

To advance healthy communities, governments may need to incorporate health into policies spanning the environment, food and agriculture, education, housing, employment, transportation, and urban planning; make targeted infrastructure investments; and engage and convene non-health actors to create frameworks for action. While broadly similar goals apply to emerging and mature economies, there are some differences. For example, low-income countries may have a greater need to invest in public health infrastructure and social services. Some countries, such as Chile, have achieved good outcomes in a range of indicators, including life expectancy, with comparatively low levels of spending, by focusing on the broader and social determinants of health.<sup>195</sup> Studies have shown that countries with greater social expenditure, particularly high public social expenditure, have better health outcomes.<sup>196</sup> Examples of government initiatives to advance community health include:

- **Clean water and sanitation.** Despite enormous progress over the past 200 years, many regions still lack access to clean water and basic sanitation in secure and fit-for-purpose housing.<sup>197</sup> Improving water, sanitation, and hygiene delivers significant benefits, according to our analysis, accounting for 3 percent of the global disease burden averted and one-third of all impact from environmental interventions. Some countries are already focused on providing clean water and better sanitation. The government of India, for instance, recently invested in building 110 million toilets over five years, making good hygiene a practical reality for 600 million people.<sup>198</sup>

<sup>195</sup> Max Roser, "The link between health spending and life expectancy," Institute for New Economic Thinking, 2016; "A decade towards better health in Chile," *Bulletin of the World Health Organization*, Volume 89, Number 10, 2011.

<sup>196</sup> *Are better health outcomes related to social expenditure? A cross-national empirical analysis of social expenditure and population health measures*, RAND Corporation, 2016.

<sup>197</sup> *Progress on household drinking water, sanitation and hygiene 2000–2017: Special focus on inequalities*, United Nations Children's Fund (UNICEF) and World Health Organization, 2019.

<sup>198</sup> Swachh Bharat mission, Department of Drinking Water and Sanitation, <https://swachhbharatmission.gov.in/sbmcms/index.htm>

- **Healthy, affordable food.** Poor nutrition remains a challenge when families lack sufficient income for food or clean and safe cooking facilities.<sup>199</sup> Taken together, dietary interventions account for 9 percent of the total impact in our analysis, the fourth-most-effective intervention category after vaccines, safe childbirth, and anti-infective medicines. The largest opportunity is in low-income regions. Bolivia, for example, has implemented the Zero Undernutrition program to improve food and nutrition security, which provides maternal supportive services and fortified supplementary foods for children aged six to 23 months. Researchers have found that it is having an impact, reducing the rate of stunting in children under the age of two by 30 percent.<sup>200</sup> But poor nutrition because of the lower cost of high-calorie, low-nutrition food is also a challenge for many families in high-income countries.<sup>201</sup>
- **Education.** Bringing health into education is critical for governments to consider. Education and health literacy help foster healthy behaviors and outcomes and are passed down through generations (positively and negatively). Access to education, and the health education delivered as part of the curriculum, have been shown to have a critical impact on sexual health. This is particularly important when combined with female empowerment and education.<sup>202</sup>
- **Incentives.** According to our analysis, health-related behaviors collectively account for about 30 percent of the total addressable opportunity we estimate. Of these, obesity and related health risks present a major health challenge across the world.<sup>203</sup> Governments are experimenting with policies to encourage healthy behavior. One example is Singapore's National Steps Challenge, a campaign that rewards physical activity. More than one million participants have a fitness tracker that measures the amount they walk per day and rewards them with health points, which they can redeem for various services. Since it launched in 2015, 7 percent more Singaporeans are engaging in physical activity and spend an average of 25 more minutes per session.<sup>204</sup> Similarly, a school-based diet and exercise program in Tunisia deploys student champions to lead awareness raising and create peer influence with simple rewards, such as stickers and prizes. This program has increased the consumption of fruits and vegetables, increased levels of daily activity, and reduced the risk of excess weight.<sup>205</sup> While there is no single solution, a growing body of evidence is available to inform program design and delivery.<sup>206</sup>

### Advancing healthy and inclusive workplaces

Employers can explore ways to invest in the health of the workforce. Beyond continued investment in conventional occupational health and safety, this could encompass broader workplace health promotion as well as new understanding of occupational risks related to the changing nature of work—including tech-induced and other mental health stressors, sleep health, and the impact of high levels of sedentariness. Examples of company initiatives advancing healthy workplaces include:

<sup>199</sup> Rachel Nugent et al., "Economic effects of the double burden of malnutrition," *The Lancet*, January 2020, Volume 395, Issue 10218; *Ambition and Action in Nutrition 2016-2025*, WHO, 2015; Barry Popkin et al., "Dynamics of the double burden of malnutrition and the changing nutrition reality," *The Lancet*, January 2020, Volume 395, Issue 10217; Jonathan Wells et al., "The double burden of malnutrition: aetiological pathways and consequences for health," *The Lancet*, January 2020, Volume 395, Issue 10217; Corinna Hawkes et al., "Double-duty actions: Seizing program and policy opportunities to address malnutrition in all its forms," *The Lancet*, January 2020, Volume 395, Issue 10218; Yashvee Dunneram and Rajesh Jeewon, "Healthy diet and nutrition education program among women of reproductive age: A necessity of multilevel strategies or community responsibility," *Health Promotion Perspectives*, Volume 5, Issue 2, 2015; Rafael Perez-Escamilla et al., "Prevention of childhood obesity and food policies in Latin America: From research to practice," *Obesity Reviews*, July 2017, Volume 18, Issue S2.

<sup>200</sup> Lesli Hoey et al., "Bolivia's multisectoral Zero Malnutrition Program: Insights on commitment, collaboration, and capacities," *Food and Nutrition Bulletin*, June 2011, Volume 32, Issue 2.

<sup>201</sup> *The heavy burden of obesity: The economics of prevention*, OECD Health Policy Studies, 2019; Scott Corfe, *What are the barriers to eating healthily in the UK?*, Social Market Foundation, 2018.

<sup>202</sup> Marcella M. Alsan and David M. Cutler, "Girls' education and HIV risk: Evidence from Uganda," *Journal of Health Economics*, September 2013, Volume 32, Issue 5.

<sup>203</sup> Michele Cecchini et al., "Tackling of unhealthy diets, physical inactivity, and obesity: Health effects and cost-effectiveness," *The Lancet*, Volume 376, Issue 9754, 2010.

<sup>204</sup> *Tech enabled National Steps Challenge*, Integrated Health Information Systems, 2020.

<sup>205</sup> Jihene Maatoug et al., "School based intervention as a component of a comprehensive community program for overweight and obesity prevention, Sousse, Tunisia, 2009–2014," *Preventing Chronic Disease*, Volume 12, 2015.

<sup>206</sup> Renata Micha et al., "Effectiveness of school food environment policies on children's dietary behaviors: A systematic review and meta-analysis," *PLOS One*, 2018.

- **Wellness programs.** Citi’s approach to health promotion at work includes rewards for participating in health assessments, sustaining health activities, and reaching health goals; support for health improvement, including organized fitness-related events and challenges; and health interventions in the workplace, such as Weight Watchers at Work and health coaching.<sup>207</sup> For smaller organizations, low-cost and relatively simple health promotion strategies can make an important difference in productivity. For example, a public-sector employer in Middlesbrough, in the United Kingdom, used health assessment questionnaires to understand the needs of staff and co-developed a flexible and multifaceted health promotion tool kit. The resulting program included family days and team-building days, health walks, bicycle access, discounted gym membership, free fresh fruit, and training in mental health, among other initiatives. This led to a 44 percent reduction in sickness absence, from an average of 4.3 days per employee per year to 2.4 days.<sup>208</sup> While evidence about the long-term health outcomes associated with workplace wellness programs is limited, survey data suggests shorter-term advantages in recruitment, retention, and performance.<sup>209</sup> Our work suggests that there is scope and potential for mutual advantage from employers working more closely with the full range of health institutions to support employee health and productivity. More research will be needed to continue to evaluate and improve health promotion strategies at work
- **Inclusive workplaces.** Employers that adapt the workplace to take advantage of changing demographics benefit from higher levels of retention—which is particularly important in regions with labor shortages—and a more diverse talent pool (see Box 19, “Rethinking aging”). This also means offering training and retraining, creating a culture that addresses discrimination, offering assistive technologies when appropriate, and making buildings accessible to people with mobility challenges.<sup>210</sup> We also find that workplaces that offer flexible working practices can help support informal caregivers to stay in work.<sup>211</sup> For example, managers at a BMW car production plant in Dingolfing, Germany, worked with employees to redesign the production line and address tasks that older workers found troublesome. The focus was on low-cost ergonomic changes that reduced physical stress. Productivity on the adapted line was equal to that of equivalent lines with a younger workforce age mix by volume, quality was higher, and sickness absence was below the plant average. The program has been replicated at BMW plants elsewhere in Germany, in Austria, and in the United States.<sup>212</sup>

## For smaller organizations, low-cost and relatively simple health promotion strategies can make an important difference in productivity.

<sup>207</sup>Citi Wellness Benefits: <https://handbook.citibenefitsonline.com/cit-1d5-health-wellness-eds-print.pdf>; *Designing incentives for wellness*, Johns Hopkins School of Public Health, 2015.

<sup>208</sup>*Workplace interventions to improve health and wellbeing*, Public Health England/UCL Institute of Health Equity, 2014; Case study: Middlesbrough Environment City - healthy eating and exercise 2013, Department for Work & Pensions, Middlesbrough Environment City website.

<sup>209</sup>*2018 Employee Benefits: The evolution of benefits, 2018*, Society for Human Resource Management; Christian Krekel, George Ward, and Jan-Emmanuel De Neve, *Employee wellbeing, productivity and firm performance*, VoxEU, April 2019; *The health and productivity advantage: Staying@Work Report 2009/10*, National Business Group on Health and Towers Watson, 2010; Ron Z. Goetzel et al., “The stock performance of American companies investing in a culture of health,” *American Journal of Health Promotion*, March 2019, Volume 33, Issue 3.

<sup>210</sup>Laura Naegele, Eric Thode, and Claire Dhéret, *Second career labour markets: Assessing challenges – advancing policies*, Bertelsmann Foundation and European Policy Centre, 2013.

<sup>211</sup>Deborah Smeaton, Kath Ray, and Genevieve Knight, *Costs and benefits to business of adopting work life balance working practices: A literature review*, UK Department for Business, Innovation and Skills, 2014.

<sup>212</sup>Christoph Loch et al., “The Globe: How BMW is defusing the demographic time bomb,” *Harvard Business Review*, 2010; Alicia Clegg, “How to help the aged at work,” *Financial Times*, July 25, 2012.

## Rethinking aging

Many countries' populations are rapidly aging. Western Europe and Japan have the highest share of people over 65 today, and countries including China and South Korea will almost catch up by 2040.<sup>1</sup> Societies will need to adapt to this shift in ways that allow people to age well and make the most of the social and economic potential of the skills and assets of this group. Three areas to consider are the following:

**Appreciate aging as a workplace and broader economic opportunity.** Companies have much to gain from retaining and attracting experienced older employees. This may require creating alternative work practices, part-time retirement programs, and lifelong learning. Companies also have an opportunity to tap into the growing segment of older and healthy consumers—a large proportion of the \$1.8 trillion consumption boost by 2040, in our estimation. Meanwhile, the financial services industry may need to consider new types of financial products and investment strategies for extended lifespans.

**Adapting societies to encourage and enable healthy aging.** To enable healthy aging, societies need to offer opportunities for older people to remain physically and cognitively fit as well as socially engaged. This may require cities to offer age-friendly housing, transportation, and public spaces. As people live longer, governments may need to consider how to guarantee financial security and access to long-term care, so that people can afford to maintain their health, eat well, and live independently. The COVID-19 pandemic has demonstrated that in the right circumstances, remote care may be as safe as or safer than conventional care, effective, and socially engaging. If adaptations can be expanded further, society as a whole has an opportunity to enhance the lives, health, and independence of older populations nonintrusively, conveniently, and affordably.

**Maximizing opportunities for healthier older cohorts to fully participate in society.** Healthy aging creates a significant cohort of educated, experienced people with valuable skills and assets to contribute in their communities. Some choose to become entrepreneurs: in Britain, 84 percent of the growth in self-employment from 2008 to 2012 could be attributed to people over 50.<sup>2</sup> Others contribute through civic and volunteer roles or through their families and friends. At the same time, a broad range of opportunities for older people to stay socially engaged helps maintain their health, creating a virtuous cycle of individual and social health.

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<sup>1</sup> International Institute for Applied System Analysis (IIASA), Aging Demographic Data Sheet 2018, IHME population forecasts.

<sup>2</sup> Thomas Wainwright and Ewald Kibler, "Beyond financialization: Older entrepreneurship and retirement planning," *Journal of Economic Geography*, Volume 14, Issue 4, July 2014; Mikaela Backman, ed., *Handbook of Research on Entrepreneurship and Aging*, Cheltenham, UK: Edward Elgar Publishing, 2019.



## Transform healthcare systems

Achieving the level of health improvement envisioned in this report would require a shift in how healthcare is delivered, and we do not underestimate the challenges involved in achieving change on this scale. In all countries, prioritizing health promotion and preventive care over treating people once they are already sick would be important.<sup>213</sup> Promising examples from around the world show that countries and healthcare systems have already made progress in this regard, but opportunities exist to adapt and scale the proven success stories and to move further, faster, and with more integrated and holistic ambition. Many regions, particularly in low- and middle-income countries, and some rural areas in high-income countries, have room to design and deploy high-quality primary healthcare services, typically delivered by general practitioners who act as the first point of contact for patients with health needs or problems, coordinating treatment and next steps.<sup>214</sup> Even in high-income countries, access to high-quality mental and behavioral healthcare can be a challenge, and public health programs are under-resourced; in OECD countries, for example, according to some estimates, only 2 to 3 percent of healthcare budgets goes toward prevention.<sup>215</sup> Innovations developed in and outside of healthcare, for instance telemedicine and self-enabled care, may require investment but could make changes in healthcare delivery scale at a low cost.

Government, payer, and provider roles and boundaries vary by healthcare system and may be blurred depending on the level of collaboration and integration. As a result, the steps we discuss below may be relevant to one or several stakeholders, depending on the local context.

Governments shape the healthcare system and set incentives that can facilitate the transformation of healthcare. They can ensure that financial incentives reward shifting efforts toward prevention and investing in the highest-opportunity areas, and expand capacity and access to affordable, comprehensive, and consistently high-quality primary care, alongside access to proven, cost-effective medicines. Governments may do this directly, through investment in infrastructure and resources (for example, health workers, equipment, community facilities, and essential medicines) or indirectly, by expanding healthcare coverage through their role as a payer or commissioner of health services, thus encouraging private-sector healthcare investments. By taking on the role of convener and connector, governments can develop elements of the healthcare system that may otherwise not be built due to market failures. For example, governments may coordinate data collection by disparate healthcare entities to increase transparency and provide a public good, which may improve healthcare delivery by all institutions.

To transform the healthcare system, health institutions can focus on two steps: reorienting and strengthening the healthcare system and introducing next-generation healthcare delivery.

### **Reorienting and strengthening the healthcare system: Provide more holistic service offerings, expand prevention programs, and rethink incentives**

To achieve the health outcomes which this report estimates, healthcare systems must shift their focus to the long-term health of the individual, which may include redefining their care

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<sup>213</sup> There is a strong body of evidence supporting this approach. For example: In England, an increase of just one primary care doctor per 10,000 population is associated with a 6 percent decrease in mortality; in Spain, regions that were first to implement primary care reforms registered the largest reductions in mortality due to hypertension and stroke; in the United States, overall health is better in regions with more primary care physicians and where primary care functions well, and overall health is worse where specialists predominate. Thailand is an example of an emerging economy in the midst of rolling out universal health coverage with an enhanced primary care model focused on providing prevention, health promotion, and gate-keeping access to specialist care. Thailand has also invested in innovation and HITAP funds research, and supports the rollout of most effective innovations. David McDaid, Franco Sassi, and Sherry Merkur, *Promoting Health, Preventing Disease: The Economic Case*, European Observatory on Health Systems and Policies Series, Maidenhead, UK: Open University Press, 2015; Barbara Starfield, Leiyu Shi, and James Macinko, "Contribution of primary care to health systems and health," *Milbank Quarterly*, Volume 83, Issue 3, 2005; Barbara Starfield et al., "The effects of specialist supply on populations' health: Assessing the evidence," *Health Affairs*, Volume 24, 2005; Martin C. Gulliford, "Availability of primary care doctors and population health in England: Is there an association?," *Journal of Public Health Medicine*, Volume 24, Issue 4, 2002; Joan Villalbí et al., "An evaluation of the impact of primary care reform on health," *Atención Primaria*, Volume 24, Issue 8, 1999. Kanitsorn Sumriddetchkajorn et al., "Universal health care coverage and primary care, Thailand," *Bulletin of the World Health Organization*, June 2019.

<sup>214</sup> *The world health report 2008: Primary health care: Now more than ever*, WHO, 2008.

<sup>215</sup> *Mental health action plan 2013-2020*, WHO, 2013; Michael Gmeinder, David Morgan, and Michael Mueller, *How much do OECD countries spend on prevention?*, OECD Health working paper number 101, OECD, December 2017.

delivery model or the boundaries between healthcare providers. This would mean thinking about how to support people to access holistic, personalized and integrated care, wherever possible fully informed by complete, longitudinal health data and preferences. It would also entail using digital technology and analytics to provide timely information, guidance, and tools for self-care and convenient, multiple-point access to patients where and when they can most benefit. In developing countries, this might mean integrating the disease-specific programs that have worked very well in response to selected priorities—such as HIV/AIDS—but may be less suited to delivering more comprehensive health promotion and essential care. Already, healthcare systems across mature economies are deploying ways to intervene earlier in the pathway that leads to poor health outcomes; these interventions must be scaled more broadly. In parallel, consortia of nongovernmental organizations, local providers, and businesses are finding opportunities to improve the health chances of disadvantaged populations in developing countries. Examples include the following:

- **Affordable and safe housing.** Many health insurers in the United States have made substantial investment in affordable housing and collaborated with community organizations with the goal of reducing health costs over the long term.<sup>216</sup> In Ahmedabad in India, an urban neighborhood of informal and substandard housing has been upgraded by an NGO-led consortium, leading to a halving of the risk of water-borne diseases for inhabitants.<sup>217</sup>
- **Social isolation.** In response to research identifying loneliness and social isolation as a driver of poorer health outcomes, Sharp Health in the United States now includes loneliness in its assessment of patient need and provides strategies and guidance to address it, along with core health and medical services.<sup>218</sup> This will be particularly important, but also challenging, when meeting health needs and when people's safety requires society to apply social distancing as a health precaution.
- **Social prescribing.** In the United Kingdom, primary care providers are beginning to employ social prescribers, who assess patients' social needs, provide information and referrals to services, facilitate peer support groups, offer guidance and counseling, and serve as case managers for patients with complex social needs. In some early studies, this intervention reduced emergency department visits and emergency admissions by up to one-third.<sup>219</sup>
- **Intersectoral integration.** In Trieste in Italy, local "micro-area" welfare programs in neighborhoods of high deprivation integrate healthcare and social services with community and civil society organizations and public housing bodies, to monitor and improve health promotion and community resilience, relying primarily on active citizen volunteers. This led to a reduction in rates of hospital admission for psychosis, acute respiratory infections, and cardiovascular conditions by 85 percent, 56 percent, and 28 percent, respectively.<sup>220</sup>

Most healthcare providers have an opportunity to expand the scope and ambition of their prevention-focused services, helping patients cultivate and sustain positive health behaviors. In some areas, proven interventions simply need to roll out more broadly, but in other areas (particularly behavioral change), more time and resources might be needed to better understand and build on what works. It may also be important to expand the range of prevention programs available to include areas where prevention has not historically played a role, such as mental health, musculoskeletal health (in particular back pain), and neurological health (in particular dementia), acting on and building on the latest research

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<sup>216</sup> For example, UnitedHealthcare. "UnitedHealthcare's investments in affordable housing to help people achieve better health surpass \$400 million," press release, March 26, 2019.

<sup>217</sup> World Bank Cities Alliance, *Cities Alliance for cities without slums: Action plan for moving slum upgrading to scale*, 2013, <http://web.mit.edu/urbanupgrading/sponsor/ActionPlan.pdf>.

<sup>218</sup> Sharp Health News, "Staying healthy by staying connected," April 5, 2019.

<sup>219</sup> Marie Polley et al., *A review of the evidence assessing impact of social prescribing on healthcare demand and cost implications*, University of Westminster, Technical Report, 2017; Clair Farenden et al., *Community navigation in Brighton & Hove: Evaluation of a social prescribing pilot*, Impetus, November 2015.

<sup>220</sup> World Health Organization Regional Office for Europe, *Case studies: The WHO European Health Equity Status Report Initiative*, 2019.

in these areas.<sup>221</sup> A positive byproduct of this shift would be a release of capital investment funds, because the capital-expenditure intensity of these settings of care is far below that of more specialized healthcare.<sup>222</sup> Further, this pivot could pave the way for changes in workforce models, expanding roles and teams to include a broader mix of therapists, community health workers, and health educators, and potentially relieving some areas where there are workforce shortages. Examples include the following:

- **Prevention programs.** A number of exercise programs have been proven to reduce fall risk and the severity of fall-related injuries in older adults. While some are already in use in a number of hospitals and residential care settings, these programs are still not widely available at scale for all who could benefit, particularly older people living in the community.<sup>223</sup> Similarly, only a very small number of countries—including Finland, the United Kingdom, and the United States—have developed diabetes prevention programs at scale.<sup>224</sup> Many others, including Mexico, Chile, and Brazil, are expanding prevention-focused strategies in this area, for example through nationwide healthy eating and activity initiatives.<sup>225</sup>
- **Workforce innovation.** Responding to very high levels of avoidable health problems and a shortage of qualified clinical health workers, the Southcentral Foundation in Alaska has developed a model that focuses on employing community health educators whose role is to work with people to understand the home environment and encourage healthy behaviors and uptake of preventive care.<sup>226</sup>

Whatever the payer model and structure, healthcare systems may need to find a payment model that encourages and rewards providers and other partners for achieving desired health outcomes rather than paying for volume or the quantity of treatment. While this applies to both emerging and mature economies, uptake and experimentation are currently greater in higher-income countries, which have sufficient data collection, transparency, and established payment channels. These value-based approaches can take different forms. Examples include the following:

- **Episode-based and bundled payment models:** These provide incentives for quality and outcomes and reduce rates of avoidable complications and exacerbations.<sup>227</sup> For example, in Tennessee, episode-based payment lowered the cost of managing asthma exacerbations in the Medicaid population by 39 percent.<sup>228</sup> The South Africa–based insurer Vitality uses incentives to support members in good health in maintaining healthy behaviors and helps those with existing chronic conditions manage their health and reduce their long-term risks.<sup>229</sup> Incentives for healthy behaviors include discounted premiums and other in-program rewards. Support for health improvement includes apps for goal setting and monitoring and subsidies for gym membership. Vitality also conducts rigorous research to measure the impact of behaviors on health outcomes and health costs over time.<sup>230</sup>

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<sup>221</sup> America's Health Insurance Plans, *Reevaluating low back pain care to help address the opioid epidemic*, 2019.

<sup>222</sup> Kerri Schroeder, "Considerations for capital spending to maximize returns: Evaluating capital expenditures is more complicated under a system focused on value," *Healthcare Finance*, August 28, 2015.

<sup>223</sup> Fabienne El-Khoury et al., "The effect of fall prevention exercise programmes on fall induced injuries in community dwelling older adults: Systematic review and meta-analysis of randomised controlled trials," *The BMJ*, November 2013, Volume 347, Issue 7934.

<sup>224</sup> Jonathan Stokes et al., "Implementing a national diabetes prevention programme in England: Lessons learned," *BMC Health Services Research*, December 2019, Volume 19.

<sup>225</sup> Michele Heisler et al., "Diabetes prevention interventions in Latin American countries: A scoping review," *Current Diabetes Reports*, September 2016, Volume 16, Issue 9.

<sup>226</sup> Charles Clement et al., *The SCF Nuka model of care: Customer-owners driving healthcare*, Southcentral Foundation, 2010.

<sup>227</sup> One US payor, Horizon Blue Cross, has reported that its episode-based payment model has reduced the hospital readmission rate after hip replacement by 37 percent and the rate of caesarean sections by 32 percent. Mary Caffrey, "NJ's Horizon BCBS pays \$3m in shared savings for episodes of care; readmissions, C-sections reduced," *American Journal of Managed Care In Focus* blog, February 18, 2016.

<sup>228</sup> *TennCare delivery system transformation: Episodes of care analytics report*, TennCare, October 2019.

<sup>229</sup> Vitality Group is the shared-value health insurance service line of Discovery Health. Vitality Group shared-value insurance is available in Australia, Canada, China, France, Germany, Hong Kong, Japan, Malaysia, Philippines, Singapore, South Africa, South Korea, Sri Lanka, Taiwan, Thailand, the United Kingdom, and the United States.

<sup>230</sup> *Fitter bodies could lead to fitter economies*, RAND and Vitality, November 2019.

- **Value-based payment in lower-income countries:** Developing countries where access to health insurance is limited have an opportunity to develop and shape models with enablers and incentives for built-in care quality. For example, in Kenya, primarily in informal housing around Nairobi, MomCare provides coverage for maternity care for low-income women. The program provides its four million subscribers with an insurance package for maternal care and a network of providers using consistent quality standards. For providers, it gives shared data on quality and patient-reported outcomes to create transparency and incentives to improve patient and provider behaviors.<sup>231</sup>

### **Introducing next-generation healthcare delivery: more appropriate and flexible settings of care, and better use of information and technology**

Innovations such as advanced analytics, artificial intelligence, telehealth, digital health management for chronic conditions, wearables, and other next-generation health technologies provide an often low-cost and highly scalable means to improve and expand healthcare. These technologies can broaden access to primary care and many other health services in developing countries as well as more mature markets. Advanced technology is not the whole solution—a huge amount can be achieved through thoughtful service design and integration. Examples include the following:

- **Enhanced and flexible care settings.** Health providers can shift focus to deliver a much broader array of services in primary and community settings. They can support, inform, and enable self-care and deliver more proactive prevention-focused service. Most of the health interventions we identify, such as vaccines and managing chronic conditions, are best offered in primary care or community-based care settings. However, overreliance on hospital services is as common in low-income countries as it is in high-income countries. An example can be found in Buurtzorg in the Netherlands, where a nurse-led, patient-centered and -empowered, holistic, community-based care service is transforming out-of-hospital care at a 40 percent lower cost compared to conventional care models. Another approach is to integrate care across the continuum.<sup>232</sup> In Germany, Gesundes Kinzigtal provides a continuum of services including pharmacies, care homes, hospital services, and primary, community, rehab, and ambulatory care settings, with a focus on delivering services in the most convenient, lowest-intensity setting.<sup>233</sup> Healthcare systems may struggle to take out old and under-used capacity, for instance, hospital outpatient clinics and sub-scale rural hospitals. Achieving a step change in health will require a major shift in resource allocation away from historical, hospital-based models of care delivery, to more nimble, agile, responsive models of behavioral support for individuals and communities.
- **Better use of technology.** Payers and providers of all types could benefit from next-generation technologies that improve the accuracy, quality, and value of care across the care journey. This may require deploying advanced analytics to identify at-risk members—both individuals and vulnerable subpopulations—building digital engagement platforms to empower self-care and support people in making informed choices, and leveraging telehealth, digital solutions, and wearable technologies to facilitate remote monitoring and care. For example, a multiyear strategic partnership between Humana and Microsoft aims to use predictive analytics and intelligent automation to reimagine health services for an aging population.<sup>234</sup> Healthcare institutions could invest in and possibly develop next-generation tech-enabled care for all, and especially those with chronic conditions. Leveraging technologies could simultaneously increase access and raise the quality and consistency of care, leapfrogging traditional models of primary care, but

<sup>231</sup> Leapfrog to Value Initiative, *Leapfrog to Value: How nations can adopt value-based care on the path to universal health coverage*, 2019.

<sup>232</sup> Buurtzorg's model of care, 2020: <https://www.buurtzorg.com/>; Jo Maybin, "Going Dutch in West Suffolk: Learning from the Buurtzorg model of care," The King's Fund blog, September 26, 2019.

<sup>233</sup> Ellen Nolte et al., "Implementing integrated care: A synthesis of experiences in three European countries," *International Journal of Care Coordination*, March–June 2016, Volume 19, Issue 1–2.

<sup>234</sup> Microsoft, "Humana and Microsoft announce multiyear strategic partnership to reimagine health for aging populations and their care teams," press release, October 21, 2019, <https://news.microsoft.com/2019/10/21/humana-and-microsoft-announce-multiyear-strategic-partnership-to-reimagine-health-for-aging-populations-and-their-care-teams/>

more research and experimentation are needed. Two different models currently prevail. Under one, the patient connects to the clinician remotely, as in China; under the other, in use in Ghana, community health workers connect to specialist clinicians remotely (see Box 20, “New models of primary care”).

#### Box 20

### New models of primary care

Technology is promoting the development of new models of primary care around the world. Two systems are currently in wide use.

In China, Ping An’s Good Doctor service is a one-stop healthcare ecosystem platform with more than 300 million users. It combines online teleconsultations as well as “tele-booths” to provide one-minute remote consultations with an AI-supported in-house medical team. The booths have been installed in cities in eight provinces, with 1,000 units providing services to more than three million users. The service is part of a health ecosystem that includes smart healthcare solutions, diagnostic services, and health insurance.<sup>1</sup>

In Ghana, the Novartis Foundation, in partnership with the national government, developed a pilot telemedicine system. First available in 30 communities, it has since expanded nationally. The system connects frontline health workers to doctors and specialists via 24-hour teleconsultation centers. The workers receive coaching and treatment advice, empowering them and avoiding unnecessary referrals. In 2018, telemedicine systems reached a total of six million patients, one in five of Ghana’s population, and in more than 50 percent of teleconsultations, the issue could be resolved by phone.<sup>2</sup>

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<sup>1</sup> Dean Koh, “Ping An Good Doctor launches commercial operation of One-minute Clinics in China,” *Mobi Health News*, January 7, 2019.

<sup>2</sup> Broadband Commission for Sustainable Development, *The promise of digital health: Addressing non-communicable diseases to accelerate universal health coverage in LMICs*, 2018; Novartis Foundation, “Reimagining healthcare through digital technology: Ghana telemedicine.”

## Double down on innovation

Innovation continues to be critical to improving the health of the world’s population. Scientific advances hold incredible promise to address many of today’s challenges with more effective, convenient, and acceptable interventions. They also provide new solutions for diseases that cannot yet be treated or prevented and combat new health threats such as the COVID-19 pandemic. Promising innovations include genomics to deliver more targeted prevention and treatment, data science and AI to detect and monitor disease and enhance research, tech-enabled delivery to expand and reimagine access, and advances in the understanding of the biology of aging.<sup>235</sup> However, current economic and business models often fail to encourage innovations in prevention and healthcare delivery. Today, treatment for established disease is more likely to be reimbursed and is rewarded much more highly than health promotion, preventive care, or early intervention, and as a result, even transformative innovations can be very difficult to monetize. This thinking flows through to the research agenda, where the economic case for investing in prevention, preparedness, and health promotion is challenging. Two specific steps would go a long way toward intensifying innovation efforts: expanding and aligning research funding with social priorities, and building more collaborative and effective R&D.

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<sup>235</sup> *Transforming healthcare with AI: The impact on the healthcare workforce and organisations*, EIT Health and McKinsey & Company, March 2020.



## Expanding and aligning research and innovation with social priorities

The pharmaceutical and medical technology industries continue to play a central role in efficiently scaling the availability of interventions as well as shaping their portfolio to tackle diseases with the highest unmet need. Our findings show that 60 percent of today's disease burden remains unaddressed by current technologies. Furthermore, innovation is needed to combat new and emerging health threats. Focusing and investing in innovative delivery models that could expand access, improve adherence, or prevent disease onset will be key, as well as increasing the funding available for research into diseases and novel pathogens with no effective prevention or cure today. Possible priorities include the following:

- **Promote innovation in healthcare delivery, adherence, and behavioral change.** Our analysis finds that one-third of potential health improvement we know how to address is unlikely to be captured with today's delivery models and levels of adherence.<sup>236</sup> Addressing this would require innovation to develop lower-cost and less resource-intensive products and services that adapt medical technologies available in mature economies for widespread use in low- and middle-income contexts. Research into behavioral interventions to prevent chronic conditions and support adherence to intervention could be intensified.<sup>237</sup> For instance, the medical technology sector can find innovative solutions to some challenges, including longer-acting agents, more convenient and easier delivery routes, and mechanisms that make adherence transparent (so that monitoring by clinician and patient does not have to rely on patient memory).
- **Intensify research in disease areas that are currently under-funded.** Cancer research constituted 35 percent of clinical trials in the recent past, a higher share than its 12 percent share of the unaddressed disease burden. A similar scale of research effort may be needed to develop solutions to address unmet needs in mental health and neurological disorders, cardiovascular diseases, and communicable diseases, according to our analysis. The lack of basic biological understanding of some mental health and neurological disorders as well as commercial uncertainty are some obstacles that need to be overcome to attract more funding in R&D for these conditions.
- **Adopt innovative funding models to expand the pool of funds available and support a wider set of priorities and interests.** Research institutions could look to a wider pool of potential investors, adopting a broader perspective on the beneficiaries of innovation to include healthcare systems, other payers, and potentially large employers. R&D incentives could be improved if developed countries or international organizations committed to purchasing needed products when they are developed and making them available to the poor.<sup>238</sup> Further examples of innovative funding models that match investment to specific stakeholder needs include subscription-model payment systems such as the one the NHS in the United Kingdom is currently testing to support the development of new drugs against antimicrobial resistance.<sup>239</sup>

## Building more collaborative and effective approaches to R&D

The COVID-19 pandemic has shown that innovation can be accelerated in the right circumstances and that collaborative approaches, knowledge sharing, and information transparency are critical aspects of this innovation. While effective regulation is essential to ensure safety, monitoring, and accountability, it may be possible to reduce the time from laboratory bench to hospital bedside with greater use of real-world data, AI, and analytics, and a focus on the highest priorities. Possible steps include:

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<sup>236</sup>This refers to the difference in our two scenarios: in the theoretical maximum scenario, with 100% adherence and adoption rates of known interventions, we find a 63 percent reduction in disease burden is possible compared to 40 percent in our healthy growth scenario with aspirational, yet realistic adoption rate assumptions.

<sup>237</sup>Chris Calitz et al., "National Institutes of Health funding for behavioral interventions to prevent chronic diseases," *American Journal of Preventive Medicine*, Volume 48, Issue 4, 2015.

<sup>238</sup>Michael Kremer, "Pharmaceuticals and the developing world," *Journal of Economic Perspectives*, Volume 16, Number 4, Fall, 2002.

<sup>239</sup>HM Government, Department of Health and Social Care, "Development of new antibiotics encouraged with new pharmaceutical payment system," July 9, 2019.

- **Promote collaboration and transparency.** Partnerships between researchers and public or philanthropic funders could strengthen biological understanding of underfunded diseases. The improved biological understanding will in turn increase the probability of success and therefore attract industry investment. The world's largest public-private partnership, the Innovative Medicines Initiative, is an example of how life science research can be improved by a program that encompasses many stakeholders working to improve health through innovation. The COVID-19 crisis has demanded and stimulated almost unprecedented levels of accelerated data sharing and collaboration in the international research community.<sup>240</sup>
- **Reduce rollout delays.** To more efficiently scale interventions in low-income countries, the pharmaceutical and medical technology sectors could work to reduce the time delay—often a decade or more—that often exists between transformative innovations reaching high-income markets and their availability in countries at all income levels.

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This report identifies an immense opportunity to improve the health of the world's population and realize significant economic and social benefits in the process. Indeed, many companies, governments, and health institutions are already introducing new ways to improve health that range from providing greater access to healthcare to promoting prevention through environmental and behavioral changes. This moment in time offers a unique chance to prioritize health around the world. Our hope is that this report encourages and motivates stakeholders—within healthcare and beyond—to do just that.

**Our research leaves us with a strong conviction: improving health has the potential to be a societal and economic game changer. After all, few investments deliver against so many of today's social needs, substantially improving wellbeing and reducing inequity, while also delivering an impressive shot in the arm to the global economy.**

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<sup>240</sup>Mukhisa Kituyi, "COVID-19: Collaboration is the engine of global science—especially for developing countries," World Economic Forum, May 2020.







# Country appendix

## Health benefits by region

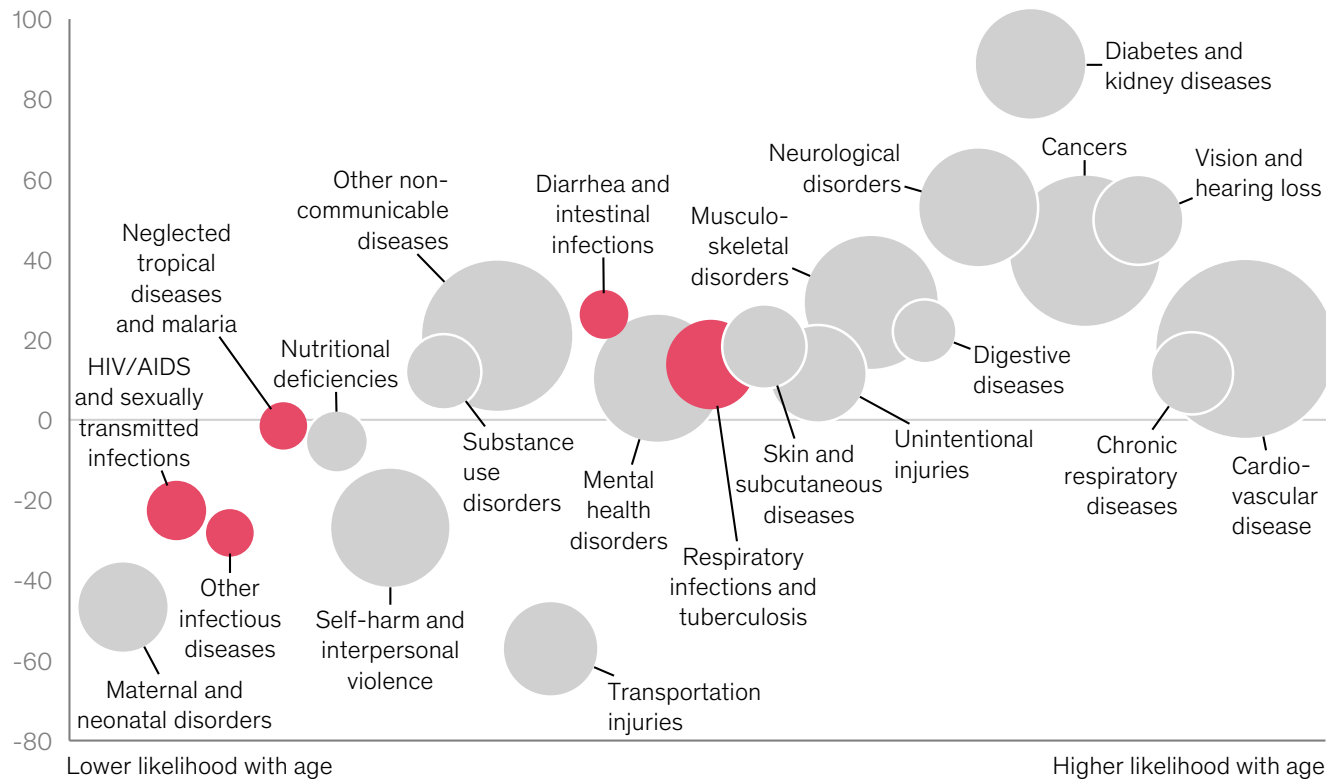
Brazil	120
Canada	122
China	124
France	126
Germany	128
India	130
Italy	132
Japan	134
Nigeria	136
United Kingdom	138
United States	140

# Health benefits by region: Brazil

## Disease burden

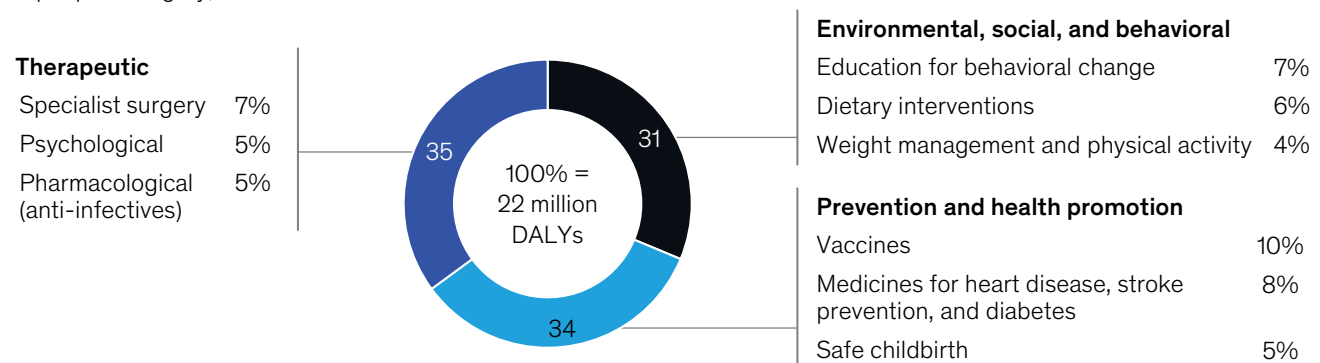
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**37%** of disease burden is avertable

1. DALY = disability-adjusted life year.

Note: View excludes "Other noncommunicable diseases." Figures may not sum to 100% because of rounding.

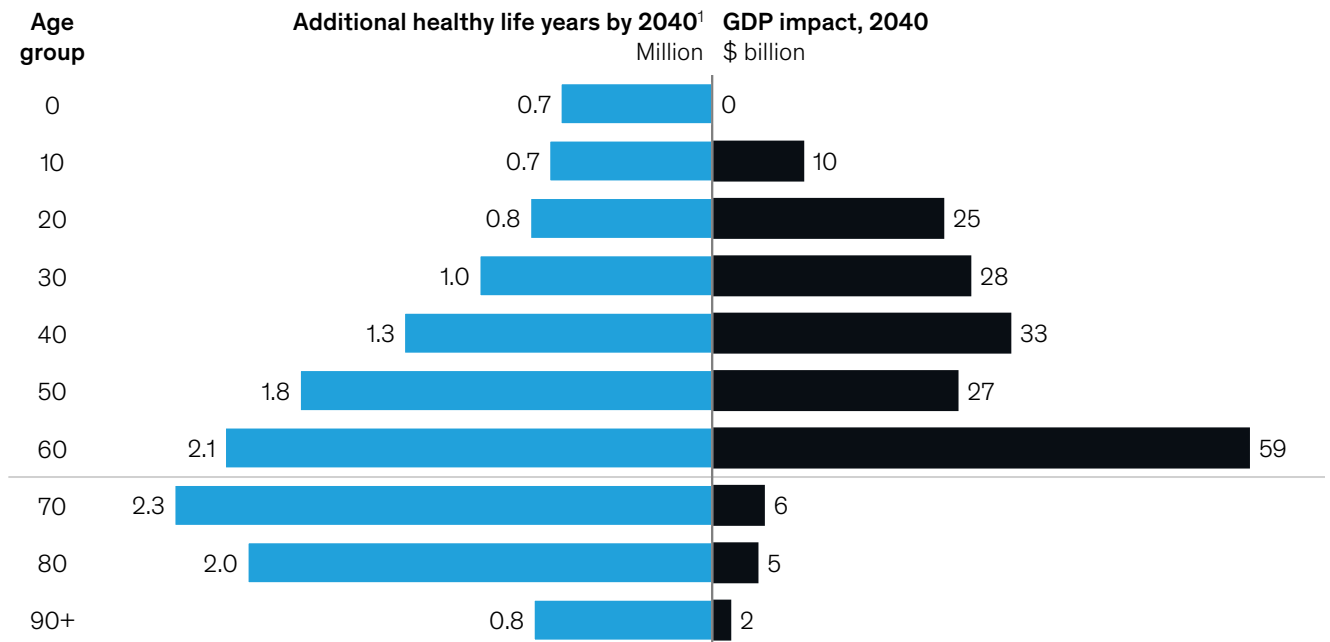
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis



## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

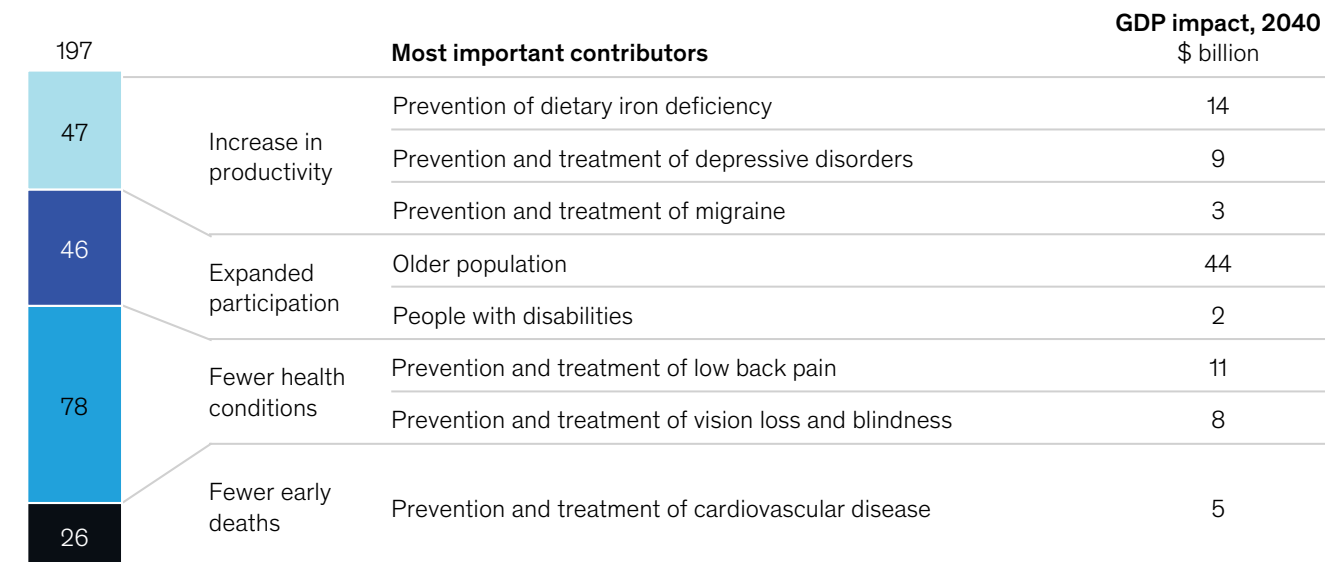


**62%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$2.9T** welfare gains

**1.5x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

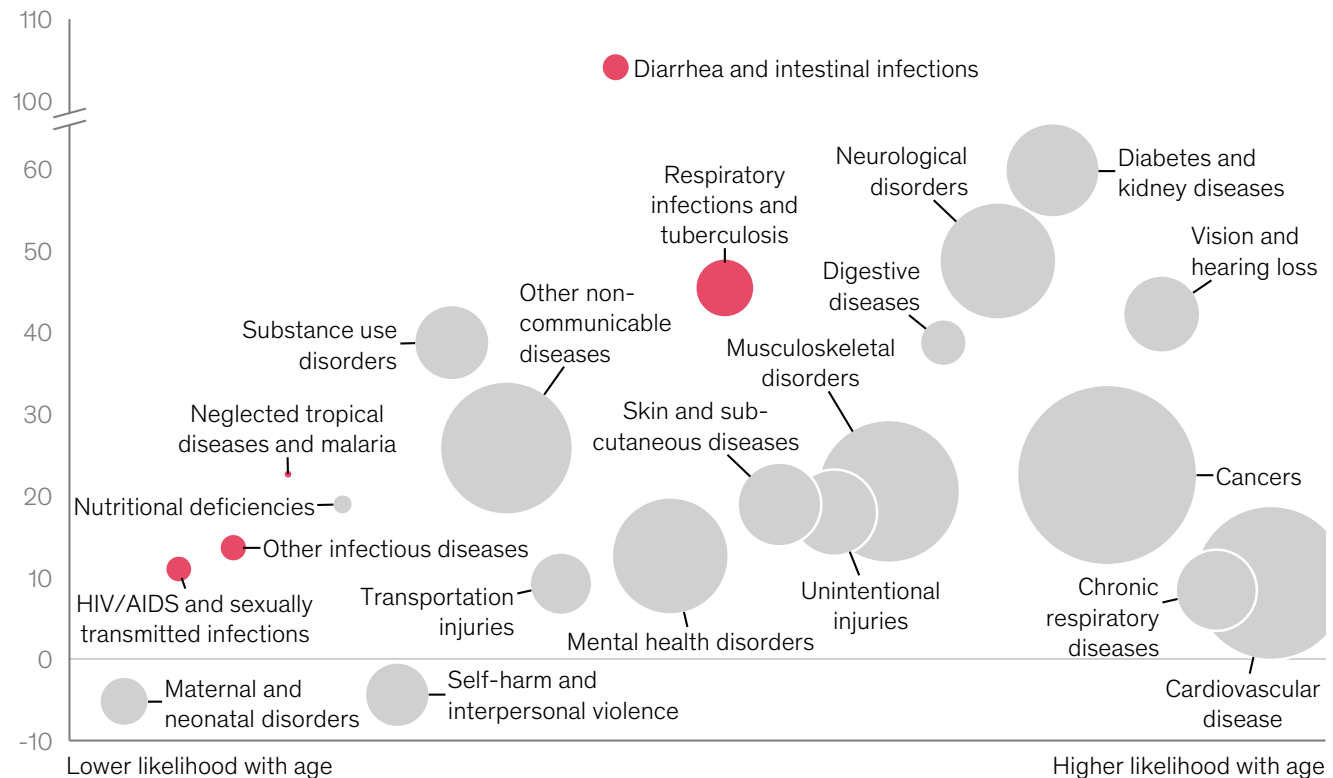
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: Canada

## Disease burden

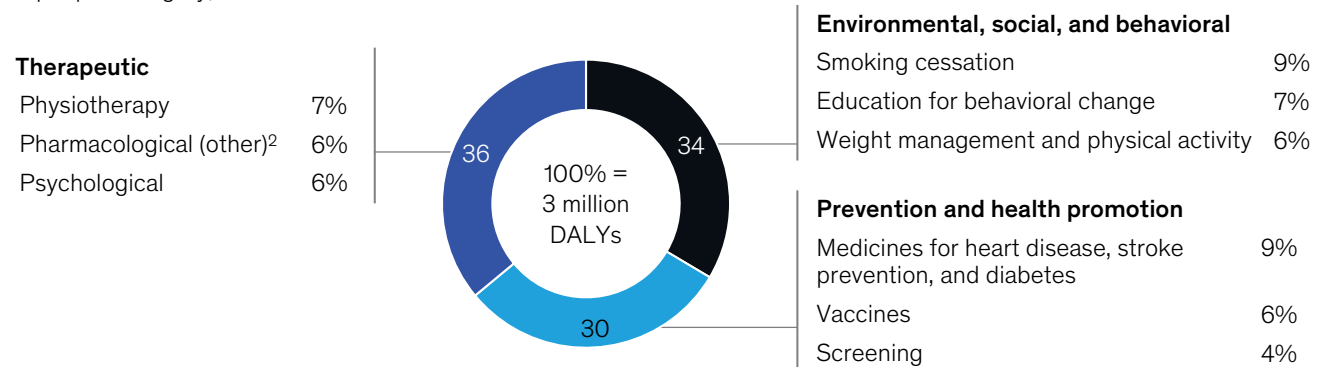
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**32%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

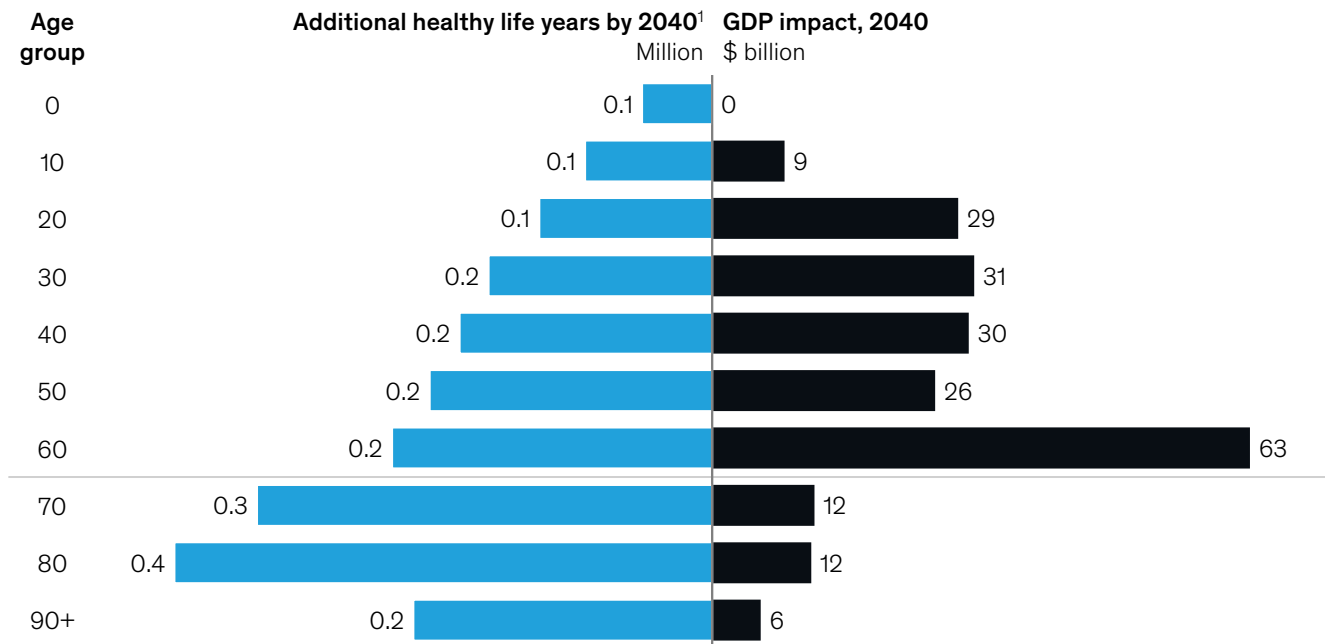
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

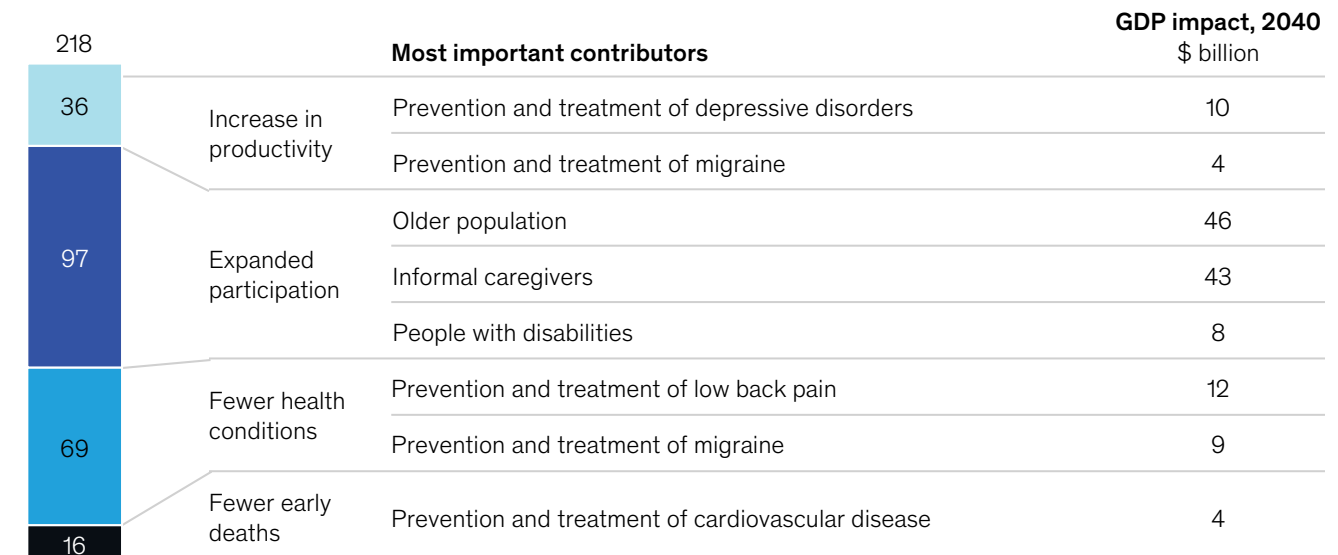


**53%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$500B** welfare gains

**3.3x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

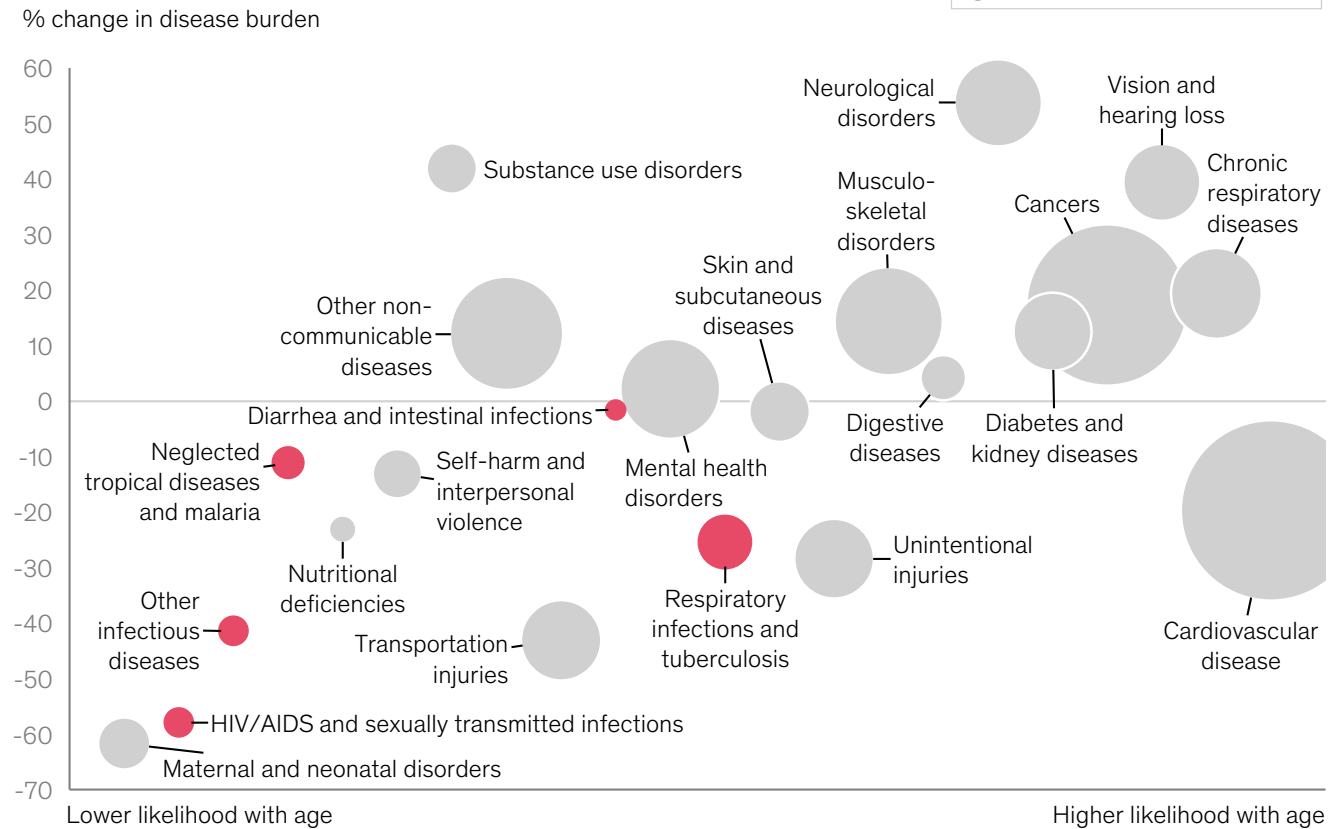
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: China

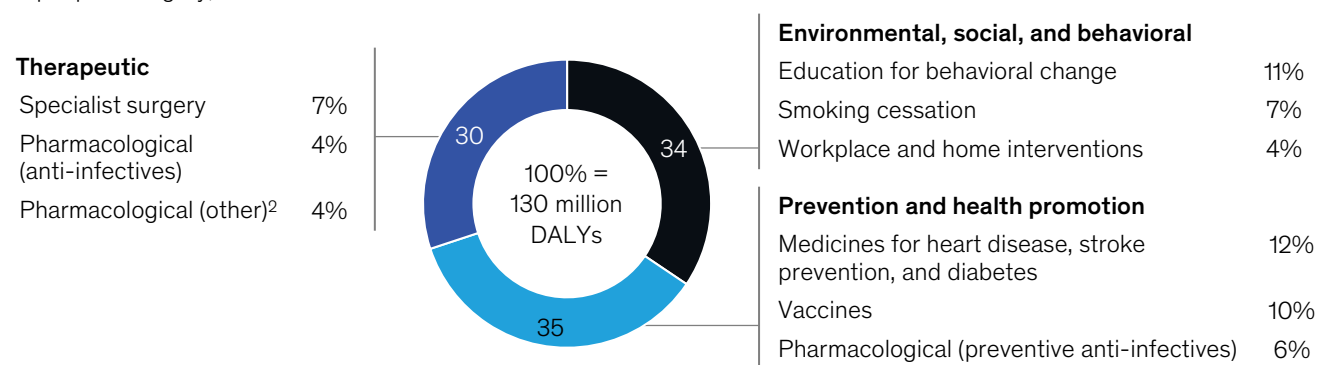
## Disease burden

### Change in baseline disease burden between 2020 and 2040



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**35%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

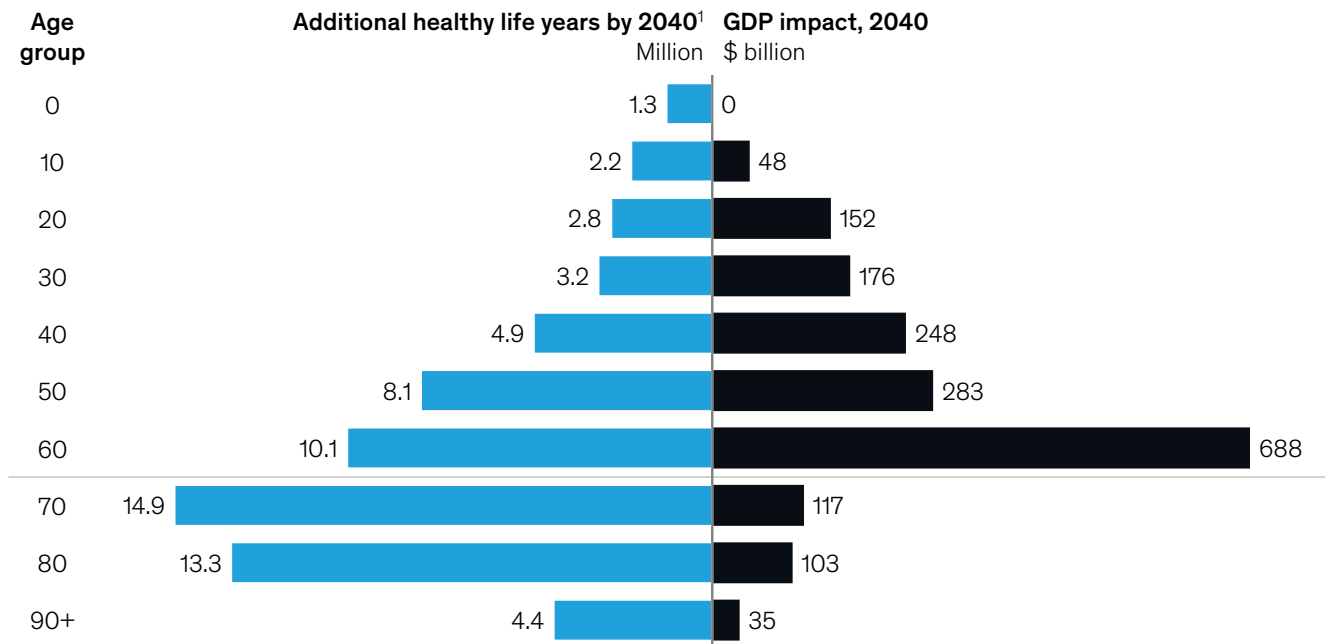
Note: Figures may not sum to 100% because of rounding.

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## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario



**58%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown

\$ billion

	Most important contributors	GDP impact, 2040 \$ billion
306	Prevention of dietary iron deficiency	43
	Prevention and treatment of depressive disorders	42
	Prevention and treatment of migraine	18
578	Older population	525
	People with disabilities	53
704	Prevention and treatment of blindness and vision impairment	85
	Prevention and treatment of low back pain	69
261	Prevention and treatment of cardiovascular disease	100
	Prevention and treatment of COPD	26
1,849		

**\$14.1T** welfare gains

**2.3x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

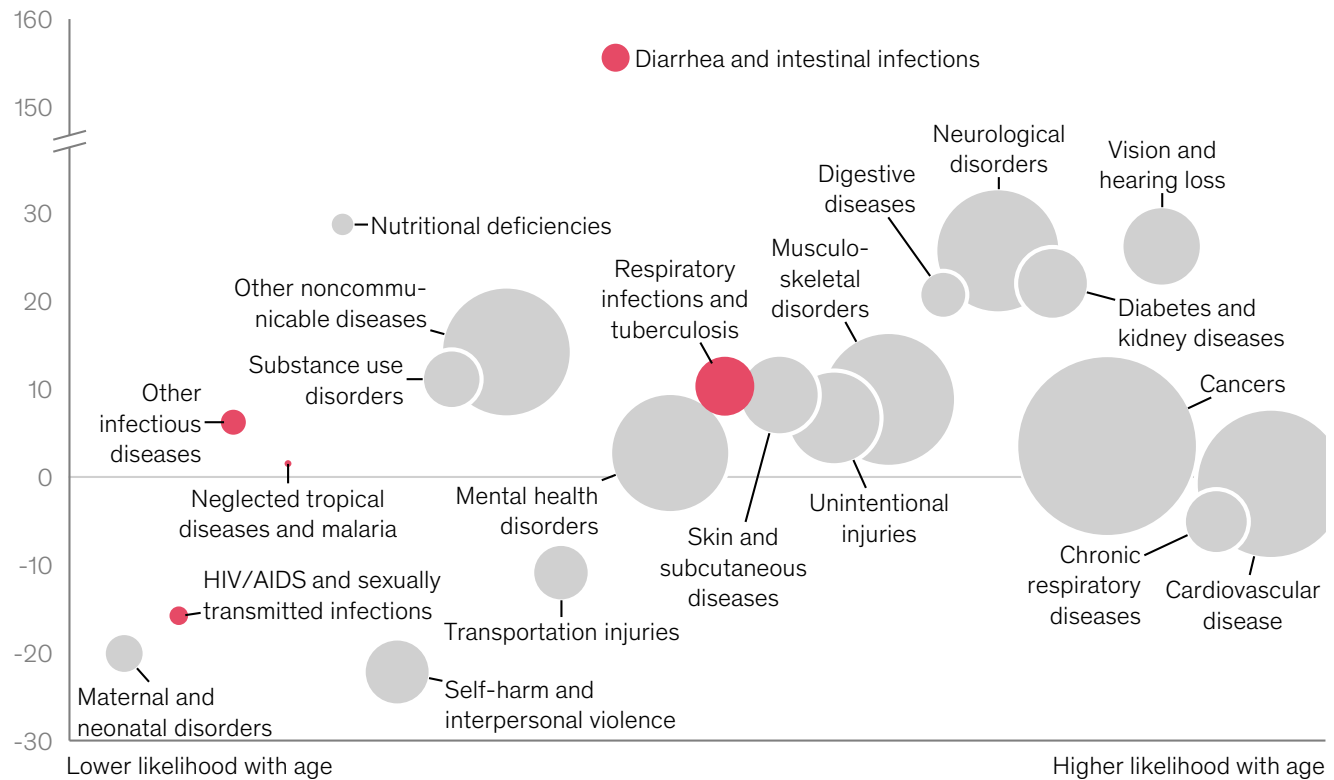


# Health benefits by region: France

## Disease burden

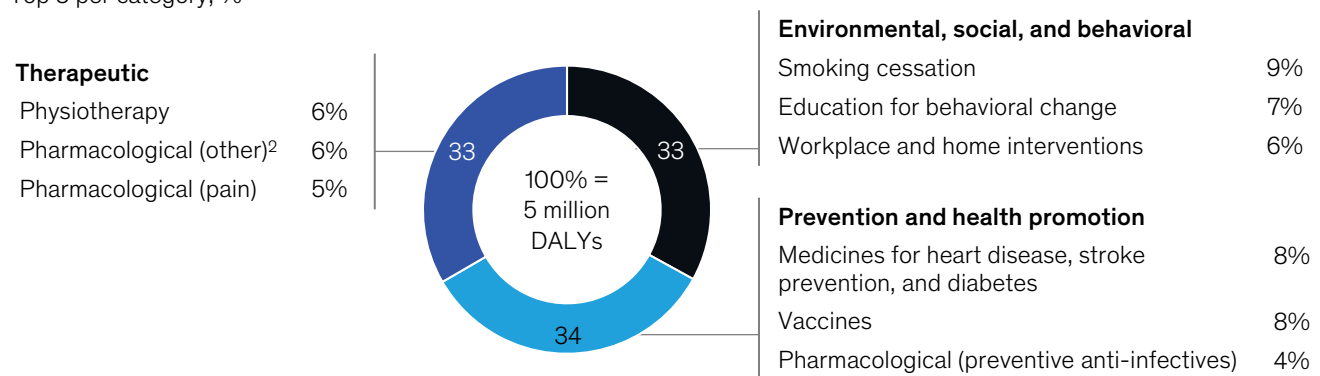
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**32%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

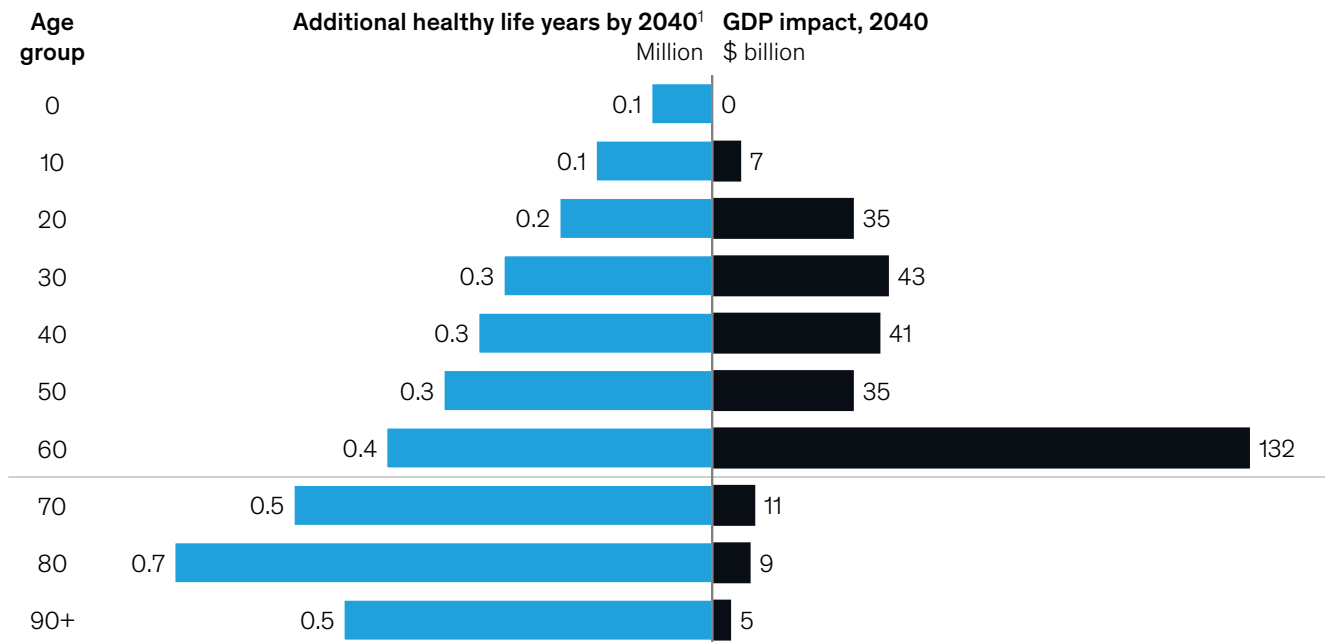
Note: Figures may not sum to 100% because of rounding.

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## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

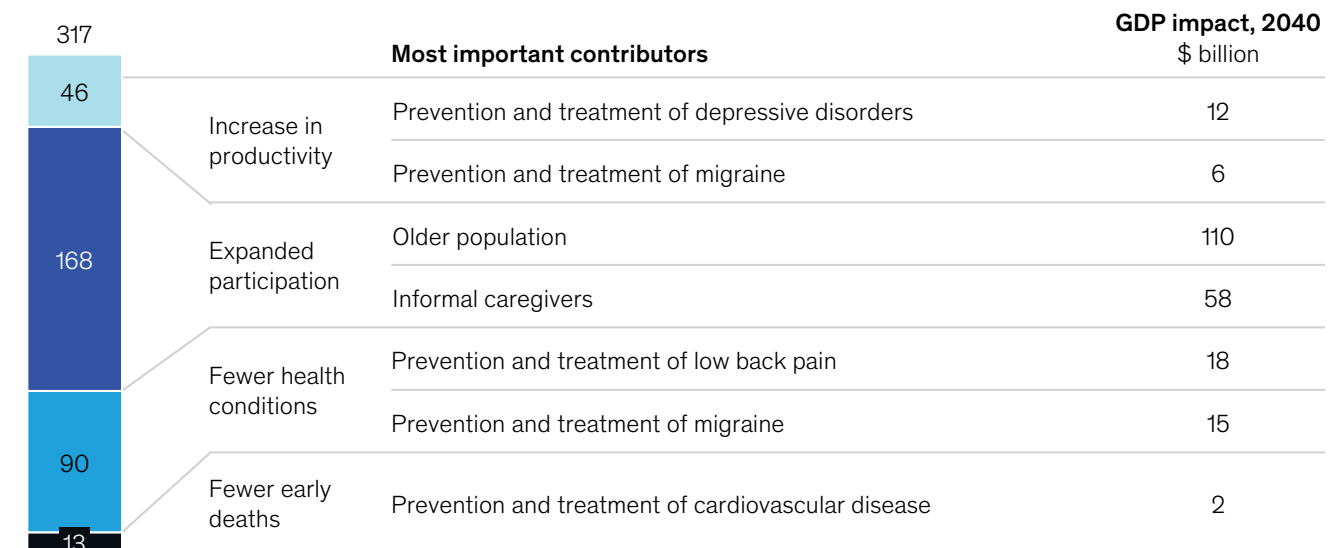


**51%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$700B** welfare gains

**2.3x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

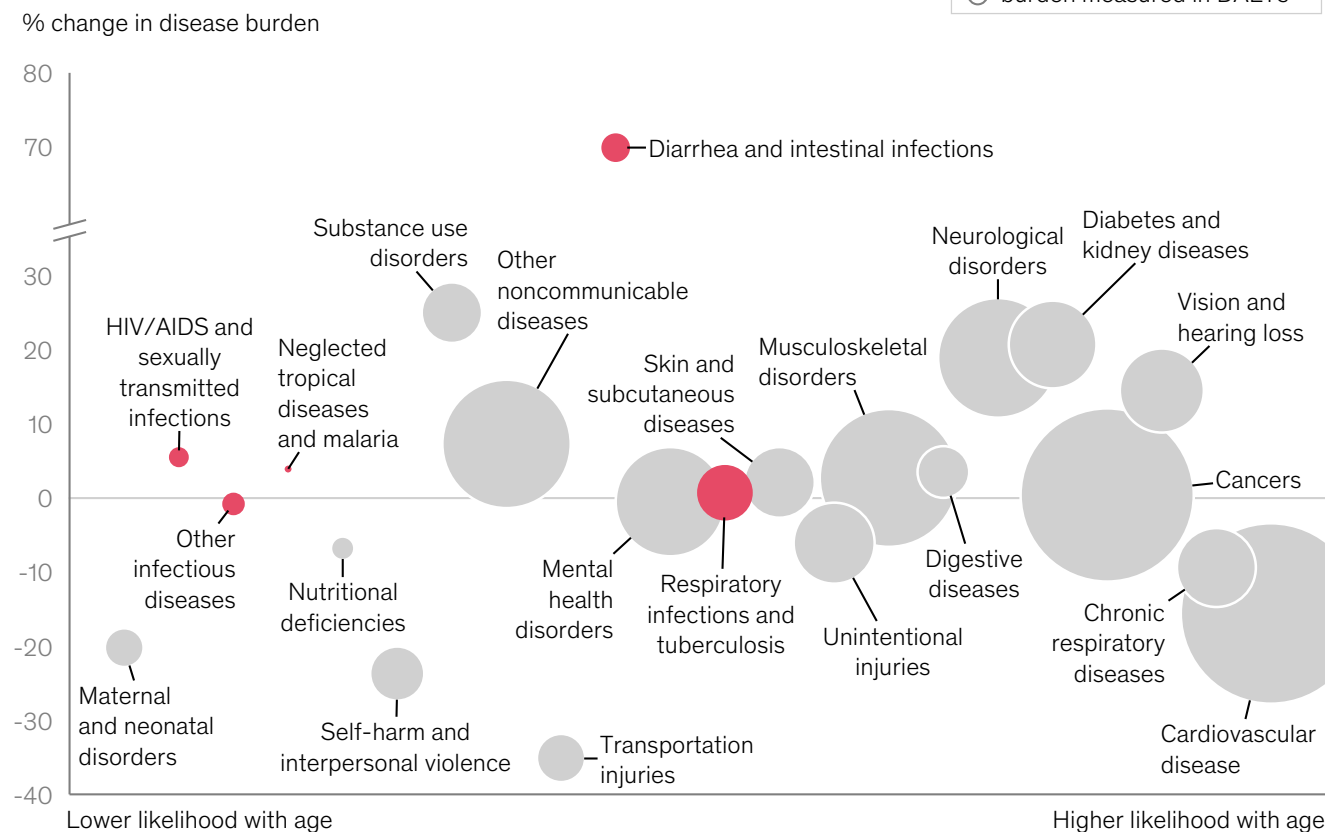
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: Germany

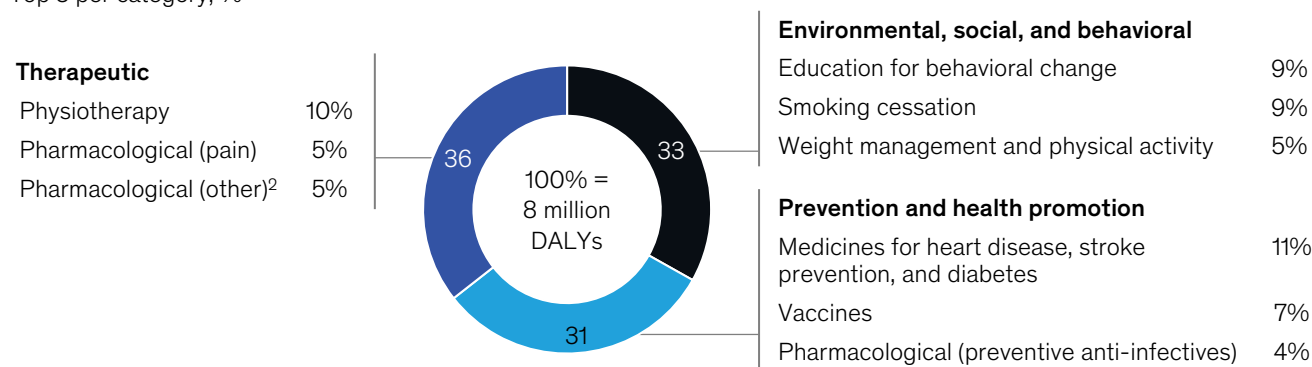
## Disease burden

### Change in baseline disease burden between 2020 and 2040



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**33%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

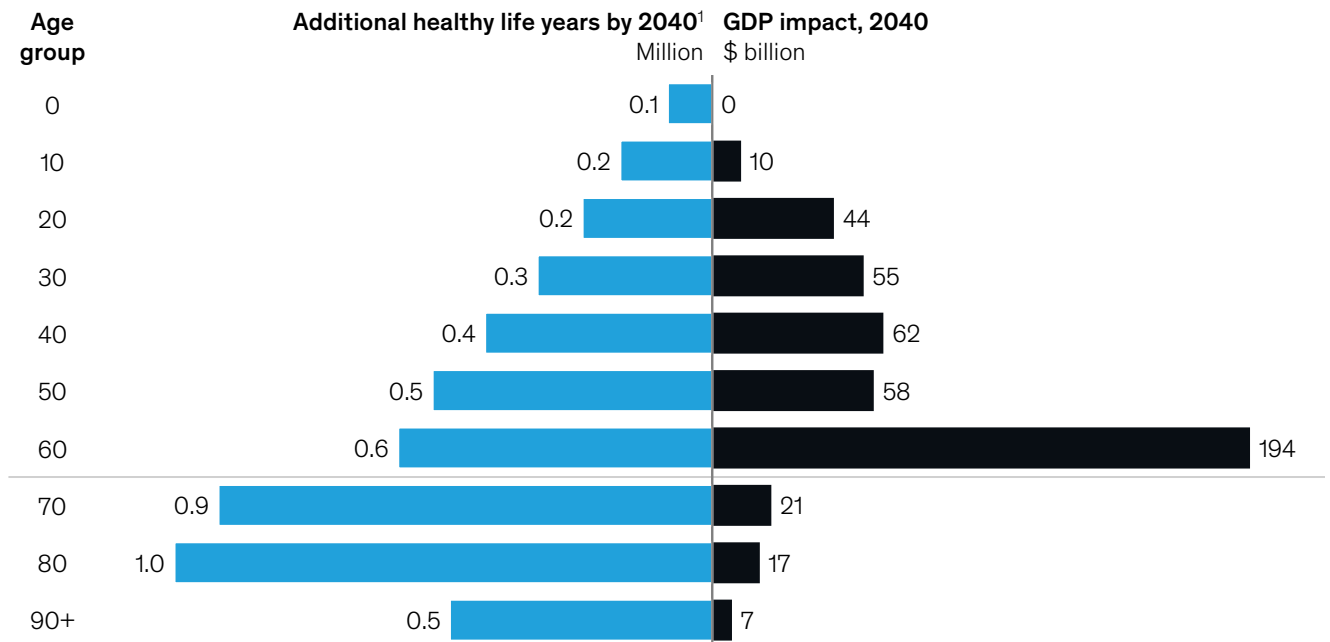
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

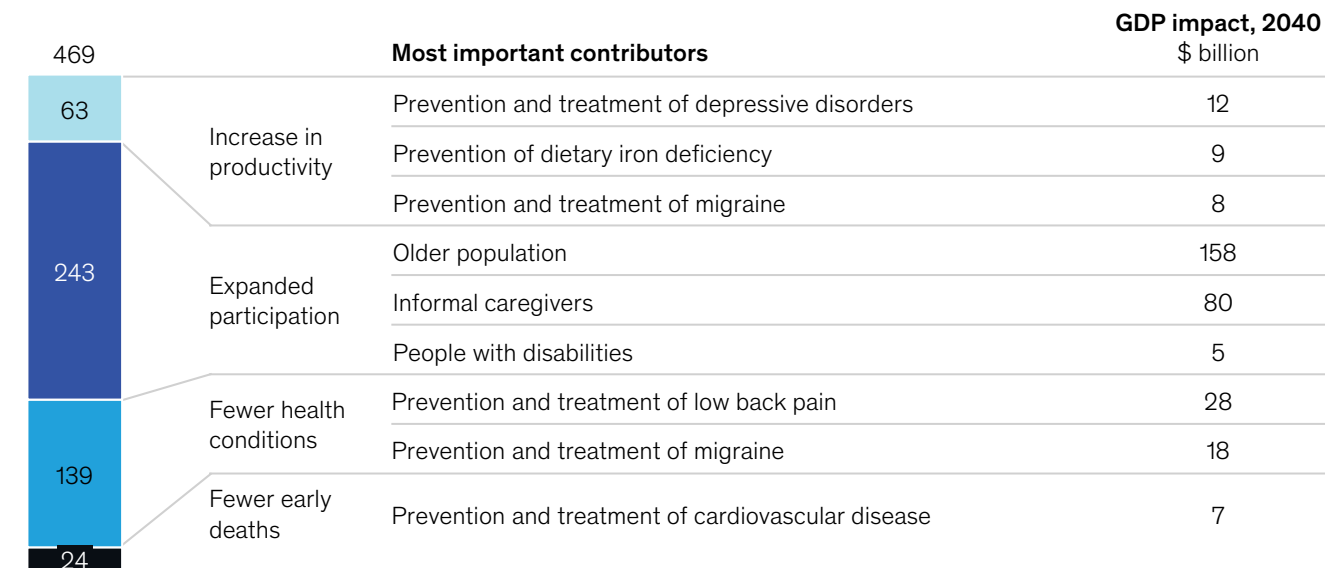


**49%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$1.0T** welfare gains      **2.5x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

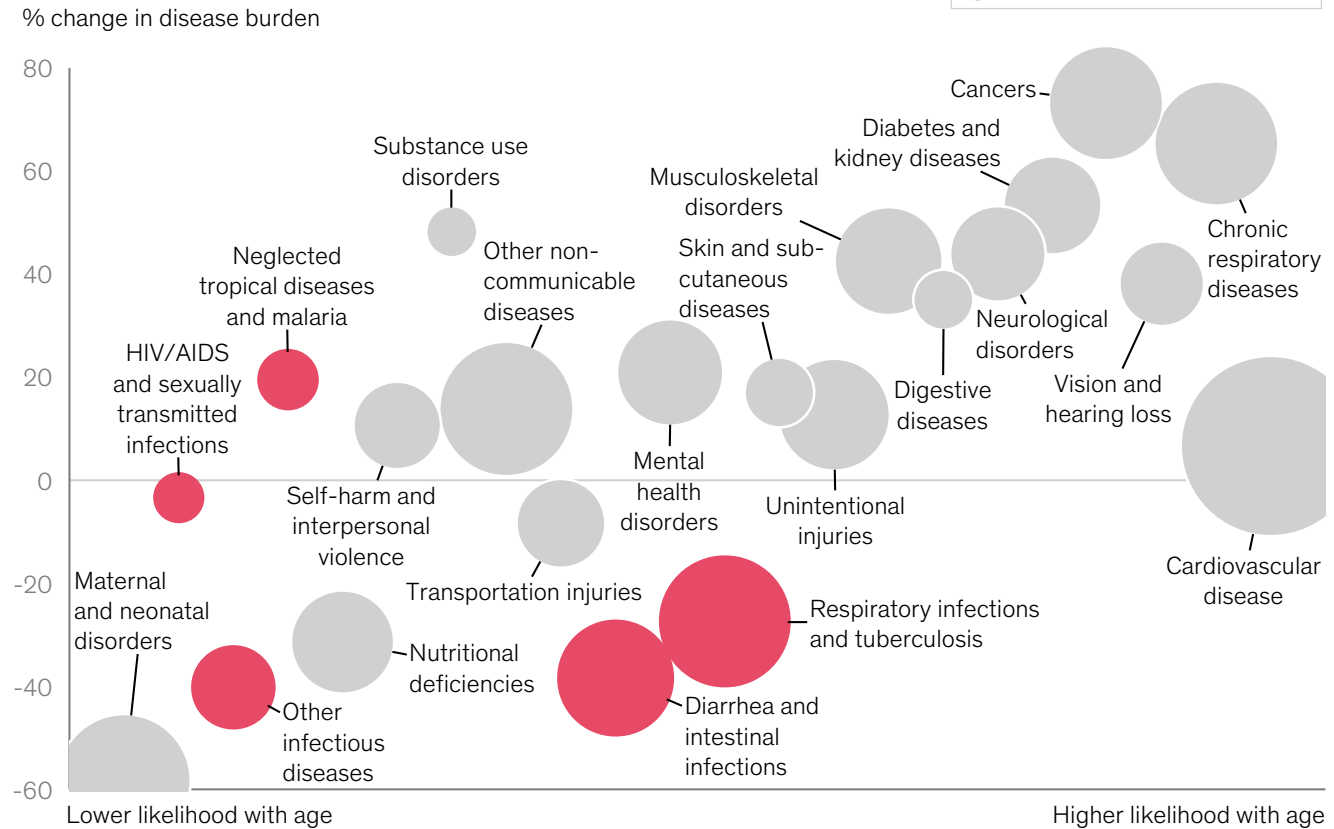
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: India

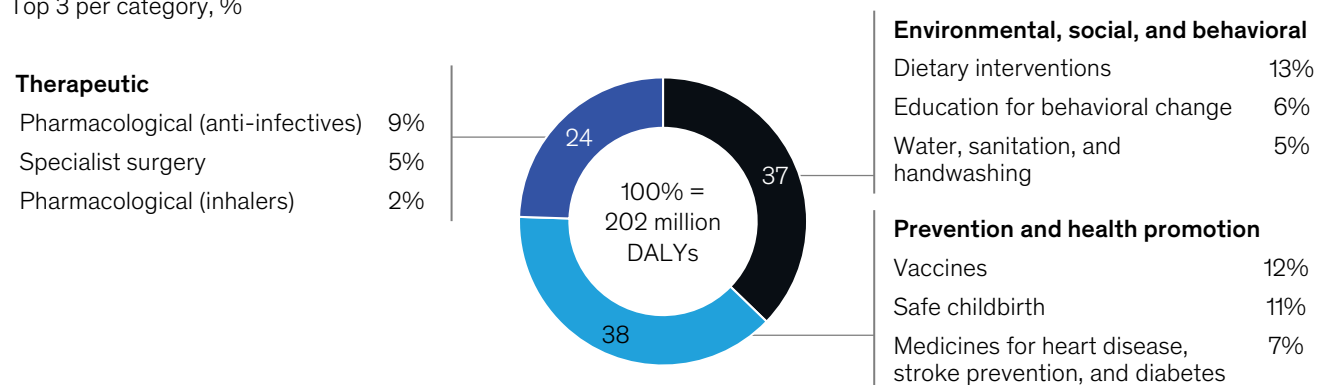
## Disease burden

### Change in baseline disease burden between 2020 and 2040



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**42%** of disease burden is avertable

1. DALY = disability-adjusted life year.

Note: View excludes "Other noncommunicable diseases." Figures may not sum to 100% because of rounding.

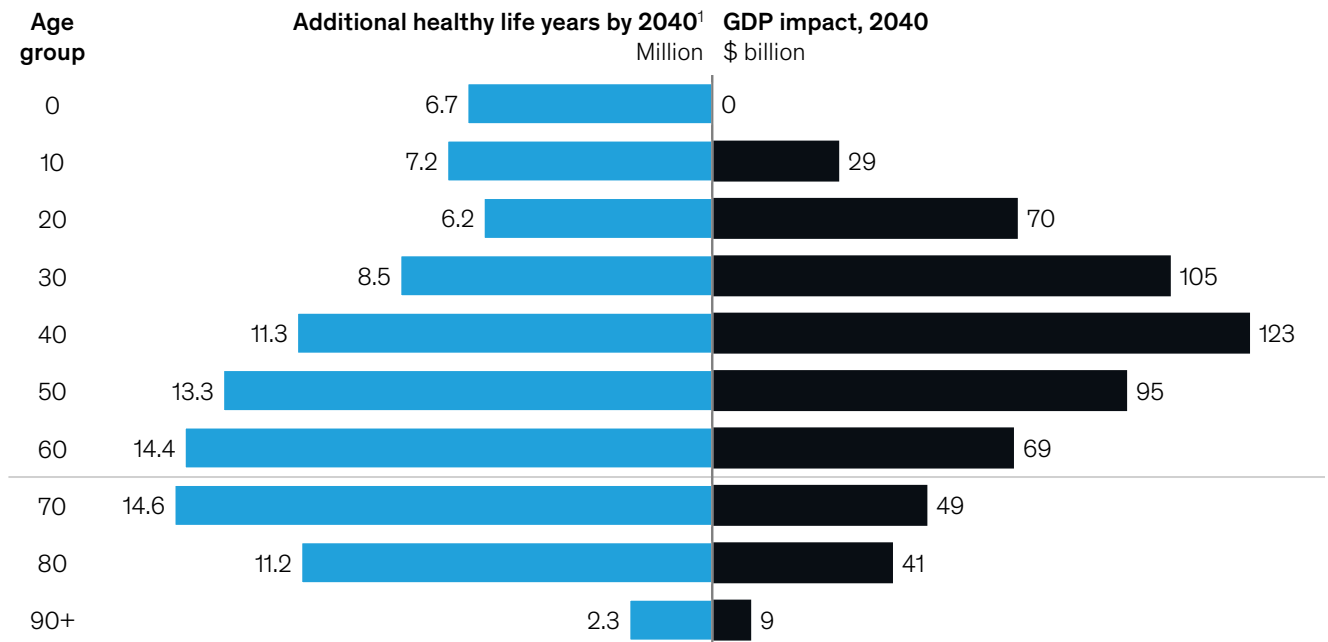
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis



## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

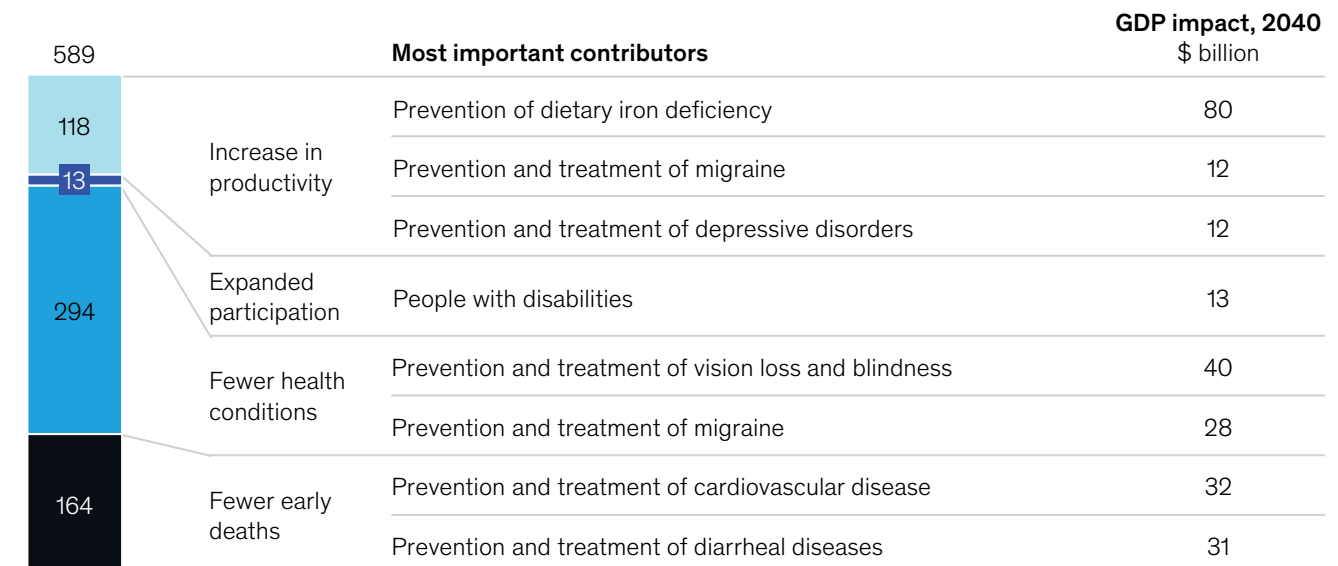


**71%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$20.8T** welfare gains

**4.0x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

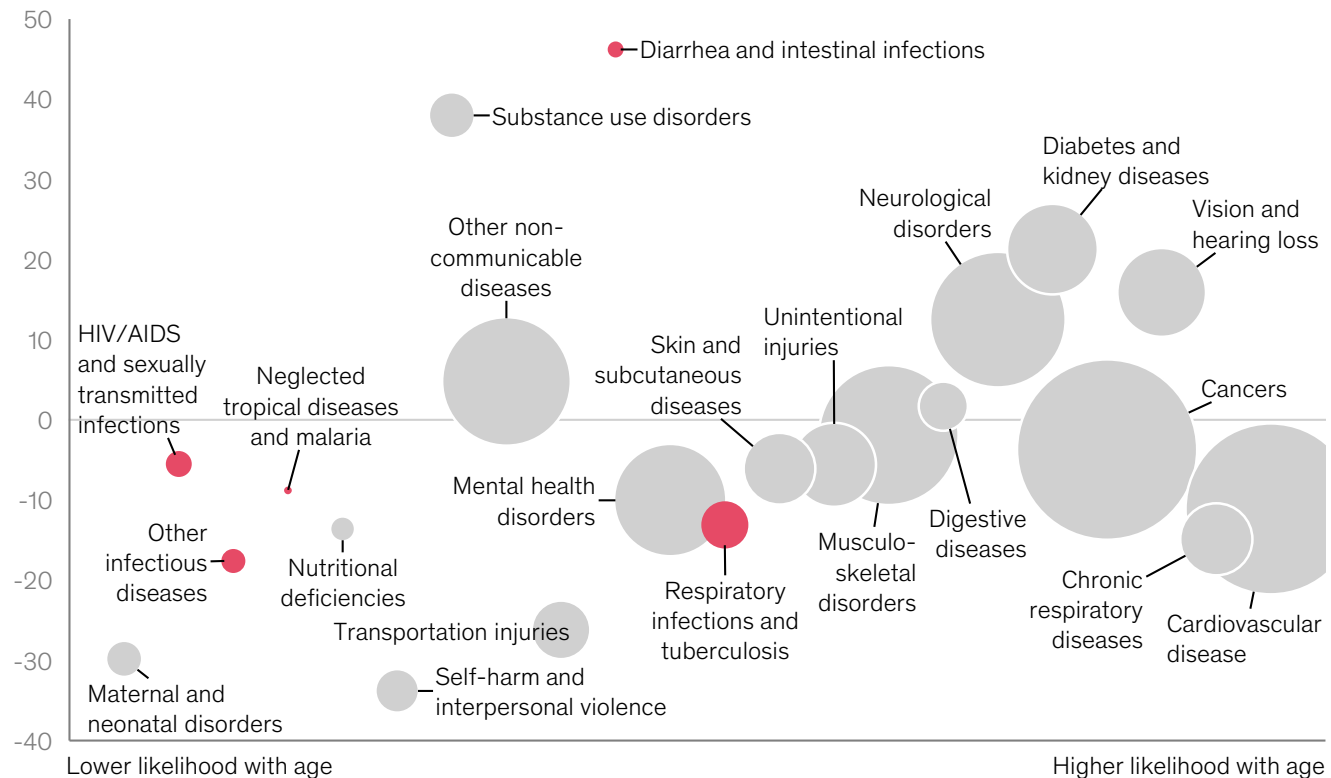
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: Italy

## Disease burden

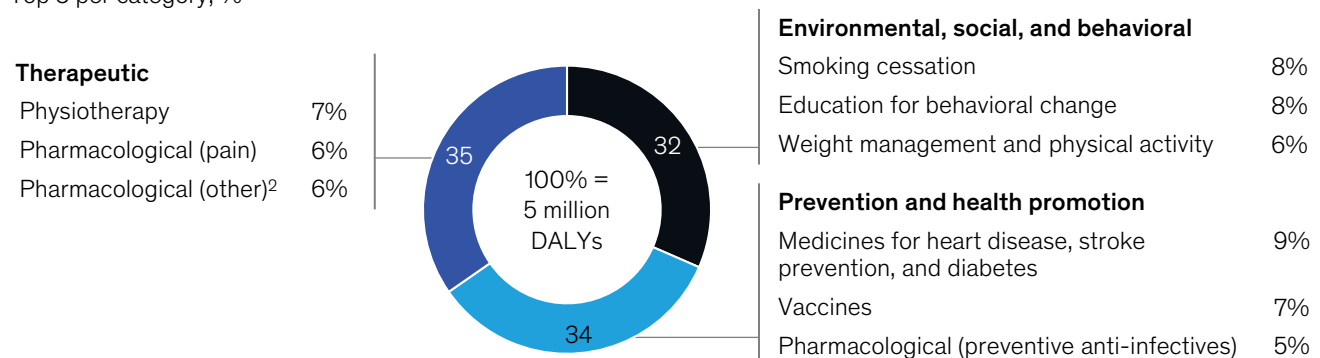
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**32%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

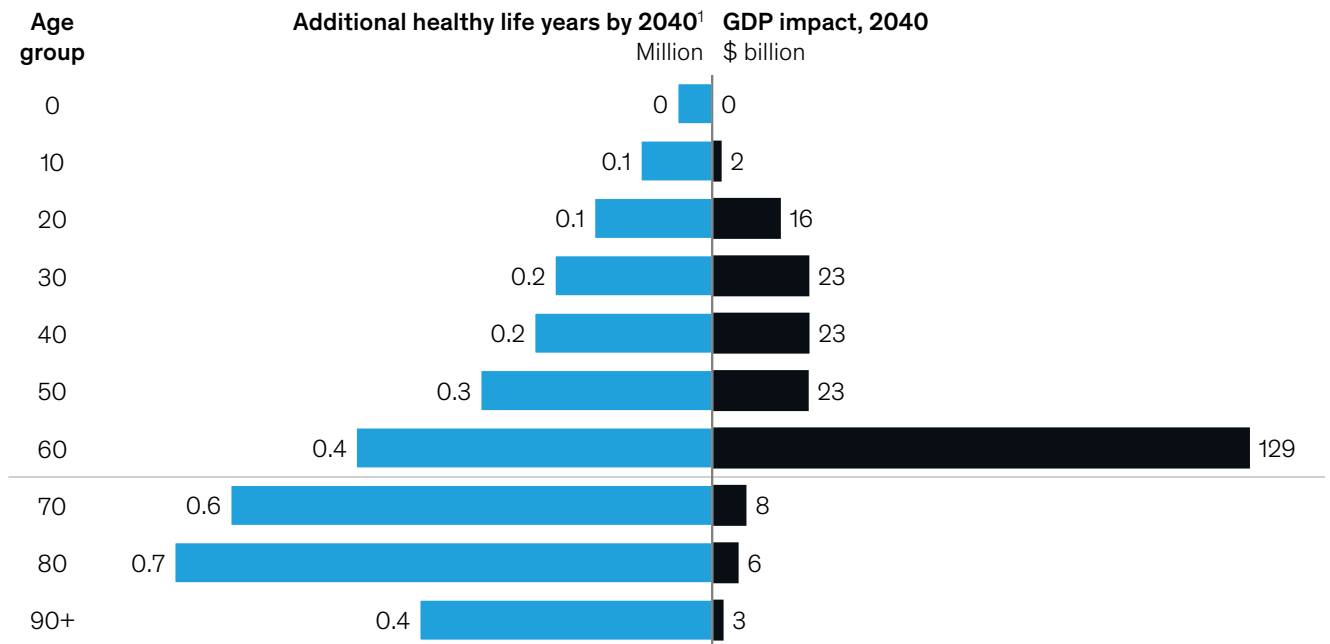
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

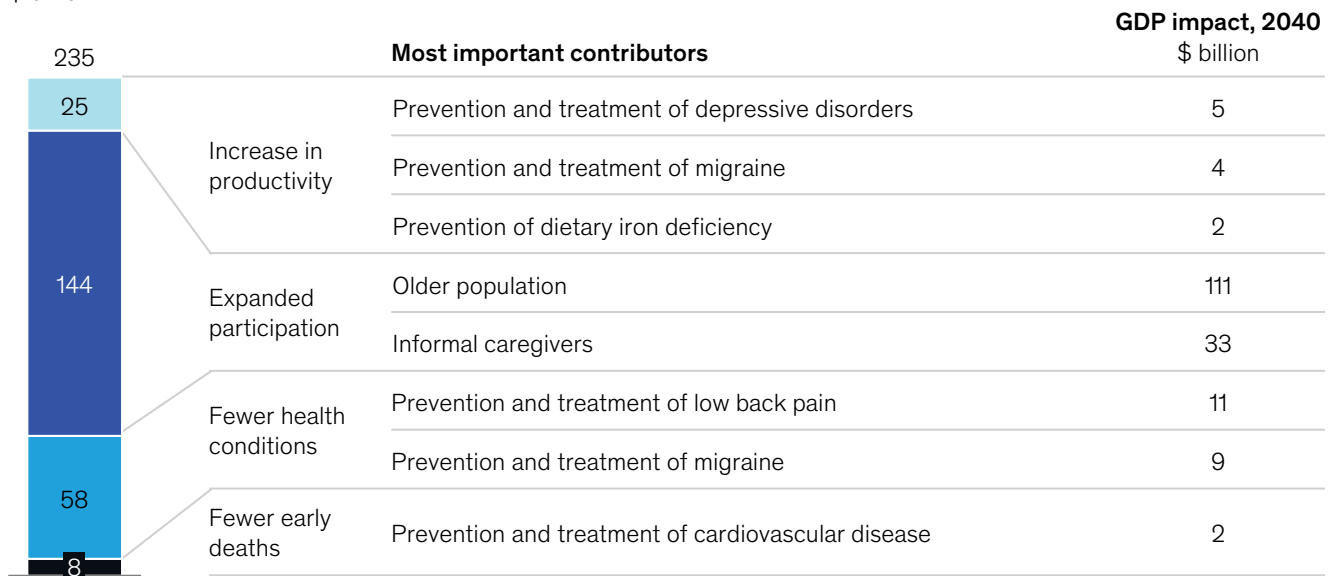


**58%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$600B** welfare gains

**1.8x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

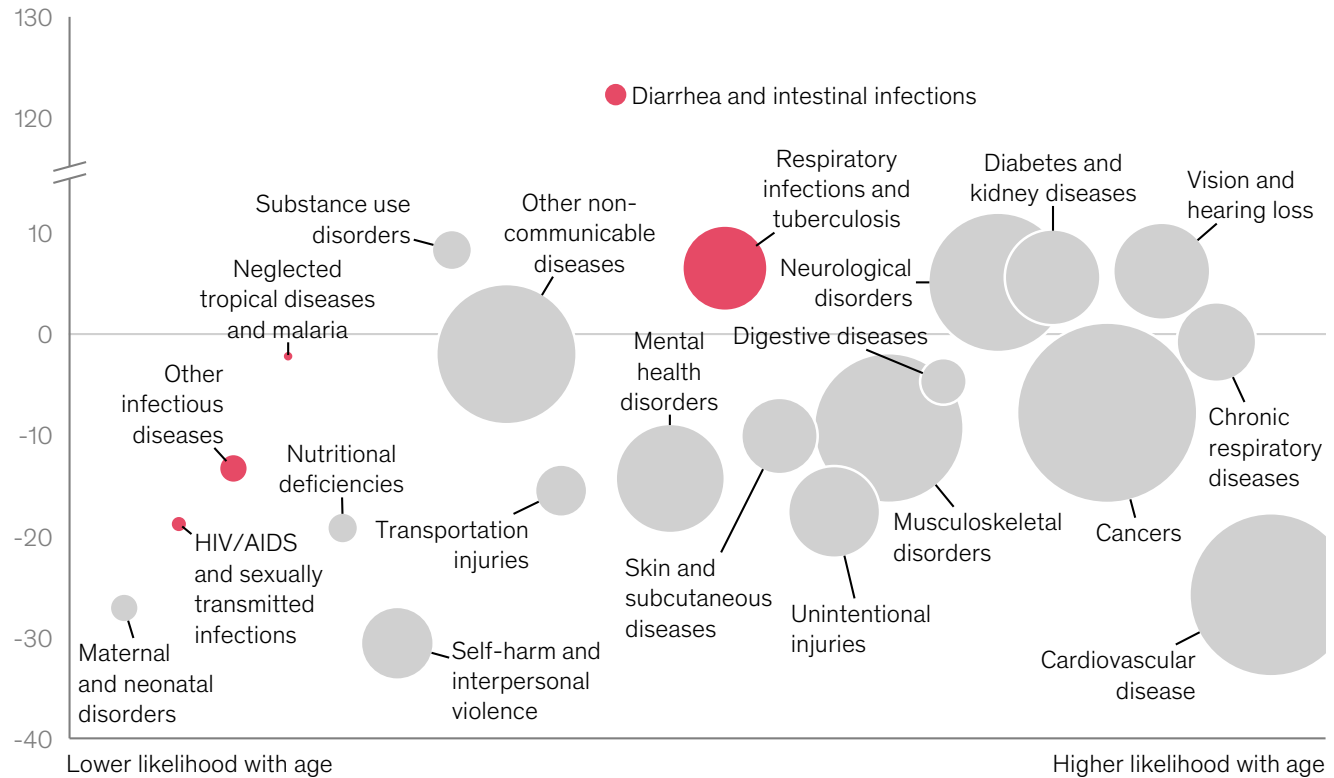
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: Japan

## Disease burden

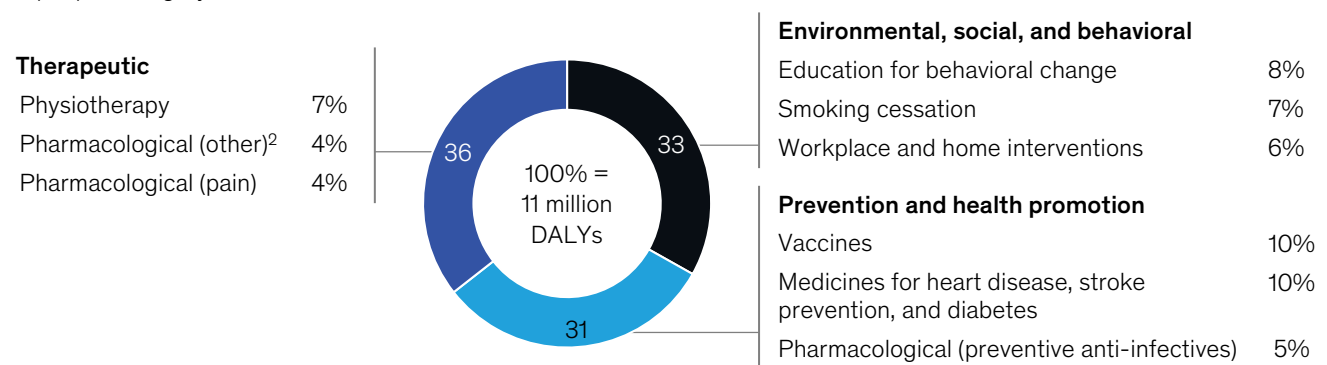
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**31%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

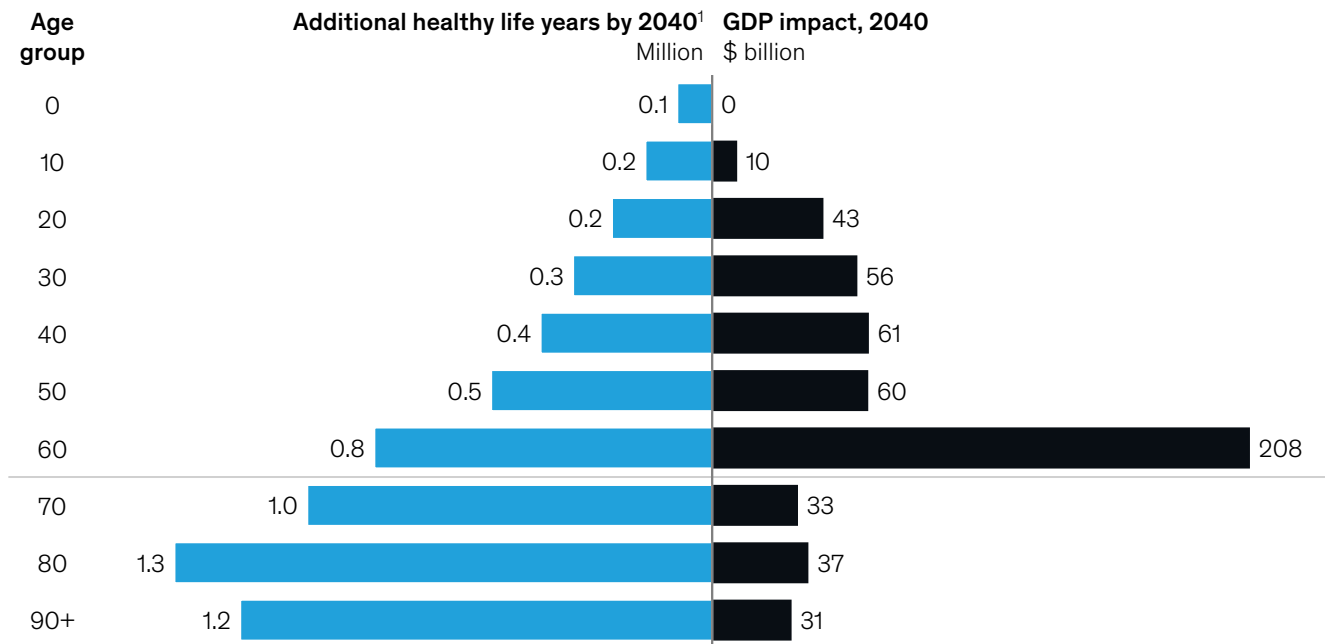
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

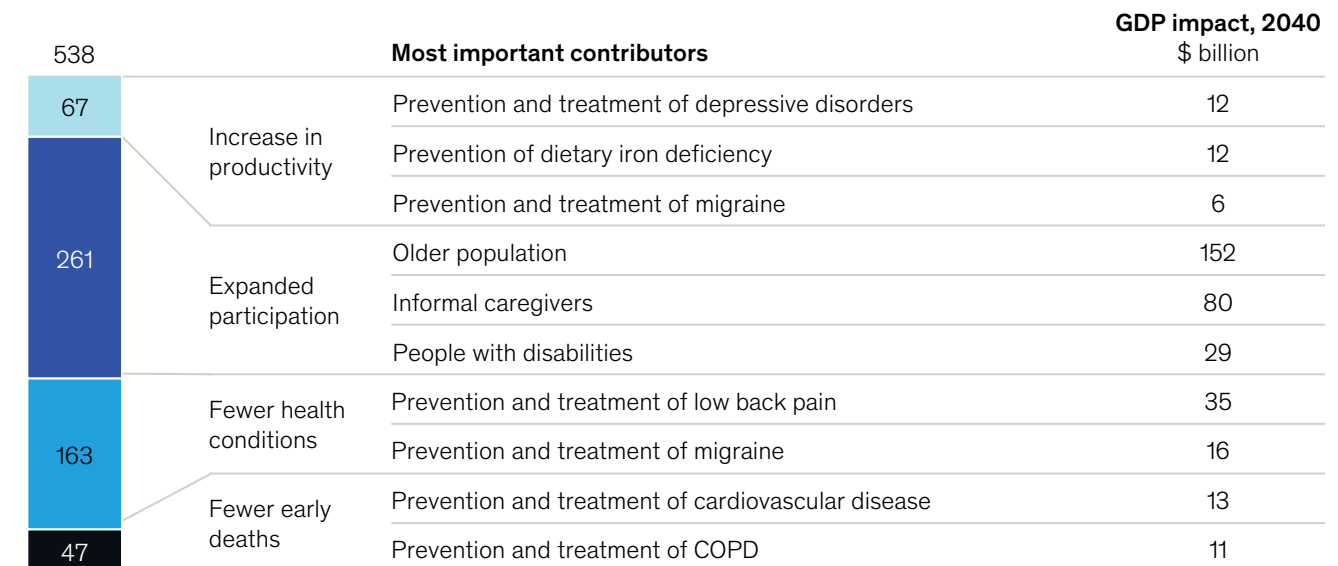


**43%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$1.3T** welfare gains      **2.5x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

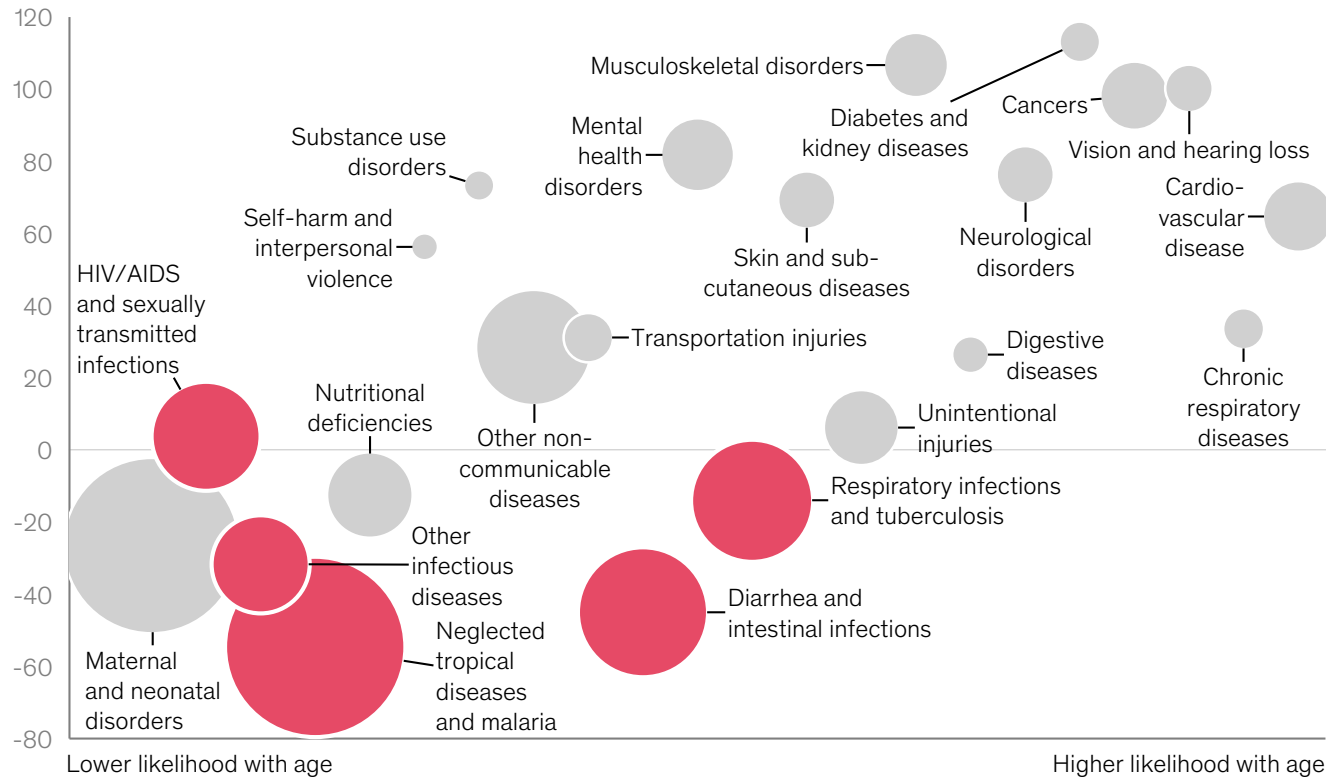


# Health benefits by region: Nigeria

## Disease burden

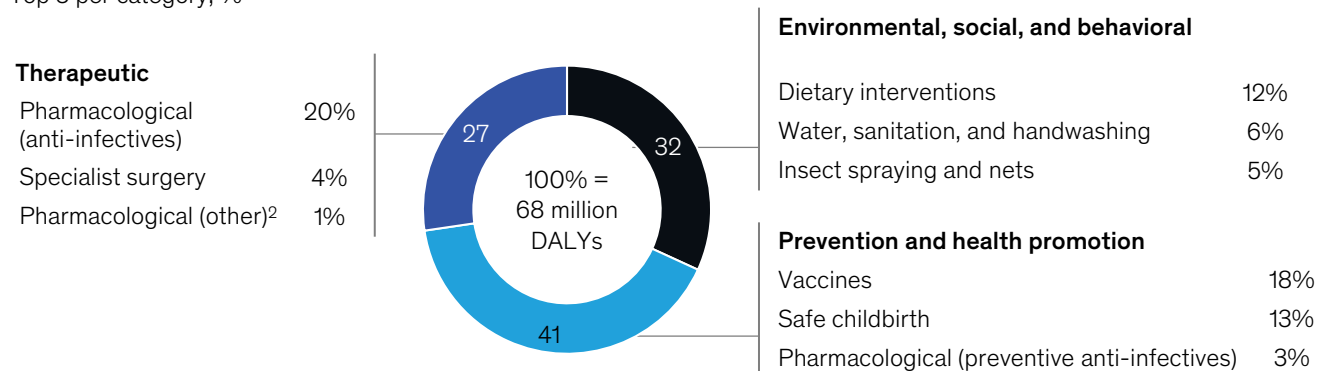
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**58%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

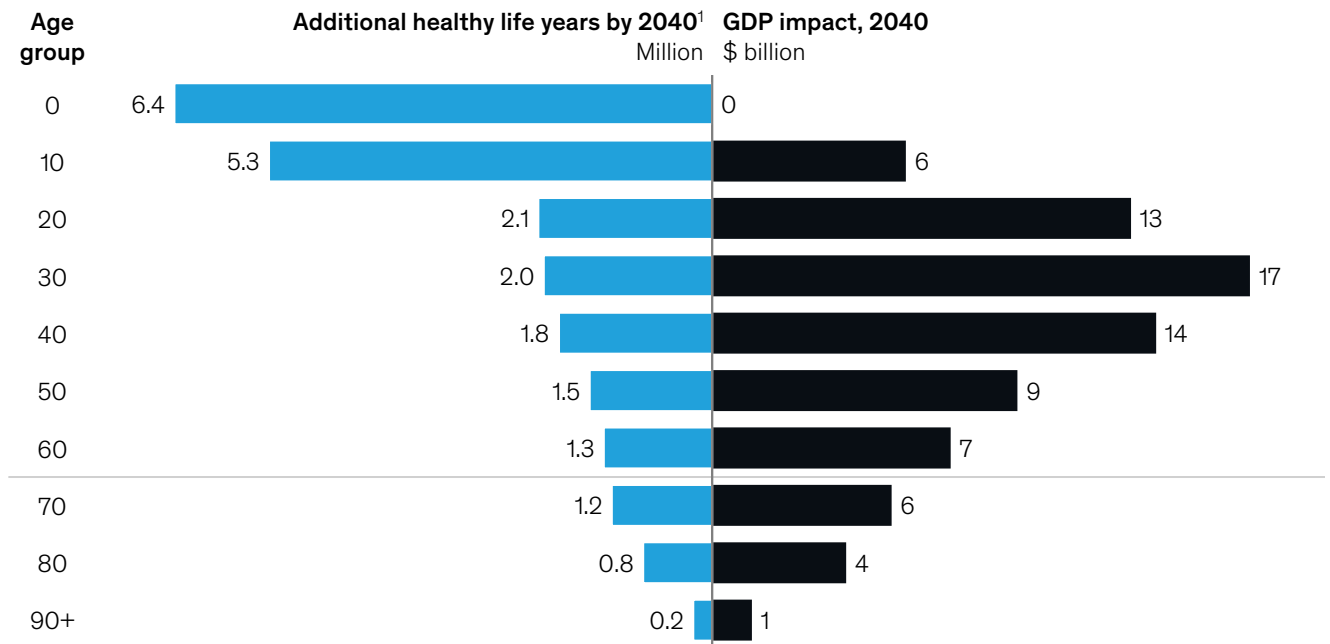
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

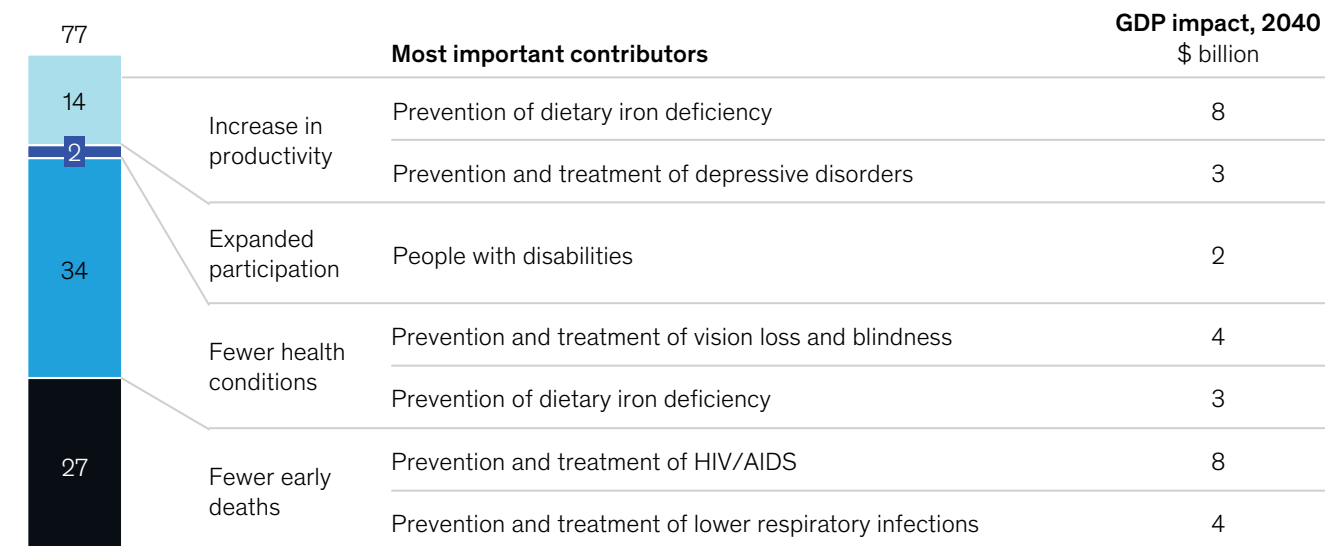


**90%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$4.7T** welfare gains

**1.8x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

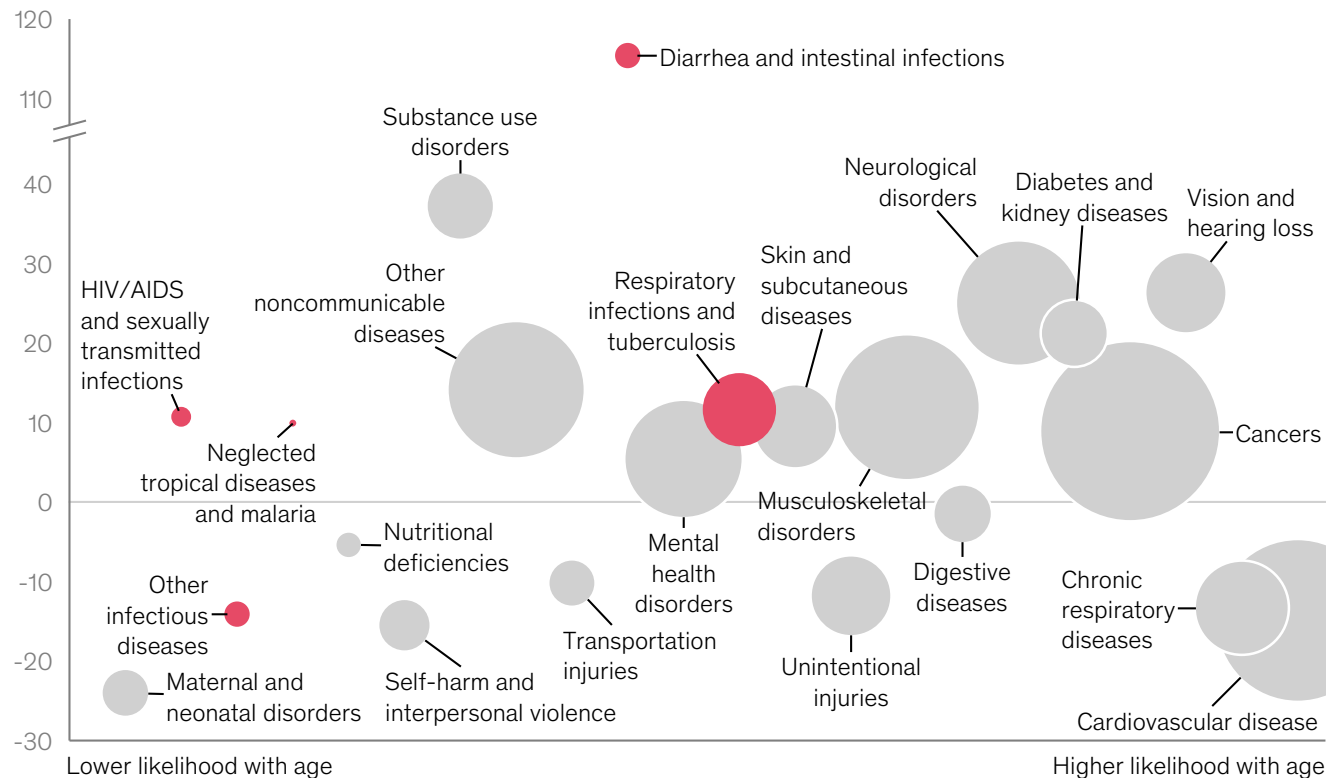
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: United Kingdom

## Disease burden

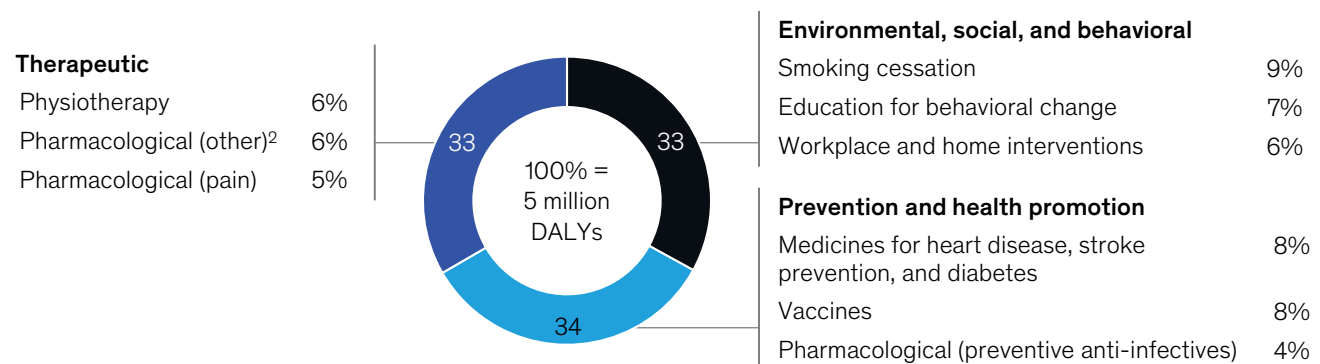
### Change in baseline disease burden between 2020 and 2040

% change in disease burden



### Distribution of interventions by category, 2017, %

Top 3 per category, %



**33%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

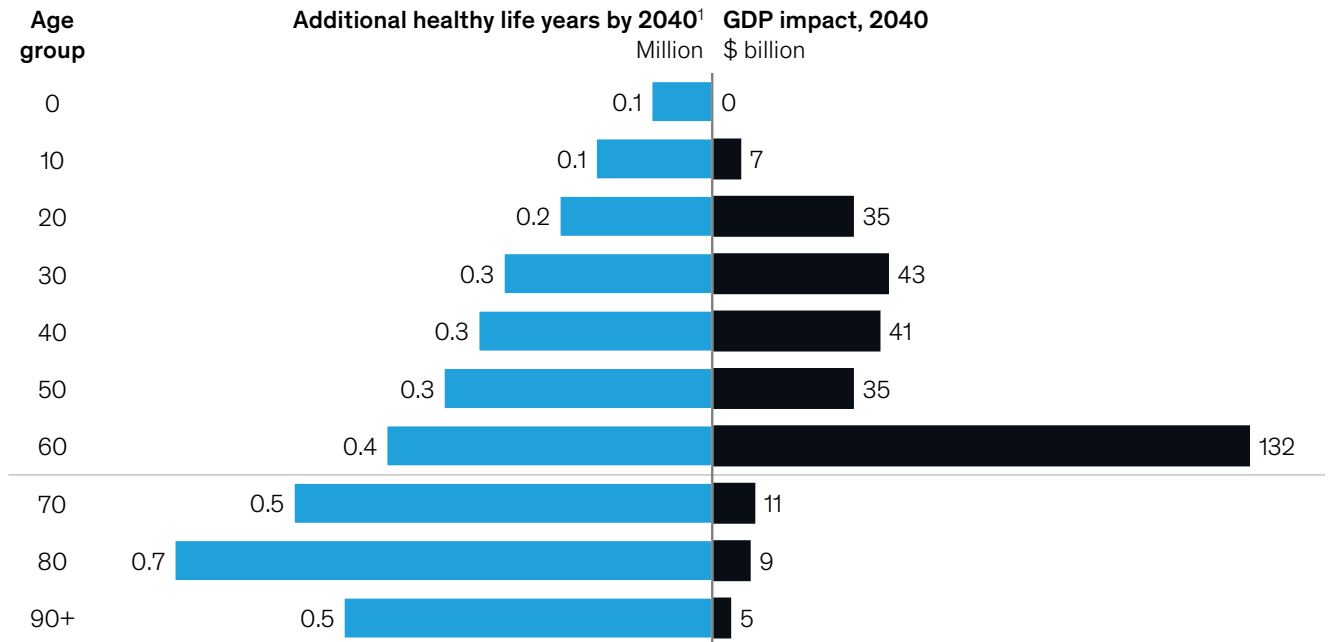
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

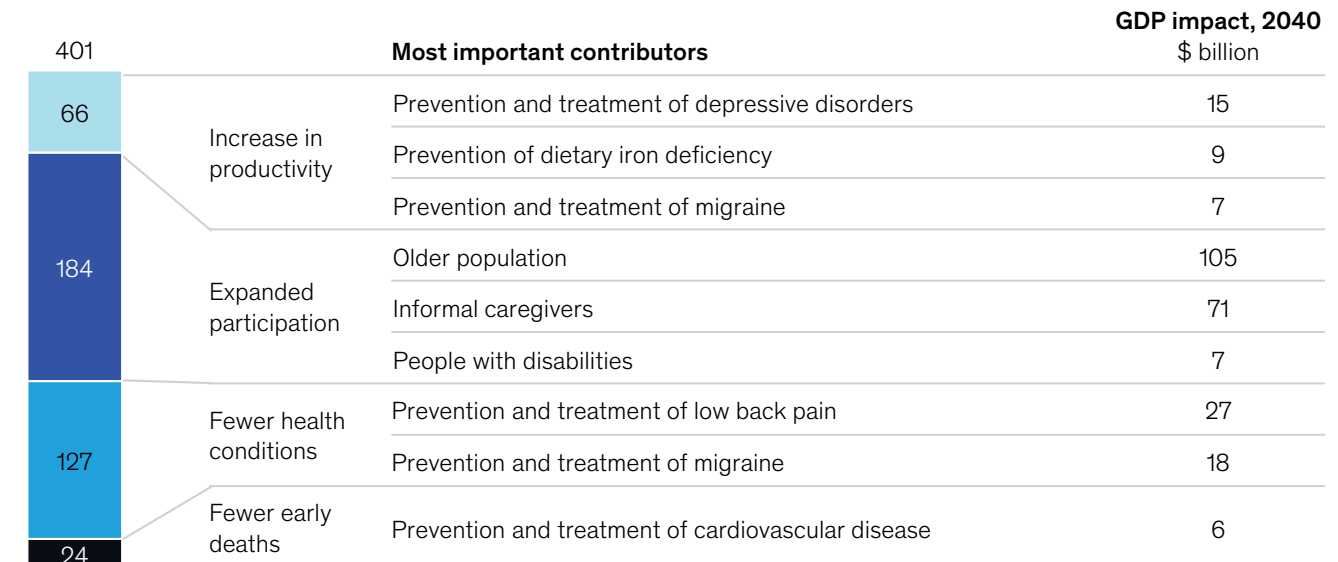


**51%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown, 2040

\$ billion



**\$800B** welfare gains

**3.4x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

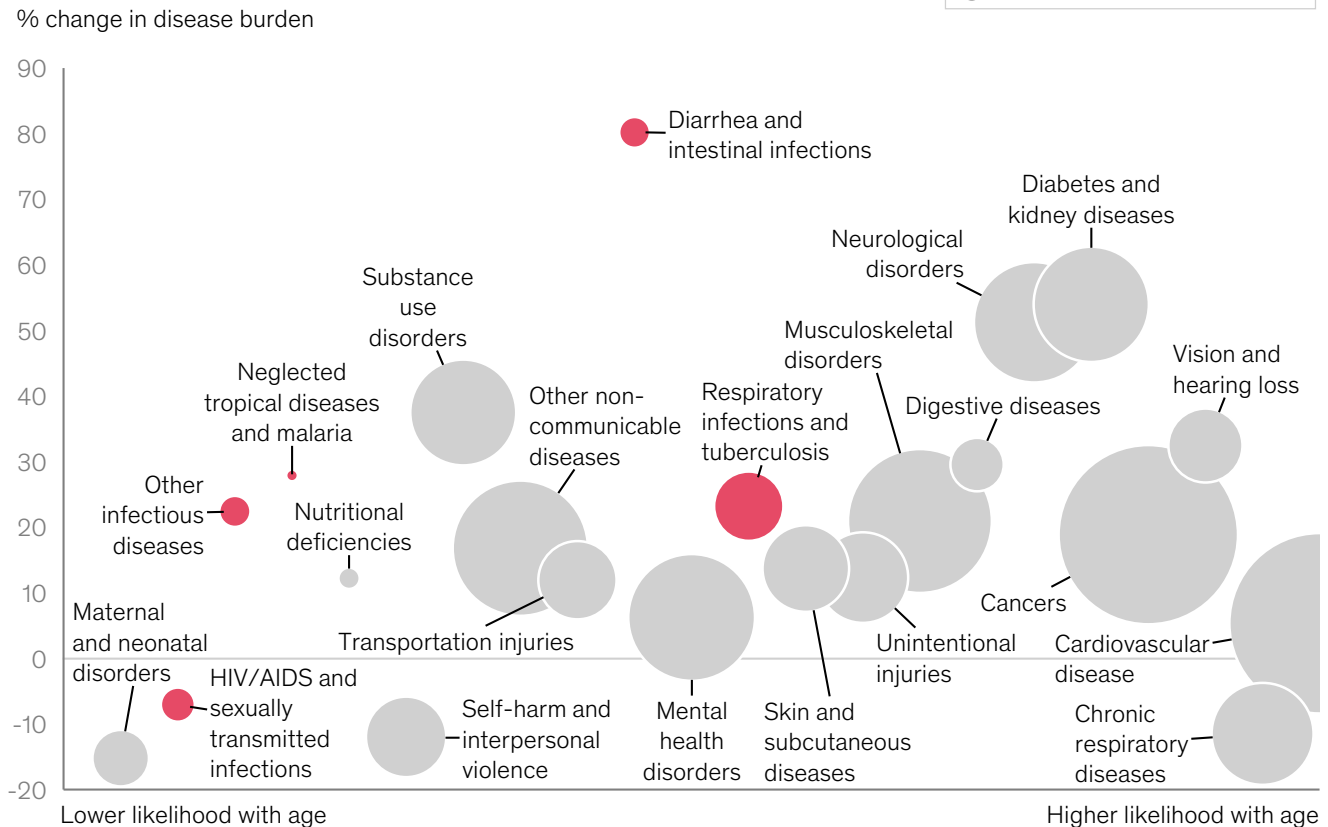
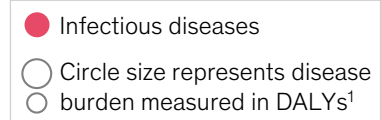
Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis

# Health benefits by region: United States

## Disease burden

### Change in baseline disease burden between 2020 and 2040

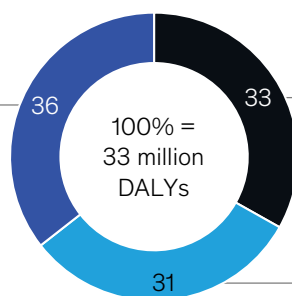


### Distribution of interventions by category, 2017, %

Top 3 per category, %

#### Therapeutic

Psychological	8%
Pharmacological (other) <sup>2</sup>	5%
Physiotherapy	5%



#### Environmental, social, and behavioral

Smoking cessation	8%
Education for behavior change	8%
Weight management and physical activity	6%

#### Prevention and health promotion

Medicines for heart disease, stroke prevention, and diabetes	10%
Vaccines	7%
Pharmacological (preventive anti-infectives)	4%

**33%** of disease burden is avertable

1. DALY = disability-adjusted life year.

2. Pharmacological (other) includes medicines for osteoporosis, gastrointestinal conditions, macular degeneration, and cancers.

Note: Figures may not sum to 100% because of rounding.

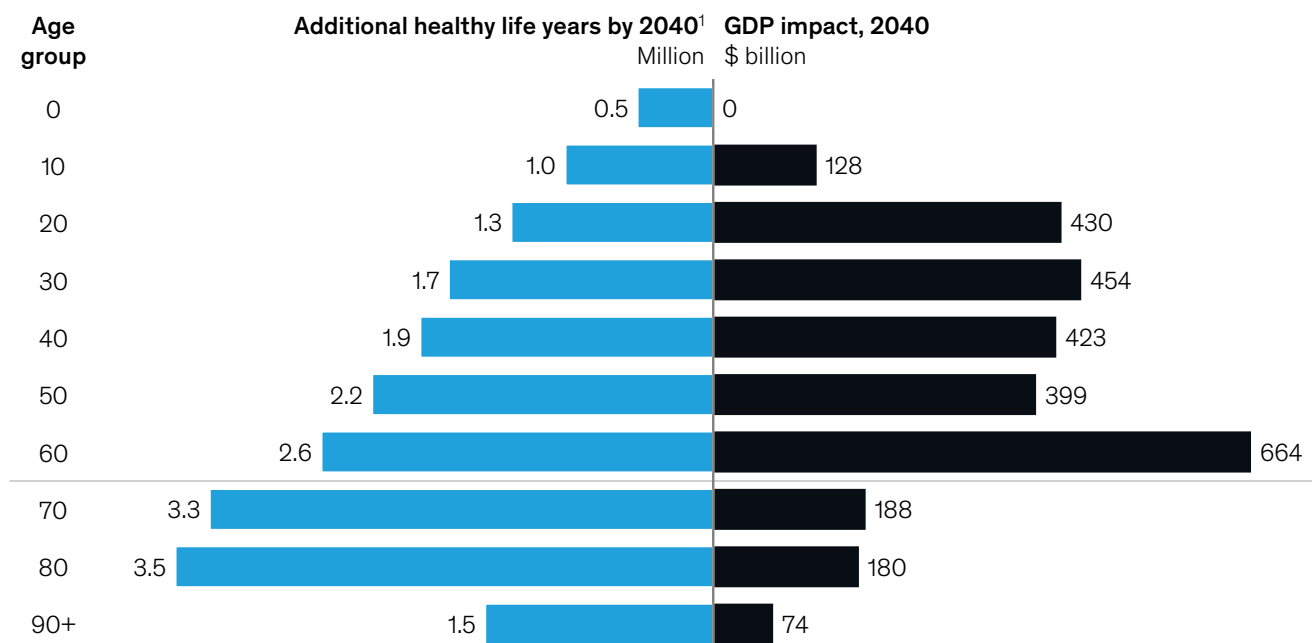
Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis



## Impact of healthy lives

### Additional healthy life years lived in 2040 and respective GDP impact by age group

Global perspective, healthy growth scenario

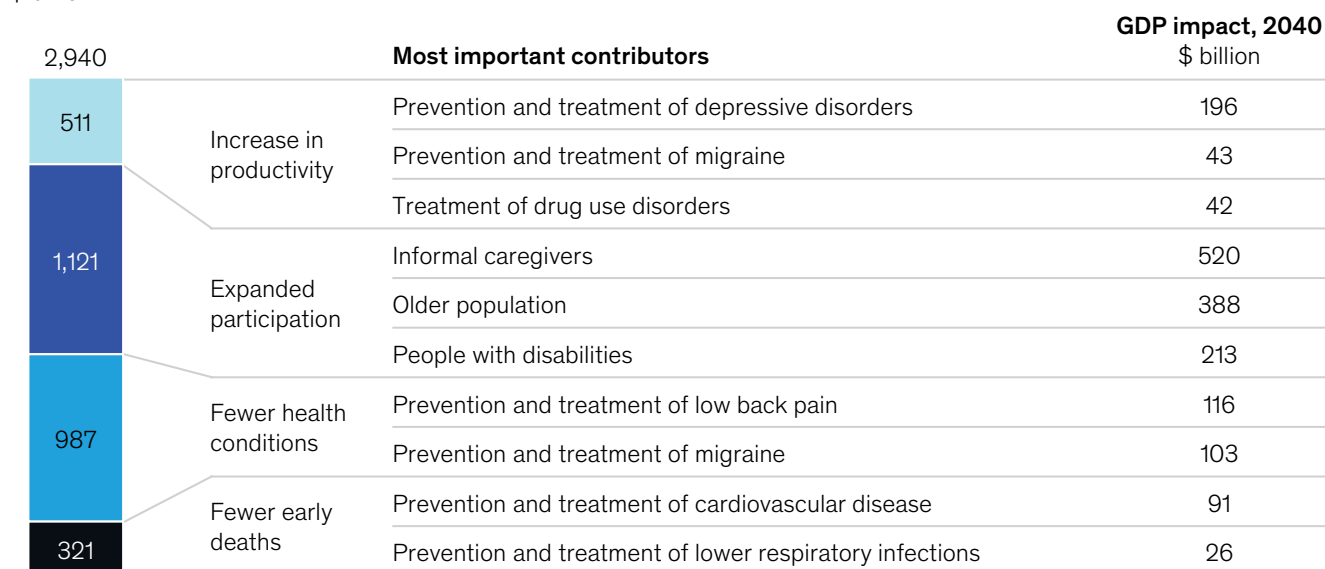


**58%** of healthy life years gained before 70

## Effect on GDP

### GDP impact breakdown

\$ billion



**\$4.2T** welfare gains

**3.9x** return for every \$1 invested

1. Additional healthy life years from averting deaths and reducing disability.

Note: Figures may not sum to 100% because of rounding.

Source: Institute for Health Metrics and Evaluation, used with permission, all rights reserved; McKinsey Global Institute analysis







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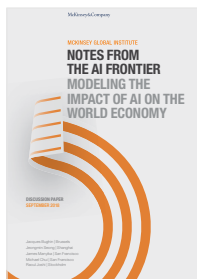
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