

UNLOCKING THE POWER OF HEALTHY LONGEVITY

Demographic Change, Non-communicable Diseases, and Human Capital



WORLD BANK GROUP



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Abbreviations and Acronyms

AARC	Average annual rate of change	LTC	Long-term care
AARR	Average annual rate of reduction	MDB	Multilateral development bank
ACS	Acute coronary syndromes	MDGs	Millennium Development Goals
AI	Artificial intelligence	MICs	Middle-income countries
AIDS	Acquired immunodeficiency syndrome	NCD	Non-communicable disease
ASRHR	Adolescent sexual and reproductive health rights	NGO	Nongovernmental organization
BMI	Body mass index	ODA	Official development assistance
COPD	Chronic obstructive pulmonary disease	OECD	Organization for Economic Co-operation and Development
COVID	Coronavirus disease (also known as COVID-19)	PCI	Percutaneous coronary intervention
CVD	Cardiovascular disease	PHC	Primary health care
CWON	Changing Wealth of Nations	PPP	Purchasing power parity
DALY	Disability-adjusted life year	R&D	Research and development
DCP3	Disease Control Priorities, third edition	SBCC	Social and behavior change communication
EVAM	Economic Value of Avoidable Mortality	SDGs	Sustainable Development Goals
GDP	Gross domestic product	SHI	Social health insurance
GNI	Gross national income	SIDS	Small island developing states
GPGs	Global public goods	SSBs	Sugar-sweetened beverages
GPT	Generative pre-trained transformer	UMICs	Upper-middle-income countries
HICs	High-income countries	UN	United Nations
HIV	Human immunodeficiency virus	UNPD	United Nations Population Division
HLI	Healthy Longevity Initiative	VLY	Value of a life year
HNP	Health, Nutrition and Population Global Practice (World Bank)	VSL	Value of statistical life
HPV	Human papillomavirus	VSLr	Ratio between VSL and income per capita
IDU	Injecting drug use	WHO	World Health Organization
LICs	Low-income countries	WPP	World Population Prospects
LMICs	Low- and middle-income countries		

Foreword

The World Bank has a long history of engaging in population issues, ranging from childhood illness, nutrition, fertility, and safe motherhood to the aging process. It supports countries in addressing the implications of the demographic process through analytical work, technical advice, and financing to expand health coverage, redesign pension systems and social security, and undertake actions that support their economies.

This report follows that tradition and analyzes the steps to promote healthy longevity and enhance the quantity and quality of human capital through attention to the burgeoning problem of Non-communicable diseases (NCDs). Research began before COVID and concluded after, drawing upon lessons from the pandemic. The report is intended to inform policy and action at the country level.

The demographic transformation is a global phenomenon, and the increasing population of the middle-aged and elderly brings with it many challenges which are more acute in low- and middle-income countries where resources are more limited. The increasing number of adults calls upon countries to institute the social and economic measures of ensuring their wellbeing and making them optimally productive. Health must be at the center of these concerns, not only its preservation towards the end but its optimization throughout the life-course.

This report builds on a compendium of analytical papers covering the economics of avoidable mortality, long-term care, behavior change, social protection, and whole-of-government solutions to support healthy longevity. It emphasizes that a great deal of ill health globally is a result of inequities—especially poverty and gender inequities that limit or delay access to and use of health care. High out-of-pocket payments for NCDs can plunge households further into poverty or extreme poverty. Women live longer with NCD morbidities.

Preserving good health increasingly depends on preventing and controlling NCDs. This is grounded not only in the demonstrated efficacy of fiscal instruments governments can use to reduce the burden of NCDs, such as excise taxes on tobacco, sugar-sweetened beverages, and alcohol, but also on the definition of the system-wide interventions that make healthy longevity possible.

The proposals set out in this report are ambitious but firmly grounded in the financial realities of individual countries and emphasize that such financing should come principally from domestic sources, noting that the poorer countries will need support from external sources. There are existing instruments to operationalize most of the recommendations of the report, and attention to research and development of global public goods is a necessary adjunct. The adoption of such policies will involve not only governments but also all of society, particularly people living with NCDs and the full range of development partners.

Countries are at different levels of development, but all can commit to the imperative of the life-course approach. This implies continuing the commitment to maternal and child health that was so successful for reaching the Millennium Development Goals. It is my hope that the wide dissemination and adoption of the recommendations in this report will contribute significantly to adding both years to life and life to years.

Mamta Murthi
Vice President for Human Development
The World Bank

Report Team

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Any errors are the sole responsibility of the report team.

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Preface: Why this report?

Governments have increasingly recognized the importance of human capital, defined as the knowledge, skills, and health that people accumulate throughout their lives, enabling them to realize their potential as productive members of society. Human capital is central to ambitions of greater prosperity and inclusive societies, as well as to the greater human wellbeing to which they contribute. Three major challenges to human capital and wellbeing are climate change, pandemic vulnerability, and demographic transformation. While the first two have received substantial attention, the demographic shifts occurring worldwide have attracted less.

This report seeks to fill this gap, demonstrating that addressing the major Non-communicable diseases (NCDs) through a life-course approach contributes to healthy longevity and improves human capital and wellbeing.

Countries continue to rebuild from the COVID pandemic, crucial in itself and as a portent of the relationship between infectious diseases and NCDs, and of the need to build resilience in individuals and societies. Simultaneously, the global demographic landscape stands at a crossroads, with rapid declines in fertility and rapidly aging populations holding profound implications for employment, social services, and wellbeing. This aging of populations has accelerated the rise of NCDs as the leading global cause of death. Projections suggest a global surge in deaths from 61 million in 2023 to 92 million in 2050, as well as related increases in needs for NCD-related hospitalization and long-term care. Beyond mere statistics is the grief, hardship, and suffering from death and severe disease.

The world finds itself inadequately prepared for the impending NCD pandemic.

This report maps out a menu of practical, cost-effective, fiscal and clinical interventions, many of which can be swiftly implemented to yield substantial benefits. With mortality and spending forecasts extending to 2050, the report underscores the imperative of prolonged interventions to fully realize the impact of a life-course approach. Its principal focus is to galvanize country-led efforts, with accelerated progress through cost-effective, pro-poor, and inclusive interventions. If low- and middle-income countries can achieve ambitious yet feasible rates of progress, the world could avert 25 million deaths annually by 2050, effectively halving avoidable deaths and meeting the related Sustainable Development Goals.

The report proposes a comprehensive, but fiscally realistic, intervention package, building on that menu and on historical successes in reducing mortality among children and mothers and combating infectious diseases. It is also important to extend interventions beyond health to encompass broader social protection, labor market, and long-term care policies. The report draws on the foundation of the World Bank's Human Capital Project and Human Capital Index and synthesizes economic, epidemiological, and implementation evidence, including 18 detailed background papers. It introduces innovative analysis assigning economic value to avoidable mortality and incorporates insights gleaned from consultations with over 90 experts conducted over a four-year span. It identifies priorities in global public goods to tackle NCDs and improve welfare.

People living with NCDs are also increasingly recognized as a potent political force and can help in gaining more attention to NCDs. The billions of individuals grappling with NCDs look to their governments for support in managing their conditions and contributing meaningfully to their families, communities, and economies.

Analyses alone will not be enough. Mobilizing support to move from knowledge to action is required to realize the astounding human and economic benefits of addressing one of the major challenges of the 21st century.

The HLI Report Team, August 15, 2024

Unlocking the power of healthy longevity: Key messages of this report

Navigating global demographic transformations—a call for strategic action

The world is undergoing a significant demographic transformation, with a rapidly aging population in many countries presenting opportunities as well as challenges. Encouragingly, there has been remarkable progress, with global mortality risk of death before the age of 80 dropping from about four in five in 1970 to just over half in 2023. Child mortality has seen remarkable declines worldwide. This positive trend, marked by longer and healthier lives, more women working, and smaller families as countries prosper, has contributed substantially to economic growth.

However, these favorable trends bring with them a set of challenges. The growing adult population, encompassing both the elderly and middle-aged individuals, has impacts that reverberate across societal organization, education, work dynamics, and health care services. The global population is projected to reach 9.7 billion by 2050, stabilizing thereafter. Some nations already grapple with declines in total population; and the majority of countries are experiencing significant declines in the rate of growth of population, and so in the growth of the labor force. These shifts result from falling fertility rates and reduced premature mortality. The one area still experiencing marked population growth is Sub-Saharan Africa.

Many nations are ill-prepared for the magnitude and pace of these demographic shifts, which will ripple through labor markets, immigration, and social policies. Retirement ages and other institutional responses to changes in the age structure are lagging behind the rapid increase in adult populations. To navigate this evolving landscape, investing in the health and wellbeing of the working-age population is imperative. Early and effective control of Non-communicable diseases (NCDs), the primary cause of adult deaths, is crucial.

The key lesson from centuries of demography and epidemiology is clear: while death in old age is inevitable, death early in life should be rare and death in middle age need not be common anywhere.

These demographic changes intersect with the challenges posed by climate stress and pandemic vulnerability. Approximately 40 percent of the global population—around 3.5 billion people—live in areas vulnerable to adverse climate effects that exacerbate poverty, especially among marginalized groups. There is also a reasonable probability of another global pandemic in the medium term. Pandemics of respiratory pathogens, like COVID, will disproportionately harm the elderly and people with NCDs. These intersections could markedly amplify intergenerational suffering and economic stagnation.

Governments cannot afford to delay addressing these interconnected challenges. Proactive measures and country-driven strategic planning are essential to build resilience. While altering the population structure significantly by 2050 might be challenging, sustaining success in reducing premature deaths and disabilities and enhancing overall wellbeing is achievable. These are potent yet underused tools to alleviate poverty.

Tackling the NCD challenge—a strategic imperative

NCDs—particularly cardiovascular diseases, diabetes, respiratory diseases, cancers, and major depression—already account for over 70 percent of all deaths in low- and middle-income countries (LMICs) and a significant portion of disability. NCDs are surging in low-income countries (LICs) due to demographic shifts toward older populations and the influence of key risk factors including tobacco smoking, heavy alcohol use, and obesity.

The share of NCDs in overall deaths—and even more as a share of avoidable deaths—is large and rising, contributing also to preventable increases in

hospitalizations, long-term care (LTC) needs, and poverty traps for families. For example, the world has over 1.1 billion smokers (who will typically lose a full decade of life compared to similar non-smokers); 1 billion people with hypertension, contributing to cardiac death and disease; and 700 million who are obese, contributing to diabetes. On current trends, the global number of diabetics may double from 500 million today to over 1 billion by 2050. LMICs are particularly vulnerable, already bearing the brunt of the NCD epidemic but without adequate preparation and resources.

Healthy longevity means sharply reducing avoidable death and serious disability throughout the life cycle, as well as increased levels of physical, mental, and social functioning through middle and older ages, and a socially-connected, reasonably pain-free and short period of time before inevitable death. It is produced by action throughout the life cycle, starting with infant health and nutrition. Countries face critical choices in responding to their aging populations. Vigorous action, as proposed in this Healthy Longevity Initiative (HLI) report, can catalyze a virtuous cycle of gains in health, improved wellbeing, and reduced poverty. With the achievement of ambitious yet feasible rates of progress, LMICs could meaningfully extend billions of lives, averting 25 million deaths annually by 2050, effectively halving avoidable mortality and meeting the related Sustainable Development Goals.

Recognizing poverty and gender equity in the pursuit of healthy longevity

The poorest within countries are most susceptible to NCDs, for example because of higher rates of smoking and obesity. They are also least able to afford treatment costs and cope with income loss. NCDs and their risk factors create intergenerational traps of poverty, affecting children's prospects. So reducing NCDs increases equity. In addition, HLI-recommended responses explicitly target poverty and gender equity. Women generally outlive men. But partly because of that, they bear high burdens of specific NCDs and experience greater and longer periods of disability, and they have fewer resources to address these challenges than men. In addition, women bear disproportionate responsibility for caregiving which can reduce their employment prospects and compromise their own wellbeing. Expanding LTC options to reduce costs and care burdens on women is essential.

Leveraging cost-effective interventions—the HLI agenda

The HLI agenda proposes proven, cost-effective interventions ranging from NCD prevention and treatment to targeted financial protection for the poor and to meet LTC needs. While recommendations vary based on individual country circumstances, they demand increased upfront financing, primarily domestic for most middle-income countries (MICs), complemented by external financing and technical support. In addition, substantial concessional financing will be needed for LICs. In the short run, excise taxes on tobacco, alcohol, and sugar-sweetened beverages can mobilize additional revenue. In the long run, enhanced productivity and extended working lives may—other things equal—boost incomes and tax revenues.

The overarching recommendation is for countries to invest in interventions for NCDs over the life course. The main thrust involves scaling up high-impact interventions, addressing financial protection for the poor and LTC needs, and supporting data and global public goods for healthy longevity.

Scaling up high-impact interventions—a fiscal, public health, and clinical approach

Leveraging fiscal instruments for health across the life course is crucial. Tobacco excise taxation stands out as the single most effective measure, with significant pro-poor health benefits and reasonably rapid reductions in premature mortality. Excise taxes on alcohol and sugar-sweetened beverages similarly bring health benefits and can generate substantial revenues for NCD interventions and other pro-poor measures at all income levels. Integrating cost-effective clinical services into primary health and first referral systems is also crucial and cost-effective—as well as preventing unnecessary suffering and death. The sooner the integration process begins and is scaled up, and the higher, better structured, and more sustained the tax increases, the greater the benefits.

HLI investments in LMICs are expected to cost about US\$220 billion in 2050, constituting about 7 percent of projected public spending on health (but significantly more as a percentage of public spending in LICs). These investments would substantially expand health care capacity: over 6 million more nurses, 0.8 million more doctors, and 1.7 million additional health facilities. It will take time to scale

up this expanded capacity, but it is important to hasten the process, primarily to accelerate health benefits, but also because the additional capacity can support expansion of overall health services to the population. Emphasizing the needs of women, who have been relatively neglected in NCD efforts, and disadvantaged social groups is essential.

Providing financial protection and addressing long-term care needs—a holistic approach

Supporting financial protection from catastrophic health expenditure is vital for inclusive healthy longevity, particularly for the poor who are primarily in the informal sector. Providing opportunities for skill development and extending working lives is crucial. In addition to existing social protection systems, expanding non-contributory or subsidized pensions for the informal sector can enable dignified aging and help cover essential costs, including health care. Emphasizing sustainable alternatives to residential LTC, particularly community-based care, will contain costs, respect dignity and cultural norms, and aid women to remain in the workforce.

Promoting data and global public goods—a collaborative strategy

It is essential to create and fund global public goods (GPGs): internationally relevant innovations, including health tools, pricing mechanisms, joint procurement, scientific and operational research, knowledge, and pro-poor intellectual property arrangements. These GPGs correspond to global challenges including synergies with climate change and pandemic preparedness and response. GPGs can expedite progress on life-course health with sufficient mobilization of resources from development partners. Expanding open data for accountability and monitoring, which are partly national and partly global public goods, is also crucial. Investments in vital registration and statistical systems, coupled with the use of healthy longevity dashboards,

can strengthen national systems, improve program management and evaluation, and facilitate knowledge sharing between countries.

Moving from knowledge to action—a call for collective effort

Health interventions have been spectacularly successful in reducing child and infectious disease mortality. Similarly, NCD interventions could yield remarkable gains reasonably quickly, improving the lives of potentially billions of parents and grandparents worldwide.

The HLI agenda requires substantially more spending, begun and scaled up quickly to avoid cost headwinds, and accelerated steps to reduce preventable disease and death. With a minimal “starter” HLI package of interventions, cumulatively at least 150 million deaths across all LMICs would be avoided by 2050, and about 8 million in 2050 alone. Analysis of the economic value of avoidable mortality suggests that this would correspond to over US\$3.2 trillion just in 2050, suggesting a very favorable benefit-cost ratio of 16 to 1 for all LMICs..

This report provides a robust knowledge base, including evidence that significant progress in tackling NCDs is possible in nearly every setting, even where delivery capacity is currently limited. However, a strong evidence base alone is insufficient. Building strong support at top leadership levels in political and other areas is crucial for adopting and advancing the proposed agenda. A coordinated, whole-of-society effort involving governments, the private sector, academia, nongovernmental organizations (NGOs), foundations, the media, the health community, including people living with NCDs, and the global and national development communities is needed. Multilateral development banks can play a pivotal role in catalyzing country analysis and ownership and sharing learnings across diverse settings.

The imperative is clear: acting now on healthy longevity can shape a healthier, equitable, and more productive future for the twenty-first century.

BOX Summary of Report Structure

Following this overview, Chapter 1 details the rapid demographic transformation the world faces from a shift to a much larger and older population of adults, declines in fertility, and changes in the age-structure. Paired with this demographic change, it describes the large and growing burden of NCDs and their key risk factors, notably smoking, harmful use of alcohol and obesity. It includes novel analysis of avoidable mortality that combines demographic estimates with economic value. It also compares the very large benefits in lives saved if countries were to accelerate their performance in life-course investments to match that of the top fifth of peer countries.

Chapter 2 sets out the links among healthy longevity, NCDs, and human capital. It explains why levers for action are needed across the life course, suggesting key levers for action at each stage. It then provides pathways from healthy longevity to enhanced human capital and wellbeing. Key to the welfare benefits is the relationship between NCDs and poverty. The chapter ends with why tackling NCDs is critical to increasing gender equality.

Chapter 3 then addresses the country-level arenas for action in advancing the healthy longevity agenda. These include tackling NCDs with cost-effective, pro-poor interventions, as well as looking beyond the health sector to social protection, jobs, and long-term care strategies. Improving healthy longevity outcomes will necessitate stronger measurement and monitoring systems, and the chapter lays out how healthy longevity dashboards can contribute to these goals.

Chapter 4 presents suggestions for financing from both national governments, which must take the lead on the healthy longevity agenda if it is to produce sustainable progress, and development partners and other external sources of financing. These international sources of financing are crucial, especially but not exclusively to LICs. In both LICs and MICs, they can support country efforts to accelerate the pace of scaling up of NCD and other healthy living investments, as well as in development and uptake of GPGs such as new knowledge creation and dissemination or pooled procurement mechanisms. This chapter also addresses intersections with climate change and pandemic finance, and the substantial role for multilateral development banks.

Chapter 5 provides a brief conclusion with key recommendations of the report.

The appendices detail the analytic methods used and provide additional analyses.

Executive Summary

This report, a product of the Healthy Longevity Initiative (HLI), presents the rationale and recommendations for focusing on the many opportunities presented by healthy longevity. This summary highlights particular points from each chapter in turn.

Chapter 1: Better health throughout the life course is achievable

Demographic transformations are reshaping the world, with the global population expected to reach 9.7 billion by 2050. Notably, the number of middle-age and older adults is rising sharply, creating both opportunities and challenges. Reductions in fertility and child mortality have largely driven these changes, along with age-structure effects. These, also known as cohort effects, relate to the relative size of different age groups.

There are important lessons from the last few decades. The world has made remarkable progress in saving children's lives. From 2000 to 2019, the deaths of 65 million children under 5 were averted in low- and middle-income countries (LMICs).

Major global goals, like the Sustainable Development Goals (SDGs), focus on reducing mortality rates, particularly for children and from NCDs. Today, urgent new global health challenges are emerging, linked to rapid demographic transformation, with a big increase in the size of older age groups and a related rise in cases of NCDs.

Population aging carries economic implications, potentially slowing growth unless there is increased labor force participation and productivity. Countries need careful analysis for policies that balance economic demands, social services, and long-term care costs. Migration policy becomes crucial in this context, depending on the size and skill composition of demand, and leveraging the differential stages of demographic transition across countries. Climate change adds an additional layer of complexity, particularly for countries facing both aging populations and rapid changes in climate.

A key reason for the sluggish pace of improvements in health outcomes among older adults is the growing contribution of NCDs. NCDs—including

cardiovascular disease, diabetes, respiratory disease, cancer, and selected mental health conditions—are responsible for at least 70 percent of deaths globally each year and most disabilities. The majority of NCD deaths already occur in LMICs, where absolute NCD burdens are also rising fastest.

By 2050, based on current projections, there will be a rise in overall deaths to 92 million from 61 million in 2023, concentrated among middle-aged and older adults, and most of these deaths will be from NCDs. The world has, over the last three years, largely overcome the COVID pandemic. Yet much of the world is unprepared for the serious and continuing NCD pandemic of recent decades.

Death in very old age is inevitable, but the main lesson from centuries of demography and epidemiology is that death prior to very old age need not be common anywhere. This report's analysis of avoidable mortality suggests that about 7 in 10 of all deaths in 2019, or 40 million, could have been avoided at the lowest observed death rates of various countries. Deaths can be avoided by applying the abundant knowledge of cost-effective ways to prevent, treat, and palliate NCDs, directly and through their major risk factors, most notably smoking, obesity and alcohol abuse.

This report provides a unique lens on NCDs by strongly emphasizing a life-course approach. Implementing this approach will increase good health during longer lives. This will be associated with increased human capital (knowledge, skills, and other individual aspects that contribute to productivity) applied over longer working lives, as well as with positive impacts on gender and income equity.

If all countries were to accelerate their progress through life-course approaches by matching the rate of progress that the top 20 percent of countries have achieved for each age and sex group, cumulatively over 500 million lives could be meaningfully extended by 2050, and 25 million lives could be saved in the year 2050. This would halve avoidable deaths and help achieve the relevant SDGs.

This report's life-course approach to NCDs aims for not only a longer lifespan but also good health throughout. It introduces the Economic Value of

Avoidable Mortality (EVAM), a new analysis to better describe the period of life spent in good health, in order to inform priority-setting and decision-making.

The EVAM quantifies the benefits of healthy longevity. It considers the acquisition and protection of health throughout life, comparing actual and projected mortality rates against a frontier of low observed rates. This comparison enables quantification, albeit imperfectly, of avoidable mortality. The EVAM method estimates the economic value of avoiding deaths, emphasizing the potential gains from improving life-course investments. This approach makes it possible to compare the economic value of various rates of progress toward reducing mortality. It suggests that substantial progress is possible, emphasizing the importance of accelerating efforts to reduce NCDs.

Chapter 2. Healthy longevity, NCDs, and human capital: Action across the life course

By acting across the life course, the world can achieve a more desirable and dignified form of longevity that benefits individuals, households, and societies alike. This report defines healthy longevity as the state of good physical, cognitive, and social functioning for nearly the full lifespan of an individual. Healthy longevity is a key component of people's wellbeing, and thus important in itself as a key objective for development. It is simultaneously a driver of greater equity and social inclusion—socioeconomic, gender, and intergenerational. The ultimate vision is for people to live longer, healthier, more productive, and more satisfying lives. Some of the health and wellbeing benefits to be had in the future will, rightly, be after retirement.

This vision would mean that in their formative years, adolescents and young adults would be much less likely to take up smoking, start drinking to excess, or become obese—all activities that significantly increase their likelihood of developing NCDs. In this improved scenario, chronic ill health would be much less likely to mar their lives, limiting their employment and income while exacting high health care and associated costs. Nor would avoidable diseases kill them prematurely. Moreover, family members, usually women, would not have to compromise their own opportunities to provide protracted care.

Investments in the life course have proven feasible and cost-effective in a variety of countries. But

a global scale-up in life-course health will require substantial resources and effort. Innovations can make investments more affordable. While it is significantly cheaper now to save a child's life than it was several decades ago, it is more expensive to save an older adult's life. In 2019, to keep up with the top 20 percent of peer countries in reducing mortality in children under 15, LMICs had to spend US\$182 per capita, substantially less than the US\$342 needed in 1990. But to achieve similar performance for adults aged 50–69, they had to spend US\$255, which is more than the US\$198 required in 1990.

The rising relative cost to save an adult life emphasizes the need for more effective interventions through research and development (R&D) and other global public goods (GPGs) to bend the cost curve downward, as has happened for children's health.

Taking a life-course approach to NCDs provides an economic case for what is already clear on moral grounds, and which shone through the world's collective response to the COVID pandemic: the lives of older adults are well worth saving. Life-course programs, starting at a young age, to reduce NCDs have a modest positive impact on human capital (more education and on-the-job training) and enable deployment of that human capital over longer working lives. Lower NCD burdens also reduce absenteeism and decrease age-related depreciation of human capital, so increasing worker productivity. Extending working lives will be particularly important as the labor force grows more slowly (or even shrinks) in an increasing number of middle-income countries. This opens up the possibility of increased economic growth, depending on the effectiveness of government policies and of their implementation—not just in NCDs but on labor market and other directly related issues. It depends even more on the evolution of broader underlying determinants of growth, including economic management, education, institutions, and technology.

Even more importantly, reducing prevalence, morbidity, and mortality from NCDs also brings about improvements in human wellbeing. This comes not only through higher incomes, but also as a direct consequence of being healthy.

In discussing the wellbeing impacts of addressing NCDs, it is important to bear in mind the equity dimension. People living in poverty and other disadvantaged groups are more likely to have NCDs. This is partly because poor people are more prone to adopt behaviors that lead to NCDs, such as smoking and obesity, and to have worse mental health. Poor

people are also more likely not to be able to afford, and may be far from, the diagnostic and treatment care they need. In addition, studies show that the combination of high medical bills and lost income of a breadwinner creates a high risk of personal and family impoverishment.

Addressing NCDs also reduces gender inequality. This is partly because women have heavy specific NCD burdens over their lifetimes, which are usually longer than those of men. It is also, importantly, because of the societal expectation that women will provide care to older household members suffering from NCDs instead of seeking gainful employment outside the household. Women also frequently experience greater barriers to health care for their own NCDs, especially because of their often-limited financial means and decision-making power within the household, particularly in LMICs. It is for these reasons the HLI includes a strong, explicit emphasis on gender in its recommendations.

In sum, reducing the prevalence of NCDs would also reduce socioeconomic and gender inequalities. The healthy longevity approach to NCDs consistently emphasizes taking account of these inequalities in strategies and interventions—whether in prevention and care of NCDs or in policies related to labor markets, pensions, or long-term care (LTC).

Chapter 3. Advancing healthy longevity now: What countries can do

Countries can make major advances toward healthy longevity with well-chosen policies and life-course interventions if implemented quickly. A key general message is the need to substantially accelerate NCD interventions, which have been underused, and to do so early. Delays in adopting interventions will result in massive and preventable death and disease, both before scaling up starts and in the longer run, because it will inevitably take a long time for scaling up to reach full coverage.

A commitment to healthy longevity through a life-course approach can be realized in part by continuing investments in child and maternal health and nutrition. To improve health from teen to older ages, Chapter 3 lists a range of 31 cost-effective, evidence-based interventions that countries can select from and adapt in view of their unique needs and constraints. The HLI recommended menu of clinical health interventions can largely be delivered through primary health care (PHC) systems, ideally in concert with community-based care. These

interventions are not only cost-effective but also address equity, reducing financial risk, and feasibility of implementation. Countries can draw on and adapt these interventions, depending on their specific needs and capacities. Scaling up all of the items in the prioritized list of interventions to cover even 80 percent of the population in all LMICs by 2030 would dramatically reduce NCD mortality and would be highly cost-effective—even though in practice it would take longer in most countries to get in place all the financing and capacity needed. For the great majority of countries, adopting all of the measures at once would involve unrealistic increases in health expenditure and institutional capacity. Realistically, most LMICs will need to focus initially on a subset of interventions and sequence the order and expansion of their coverage. Most countries will likely want to apply “progressive universalism”: limiting costs by concentrating public financing initially on the poor and disadvantaged, then moving toward universal coverage of a set of basic services, and then adding to that set as financing and institutional capacity permit.

The chapter also provides a framework for prioritizing NCD interventions based on three other criteria beyond cost-effectiveness: equity, financial risk protection, and implementation feasibility. The list of high-priority intervention includes six population-level prevention measures, all of which are highly cost-effective and relatively inexpensive to implement. The biggest and most cost-effective gains would generally come from “health taxes”—particularly taxes on tobacco. These policies are feasible to implement even in countries with weak institutional and financial capacity, including in those recently emerging from war or conflict. There is vast evidence that health taxes reduce consumption of these substances that sicken and kill; in the case of tobacco, prolonged smokers lose an average of one decade of life compared to non-smokers. Yet this fiscal tool is greatly underused worldwide. The high priority package also recommends other clinical interventions—including pulmonary rehabilitation and treatment for chronic heart failure—and prioritizes them based on country income level.

Overall, fully implementing the high-priority package of interventions starting from 2023 to 2050 could avert up to 150 million deaths by 2050, at an incremental cost of US\$1.3 trillion (US\$9,300 per death averted). The budgetary implications of the package would be more manageable. Total cost (at 80 percent coverage) would in the longer run range

from a relatively affordable 7 percent of projected public spending on health in 2050 in upper-middle income countries, to a much more challenging 20 percent in low-income countries. This cost is based on the assumption that countries invest in the package constantly every year from 2023 to 2050. Given that programs take some years to reach full operational capacity and the cost to save a life increases over time, it is urgent that countries act now in prioritizing, adapting, and implementing the package, so that consequently with economies of scale, scaling up coverage for these interventions remains feasible.

The HLI intervention package should be considered a starter or catalytic package that needs to be customized to local contexts. For political economy and institutional reasons, some countries will continue NCD interventions not in the HLI list, even if they are relatively less cost-effective. In addition, over time there will be new cost-effective interventions (new or newly cost-effective) because of declining prices, including from GPGs.

Moving beyond health-specific interventions, policies on jobs, social protection, and LTC will also be needed to progress on the NCD and healthy longevity agendas. In terms of employment, countries could call on a range of policies to support older workers who wish to continue working, with resultant benefits for their, and potentially, national incomes. For those no longer able to work, a critical area of social protection is non-contributory pensions, where fiscally feasible, for the large poor populations in LMICs who have worked in the informal sector. This can help the many older adults and families facing both low incomes and high out-of-pocket medical expenses, especially in those countries far from achieving universal health care. Additionally, to ensure the healthy and dignified aging of people who require LTC, countries should consider how best to bolster, oversee, and -as needed- partly subsidize community and home-based care, with less emphasis on sparse and expensive residential LTC. For both non-contributory pensions and LTC systems, countries will have quite different needs and capacities, and so different approaches. Well-evaluated pilots of both, supported as appropriate by external funding, can help countries assess what makes the most sense for them before large-scale expansion.

Adults who continue working longer contribute to household income. They can also support children and other, needier elders by providing family or community care. As they age, they can retain some independence—with many aging in their

own homes, with family, community, and public support. For older adults, especially women, there is a need for adequate access to health care. Ideally, ill health would be confined to a short period just before the end of their lives.

Another urgent area for country action is the strengthening of country data systems that can help set and measure progress on life-course health. Expanding open data sources for widespread use is needed to help countries consider how to improve their performance, including by providing data with which to measure their progress and problems against those of peer countries. Essential investments include supports for national vital events, registration systems, and improved statistical capacity. There is also a need for healthy longevity dashboards: an innovative data visualization tool tailored to countries that aims to help turn data into action. It synthesizes key indicators to improve management and evaluation, and enables and encourages countries to draw on available data to assess their performance in relation to others.

Chapter 4. Financing for healthy longevity: Country leadership and key supporting roles for development partners

The NCD and other aspects of the healthy longevity agenda are ambitious, and the necessary financing will be considerable. But these investments will deliver strong returns on investment, contributing to human capital while reducing poverty.

The time for action is now, as delaying NCD-related interventions will result in increased NCD death, disease, suffering, and worsening poverty. While some interventions can affect change quickly, most NCD programs take some years to establish the financial and institutional capacity—and needed political support—for adequate national coverage. Strong country ownership is essential. And it is at the country level where the bulk of the financing will need to be mobilized.

To extend the high-priority package of recommendations to all LMICs would cost up to US\$220 billion in 2050. The cost would be reasonably affordable, at 8 percent of projected public expenditures on health in 2050 for lower-middle income countries, 6 percent for upper-middle income countries, and 20 percent for LICs. The corresponding benefits of life-course investments are large—corresponding to over US\$3.2 trillion in economic value of avoid-

able mortality in 2050. Thus, the benefit-cost ratio is very favorable, at about 16 to 1 overall for all LMICs. Countries need to customize interventions to various contexts and over time. The overall cost-benefit ratio of the HLI is sufficiently high to suggest that various combinations that include most of the HLI interventions should be attractive investments.

The political economy of investments over the life course suggests that each country would have to consider the benefits and demands from its citizens. Most interventions will require long-term efforts to attain full coverage. Reassuringly, longer-term costs would fall somewhat through economies of scale plus benefits from investments in GPGs (health technologies, good practices, and other “tools” at the global or regional level with benefits beyond borders).

External assistance could play an important role in accelerating expenditures and policy actions in the early years of scaling up NCD programs. The external financing would be available to support countries’ efforts at determining priorities, institutional reforms, and to kick-start the scaling up of life-course investments. Development partners (external donors and partners of development—bilateral and multilateral organizations, foundations, and NGOs) can also help in analysis and technical assistance.

Development partners have enormous scope for increasing their financial assistance. Currently just 2 percent of all official development assistance for health (ODA) goes to NCDs. Development partners as well as countries should work closely with foundations, academia, and NGOs. The private sector also has a major role to play in research, production, financing, and technical capacity. Stewardship of the private sector should be encouraging while still taking account of diverging incentives.

The HLI comes at a time when there is momentum for a strengthening the role of multilateral development banks (MDBs). MDBs are well placed to use their financial, technical, and institutional resources, their cross-country experience, and their close relations with both finance ministries and health ministries to encourage and support country-owned NCD and broader healthy living initiatives and programs. The World Bank Group stands ready to apply its full set of relevant instruments to implementation of the HLI, tailored to specific country circumstances as a part of its growing support for health and social protection.

Experience from NCDs suggests three priorities for planning responses to future pandemics: (i) reducing NCDs, given that much of COVID’s very

large death tolls occurred among those with pre-existing chronic disease and that NCD sufferers are also likely targets for future viruses; (ii) improving data systems for both emergencies and routine diseases, including nationwide systems to monitor deaths and detect outbreaks; and (iii) the close link between NCDs and the impact of pandemics adds a strong argument in favor of a cost-effective global adult vaccination program to expand routine antigen coverage and to provide surge capacity for future pandemics.

While climate investments are essential for planetary health, they are also complementary to life-course investments. Synergistic investments, such as expanding green transportation in urban settings, can reduce carbon footprints and increase incentives for physical activity. Ending harmful subsidies for fossil fuels, which represent about 7 percent of global gross domestic product (GDP), can free up major amounts in government budgets that can be used for health as well as climate change mitigation and adaptation and other priorities.

GPG investments are a powerful lever for improving health throughout the life course and for amplifying the equity impact of such efforts. They are much needed to bend downwards the cost curve (reduce costs) and improve results for developing countries. GPGs relevant to NCD prevention and management include knowledge-sharing networks, sharing of intellectual property, and global procurement mechanisms for health commodities, as well as relevant scientific breakthroughs for NCD treatment. Our broad definition of GPGs also includes technical assistance to countries on uptake of GPGs. This includes possible expansion of the role of artificial intelligence (AI) in global health. AI tools could help identify new treatments and spur efficiencies in delivery and quality assurance of life-course investments. Careful cross-country regulation and transparent governance will be required to curb disinformation and other harmful AI practices and share benefits equitably.

Development partners should give high priority to investing in and fostering the uptake of GPGs for healthy longevity as an important complement to their financing at country level. Financing to date for GPGs for elders and other adults has been grossly inadequate. While most financing for NCDs at country level will come from the countries themselves, this is not the case for GPGs. Rather, GPG support is a critical area where multilateral and bilateral development partners, foundations, NGOs, academia, and public health groups can spur trans-

formation. MDBs are considering how they can best give higher priority to participating in the development and application of such GPGs.

GPGs have helped to foster incredible improvements in child survival and have driven the significant decrease in the cost of saving a child's life. They could help to do the same for adults. Drawing on the lessons from those improvements and applying the same energy to a life-course approach to address NCDs has the potential to contribute to putting the world on a path to a more equitable and healthy future.

Chapter 5. From knowledge to action

Prevention and control of NCDs amidst demographic transformation is a grand challenge for the first half of the twenty-first century, commensurate in scale to climate change and global pandemics.

The overall recommendation is for countries to invest in life-course investments for NCDs, with related reforms of labor markets, pensions, and long-term care. The former covers three areas: (i) scaling up high-impact interventions; (ii) addressing specific social protection and long-term care needs; and (iii) supporting data and global public goods for healthy longevity. More detailed recommendations are provided in the various chapters

and are summarized above.

Acting on these recommendations would contribute to three linked key outcomes: (i) reduced death and disease from NCDs and improved well-being; (ii) reduced poverty and gender inequality; and (iii) improved productivity, choice, and equity in work.

If all countries improve their performance to match their best-performing peers, this could avert up to 25 million deaths in the year 2050, halve avoidable deaths, and achieve many of the SDGs.

At both country and global levels, building strong support at top political and other leadership levels for adopting and advancing the agenda is required. That will take a strong and coordinated whole-of-society effort that includes, within governments, ministries of finance, planning, social protection, labor, and gender among others, as well as championing by health ministries. That effort should go far beyond governments and external partners to include academia, NGOs, foundations, the media, civil society, the private sector, and the broader global and national development and health communities including people living with NCDs. The challenge facing all who recognize the feasibility and importance of healthy longevity is moving from knowledge to large-scale, sustainable action and impact.

Introduction: Better health throughout the life course is achievable

Demographic transformations are rapidly reshaping the world, with the global population expected to reach 9.7 billion by 2050. The number of middle age and older adults is rising sharply, creating both opportunities and challenges. The core of meeting the needs of people involves increasing good health during longer lives.

Over the last few decades, the world has witnessed extraordinary improvements in human welfare. The proportion of the world's population living in poverty fell from over 50 percent in 1950 to below 9 percent in 2019, driven by particularly faster declines in poverty from about 2000 onward (World Bank 2022). In 1970, one in seven of all newborns died before their fifth birthday. By 2020, only one in 25 did. From 2000 to 2019, the world made extraordinary human development gains, particularly in reducing poverty and child mortality. Concerted global action on child mortality and extreme poverty was catalyzed by the UN's Millennium Development Goals (MDGs). The first MDG goal—to halve extreme poverty between 1990 and 2015—was reached ahead of schedule. Countries' participation in the MDG process may have resulted in saving the lives of as many 17 million additional children, beyond what would otherwise have been achieved (McArthur and Rasmussen 2018). From 2000 to 2019, the deaths of 65 million children under five years of age were averted in LMICs. The economic value of this achievement is staggering, corresponding to US\$45 trillion (Chang et al. 2024).

The eminent epidemiologist Sir Richard Doll summarized that the main lesson from 200 years of demography and epidemiology is that, “*while death in old age is inevitable, death before old age is not*”. As he conveyed, death early in life should be rare, and death in middle age need not be common anywhere.

By necessity, any definition of old age will be arbitrary. For purposes of this report, we define old age as above 80 years. Currently, global life expectancy in 2023 is 73 years and it is expected to increase to 77 years by 2050 (assuming the setbacks from the COVID pandemic do not change the pre-pandemic trajectories). While the median age of death in low-income countries (LICs) by 2050 is expected to be only 59, it will rise in upper-mid-

dle-income countries (UMICs) to about 80 years (Appendix B Table B4).

Healthy longevity is produced across the life course. This entails avoiding death and serious disability in middle age, enabling a high level of mental and social functioning through middle and older ages, and includes a socially-connected and reasonably pain-free, short period of time before death (O’Keefe and Haldane 2024). Moreover, there is evidence of avoidable disability at every age including past age 80.

From 1970 to 2023, the global risk of death before age 80 fell from 79 percent to 54 percent, driven by improvements in mortality at younger ages: below 50, mortality risks fell from 30 percent to 11 percent, driven specifically by reductions in child mortality. Even between the ages of 50 and 79, when NCDs are the major causes of death, the risk of death fell from 71 percent to 46 percent.

Much of the stunning reduction in child mortality has been related to communicable diseases. There have also been some improvements on adult communicable diseases, notably tuberculosis and HIV/AIDS. The picture for NCDs is quite different. For example, annual rates of progress in reducing mortality from most cancers and ischemic heart disease have been much slower than for childhood diseases and from infections (Wu et al. 2024) (Appendix B Table B7). And urgent new health challenges are emerging, linked to rapid demographic transformation and rising NCDs. Sustainable Development Goal (SDG) 3 calls for ensuring healthy lives and promoting wellbeing, including a specific indicator to reduce NCD mortality at ages 30–69 by one-third by 2030. While the goal is laudable, given current progress, it is unlikely to be achieved on time.

These extraordinary transitions are best understood by examining changes in past and future demography and in the major NCDs.

1.1 Demographic shifts affecting life-course health

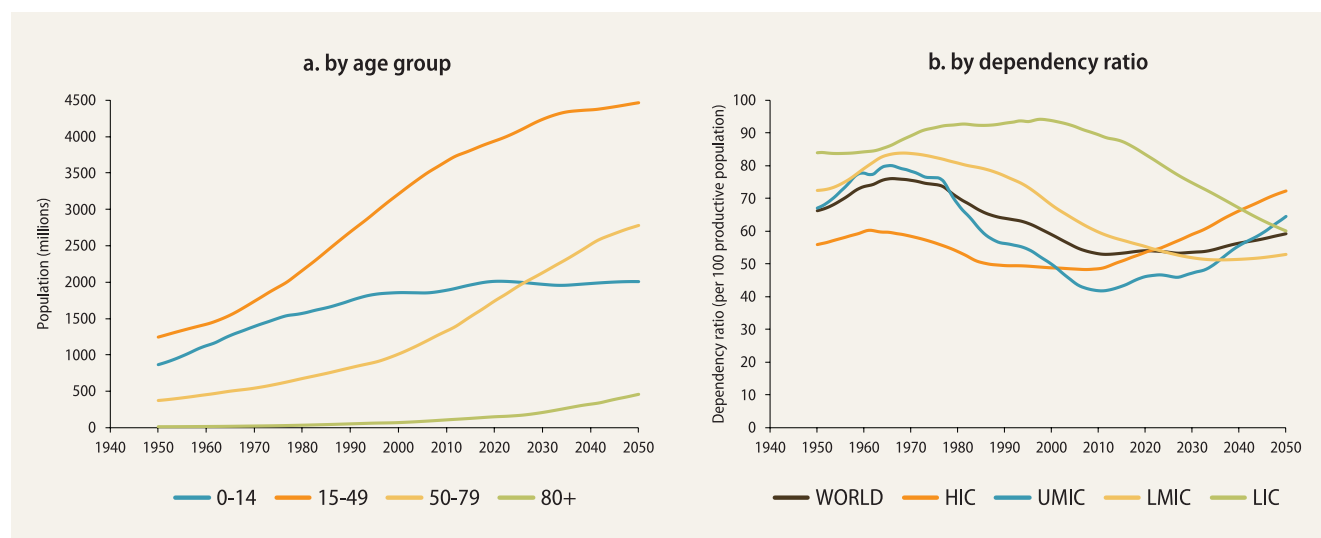
The rise of NCDs has occurred against the background of sweeping demographic changes underway over the last 100 years, and, importantly, changing trajectories in the size and structure of populations by 2050.

The global population is expected to grow from the current 8 billion to approximately 9.7 billion in 2050 before plateauing at just over 10 billion, and eventually declining by 2100 (UNPD 2022). Figure 1.1 shows the trends from 1950 to 2050, indicating that the number of children below the age of

15 peaked around 2020, and by 2040 they will be outnumbered by 50–79-year-olds. The number of young adults aged 15–49 will rise substantially and will not peak until the turn of the century. The number of people aged 80 or more is rising sharply and will do so until 2100.

Dependency ratios (the ratio of the sum of the population aged 0–14 years and those aged 65 and above to the population aged 15–64) have fallen sharply globally. In all regions, except in low-income countries in Sub-Saharan Africa, dependency ratios will continue to increase between now and 2050, driven by falling fertility and aging.

FIGURE 1.1 Trends in global population change by age and dependency ratio, 1950 to 2050

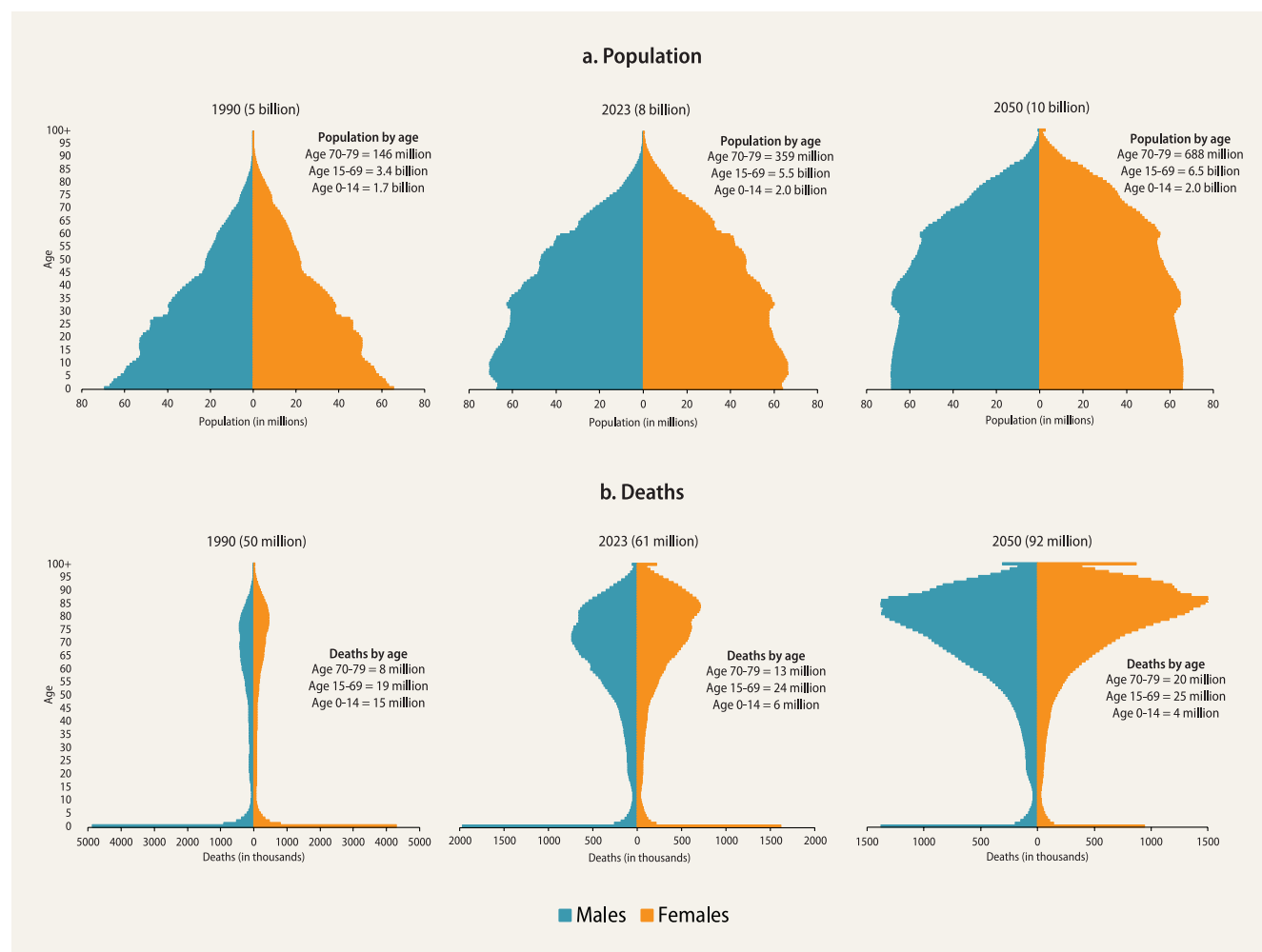


Source: UNPD (2022).

Note: HIC = high-income country; LIC = lower-income country; LMIC = lower-middle-income country; UMIC = upper-middle-income country.

Figure 1.2 depicts the overall change in population and deaths by age and sex group worldwide in 1990 and 2023 and projections to 2050. It shows that the “inverted V” of mostly children and young adults in 1990 has already yielded to rapid growth of population at older ages by 2023. Between 1990 and 2023, there were 2 billion additional adults aged 15–69, and another 1 billion will join this age group by 2050. The population at ages 70–79 alone will reach 0.7 billion by 2050.

Concurrently, by 2050, on existing projections, there will be a vast increase in overall deaths to 92 million from 61 million in 2023. In 2050, there will be about 30 million deaths of people below age 70, the same number as in 2023. By contrast, at ages 70–79, deaths are expected to rise from 13 to 20 million. As deaths increase, so will the huge burdens from those sickened and from demands on care in homes or facilities.

FIGURE 1.2 Population and deaths by age in 1990 and 2023 and projections to 2050

Source: UNPD (2022)

Note: Crude mortality (deaths per 1,000 population) fell from 10 in 1990 to 7.6 in 2023 and will rise to 9.2 by 2050 due to a greater contribution of deaths at older ages (which have higher death rates) in 2050 than in 2023.

1.2 Falling fertility, reduced mortality, and cohort effects shape the future population

For most of human history, population growth has been slow because high fertility was countered with high mortality rates, particularly in childhood. Thus, it took most of 200,000 years of human history to reach a population of 1 billion (around the year 1800), and another 130 years to reach 2 billion. However, from the 1950 to 2050, the global population will approximately quadruple, growing from 2.5 billion to 9.7 billion.

Broadly, demographic changes can be thought of as two phases. The first arises from reduced death

rates, particularly in childhood, and reduced fertility, which collectively increases labor supply of working age adults, reduces the dependency ratio, and increases economic output. The second phase results from reduced family size, which reduces growth in labor supply and increases the dependency ratio. Much of the world, with the exception of Africa, is already in the second phase (Bloom et al. 2024).

Three main factors determine changes in the world's population size and structure—declines in fertility, increases in life expectancy, and age-structure effects—and how they vary by country.

In 1950, women worldwide had an average of five children and a quarter of children born would die before their fifth birthday. But this fertility is now

halved. The transition to lower fertility has been faster in many LMICs than in the US or Europe. For example, the reduction from six children per woman to three took the US over 80 years (from 1840s onward) and even longer in the UK. But Bangladesh achieved this same halving over 20 years (from 1982 onward) and China took only 11 years (from 1967 onward and even prior to the start of its “one child policy”) (Roser 2014). Today, women in many LMICs, such as Brazil, Chile, China, and Thailand have fewer children than do women in the US.

Reductions in fertility have been driven by favorable changes in empowerment of women (as measured by expanded access to education and contraceptive technologies, and greater participation in the labor market), and declines in child labor and child mortality.

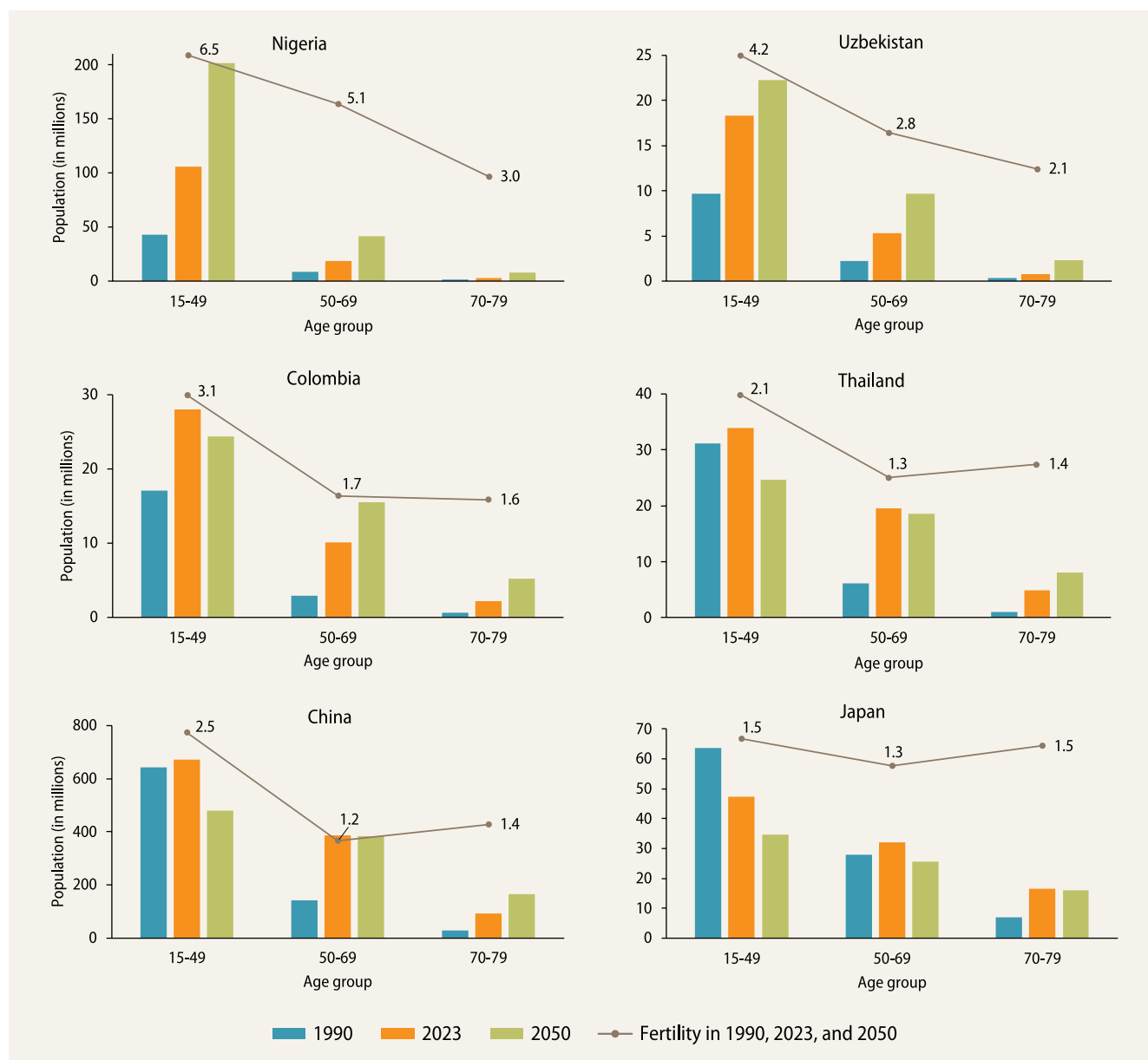
Increases in life expectancy have largely arisen from reductions in infectious diseases including those common in childhood. Improvements in nutrition, water, and sanitation have complemented public health innovations. Prior to about 1950, much of the improvement in child and young adult mortality arose from general improvements in water and sanitation, and public health practices including basic understanding of the modes of transmission of common infections. However, since 1950, the major improvements have arisen from biomedical innovations, such as use of antibiotics, vaccines, insecticides for malaria control and related technologies (Jha et al. 2005). Since about 1960, reductions in adult mortality also arose in many countries due to smoking cessation and more widespread simple treatments for heart attacks (Norheim et al. 2015).

The third factor in population aging consists of age-structure or “cohort” effects. In 2030, the number of adults aged 50–59 years will reflect the death rates faced by the cohort born between 1970 and 1980 as they aged. Generally, mortality declines have preceded fertility declines, creating a cohort of living children who would have otherwise died in infancy or early in life at the death rates of earlier generations. This has led to the so-called “baby boom” generation, or a “bulge” in the age structure which works its way through the population. When

members of this bulge reach reproductive age, this creates a second, smaller boom in births. Thus, even if total fertility rates are at replacement (meaning a woman has about 2 births to replace biological mother and father), this bulge effect, sometimes called population momentum, carries on for generations. Indeed, population momentum is expected to drive much of the growth in total population in LMICs through 2100 (Bloom et al. 2010a; Bloom et al. 2010b; Bongaarts and Johansson 2002). Importantly, reductions in adult mortality from NCDs have little impact on population growth because most families have completed their childbearing by the ages when adult mortality substantially rises.

The remarkable and rapid reduction in fertility paired with reduced mortality and cohort effects will substantially change the demographic profile of the world by 2050, but variably so. Six country examples illustrate this diversity (Figure 1.3). Nigeria, the most populous country in Africa with over 210 million people, is expected to nearly double its population to 375 million by 2050 and to 546 million by 2100. This is driven by currently high fertility (over 5 children per woman), and with fertility expected to stay high. Moreover, the successive of cohorts born in Nigeria have their own population momentum. Fertility rates are expected to decline to only 3 by 2050. Thus by 2050, much of Nigeria’s population will be aged 15–49, which includes prime economically productive years. Uzbekistan is expected to similarly grow in population size, with a larger proportion at ages 15–49 years. By contrast, fertility rates are notably below replacement in Colombia and cohort effects imply that the number of adults aged 15–49 years will fall but the number of adults aged 50–69 and 70–79 years will rise sharply. Thailand shows similar patterns, with modest declines in its population aged 50–69 and increases at ages 70–79. China and Japan can both expect net depopulation by 2050 because the decline in numbers of younger and middle-aged adults does not offset the increase at ages 70–79 years.

Appendix B Figure B2 provides these graphs for the 25 most populous countries plus other selected countries.

FIGURE 1.3 Population size by age group in 1990, 2023, and 2050 and changes in total fertility rate, selected countries

Source: UNPD (2022).

1.3 Implications of future demographic change

In the past, population growth was the major concern for global demography. While Africa faces ongoing challenges to reduce fertility, much of the world has seen population growth rates decline. Population aging is increasingly becoming the main concern. Future vast demographic changes up to 2050 are, for the most part, not avoidable; for exam-

ple, pro-natalist policies are unlikely to substantially reverse the large decline in fertility in many countries (Brainerd 2014).

Societies have moral, political, and social obligations to all their people; and as the world ages rapidly, governments, global institutions, academic and civil society have obligations to try to improve the welfare of the far larger number of adults that nearly every country will have by 2050. Indeed, a key theme of this report is that this rapid demo-

graphic change represents an opportunity to improve wellbeing, as well as gender and income inequalities. An important opportunity exists for government action to achieve healthy longevity, allowing individuals to live more years in good health and stay productive and independent for longer (World Bank 2021).

Population aging can slow economic growth if it is not accompanied by an increase in labor force participation and productivity (Bloom et al. 2010a; Onder and Pestieau 2014). Population aging can impair long-term economic growth through a reduction in employment and labor productivity, higher dependency, and lower savings and investments. An aging population needs additional resources for social services, associated mostly with health systems and long-term care costs and pensions (Araújo and Garcia 2024; Rofman and Apella 2020). The effect of population aging on economic growth ultimately depends on how population aging affects the size and productivity of the labor force, capital intensity and returns to capital, consumption, and asset accumulation and if careful public policy can enable longer, economically and social productive lives (Lee 2016; Lee and Mason 2017).

While future scenarios will vary by country, the dramatic changes in the size and structure of the population are likely to profoundly influence all societies by creating large numbers of working-age adults in some countries, which could drive economic growth, including by expanding savings, but also by leading to more older adults who require care (described in Chapter 3) and by influencing migration. Finally, future demographic changes will interact closely with climate change.

Economic growth: The effects of a changing age structure can increase economic growth if defined as the “demographic dividend.” For any specific country, the possible dividend is driven not by population growth alone, but also by macroeconomic management, labor and capital markets, savings rates, trade policies, and, importantly, by human capital accumulation (which Chapter 2 describes in some detail). For many LMICs where the 2050 population may have higher portions able to work and save, specific policies can expand economic growth. The countries that can (i) combine effective policies to create jobs while expanding publicly financed health insurance, (ii) adopt additional efforts to promote human capital (especially for women), and (iii) ensure safety nets for the poorest are more likely to see the demographic dividend yield broader benefits.

These include policies to support competitive labor and capital markets—equipping workers with human capital and building infrastructure and carefully designed trade policies (Bloom 2020). For example, despite concern in the US that national health insurance would reduce employment, the Canadian experience showed that the introduction of health insurance from 1961 to 1975 actually increased employment and wages (Gruber and Hanratty 1995). Conversely, countries that do not generate sufficient jobs for large cohorts of young adults are prone to social, political, and economic instability as occurred in Tunisia and other settings (Bloom 2020).

Given concerns about slowing global economic growth over the next decade, there are challenges for countries to make these investments in an era of reduced government revenue and lower real per capita income. This raises the concerns about countries becoming old before they become rich. While it took 115 years for France to transition from “young” to “old” (defined as the proportion of people aged 65+ doubling from 7 percent to 14 percent), in some countries this transformation is happening in less than 20 years (Araújo and Garcia 2024). Fast aging is not in the future, it is already here.

Migration: The 2023 World Development Report, *Migration, Refugees and Societies*, identified about 184 million people across the world, including 37 million refugees who do not have citizenship in their country of residence. The report concluded: “Rapid demographic change is making migration increasingly necessary for countries at all income levels. High-income countries are aging fast. So are middle-income countries, which are growing older before they become rich. The population of low-income countries is booming, but young people are entering the workforce without the skills needed in the global labor market. These trends will spark a global competition for workers” (World Bank 2023e, p xxiii).

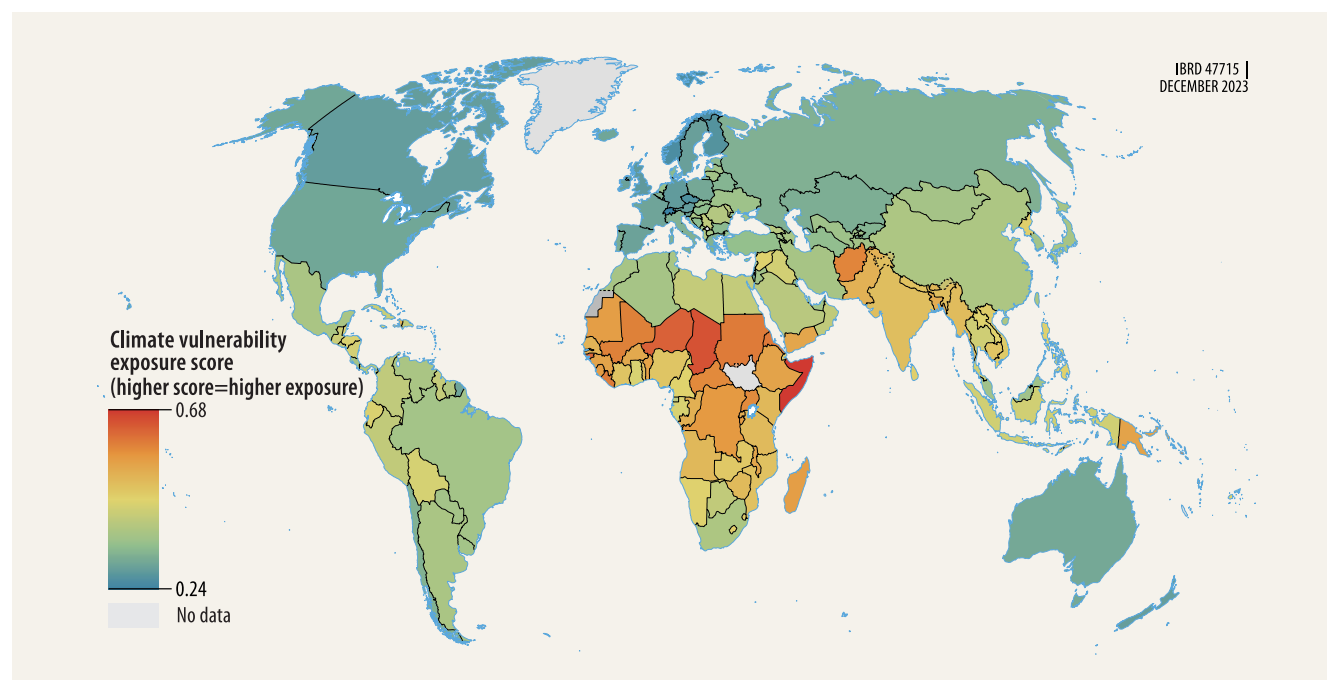
The report outlined advance planning for matching migrant skills from countries of origin to destination countries. It argued that origin countries should manage migration for development, including facilitating knowledge transfer by their diaspora and building skills that are likely to be globally relevant. For this report, a major consideration, identified in Chapter 3, is the need for long-term care and health care workers.

Climate change: Over 3.5 billion people, or about 40 percent of the world’s population, already live in settings highly exposed to climate change (Figure 1.4) (World Bank 2023e). Highly urban-

ized populations in coastal or mountainous regions are especially vulnerable to the effects of climate change. By 2050, an additional 2.5 billion people, primarily in Africa and Asia, will be exposed (Intergovernmental Panel on Climate Change 2022). Additionally, an estimated 2.8 billion people will be living in countries facing extreme ecological threats in 2050, compared to 1.8 billion in 2023 (Institute for Economics & Peace 2023). Effects of climate change include heat stress, drought, water shortages, sea level rise, and extreme weather events

such as hurricanes and floods. Many of the impacted LMICs countries also face large burdens of aging populations, including higher rates of mortality at ages 50–69. In particular, Small Island Developing States face an existential crisis of rising sea levels, aging populations, and high NCD burdens (Box 4.1). Climate change also affects NCDs through increasing exposure to heat stresses, and in worsening respiratory health. Their possible mitigation is further discussed in Chapter 4.

FIGURE 1.4 Global distribution of climate vulnerability



Source: ND-GAIN (2021).

1.4 Progress in reducing mortality

Over the last five decades, survival to age 80 worldwide improved substantially. In 1970, nearly four in five (80 percent) of those born worldwide could die before age 80 years. By 2023 this risk of death fell to 54 percent (Figure 1.5). Death rates before age 50 years have declined even faster, falling from about 30 percent to 12 percent, and at these ages, the fastest decline was in LICs, where death rates substantially dropped from about 1997 onwards, driven by extraordinarily fast declines in child mortality.

Annual rates of mortality decline from 1990 (which was the start of several major efforts on

global maternal and child health) to 2019 were 3 percent among children below age 15 and about 1.5 percent between ages 15 and 49 (Table 1.1). For both age groups, nearly every income region matched or exceeded the annual progress in high-income countries (Appendix B Table B2). By contrast, the annual rates of decline in 50–69 and 70–79 age groups were only 1 percent, with far greater progress in high-income countries than in LMICs. Thus, in the past few decades, LMICs have been able to achieve at a faster rate the kinds of children's health improvements that wealthy countries saw in the early twentieth century.

ry. By contrast, the faster improvement in mortality at older ages in wealthy countries has yet to occur in LMICs. These annual rates of improvement help inform plausible targets for the future.

Thus, while significant alterations in future population size and age structure are probably not possible, improving wellbeing throughout the life cycle is possible. Consider the expected ages at which the 131 million children born in 2023 worldwide (of whom 118 were born in LMICs) would eventually die if 2023 age-specific death rates were to continue. Among all births, approximately 15 million would die before age 50 years (6 million before age 15),

losing several decades of good life. Fully 24 million would die at ages 50–69, losing about two decades of good life, and 29 million at ages 70–79, where the loss of life years is smaller.

Thus, securing a future for all the children born today requires attention not only to the nearly fully avoidable deaths early in life, but also the substantial avoidable proportions of death in middle age. Chapter 2 expands in greater detail on better health throughout the life cycle. A historic perspective on progress in mortality from 1970 onwards at different ages helps set the stage to understand avoidable mortality.

FIGURE 1.5 Trends in probability of death at ages 0–79, 50–79, and 0–49 years from 1970 to 2019 by income region

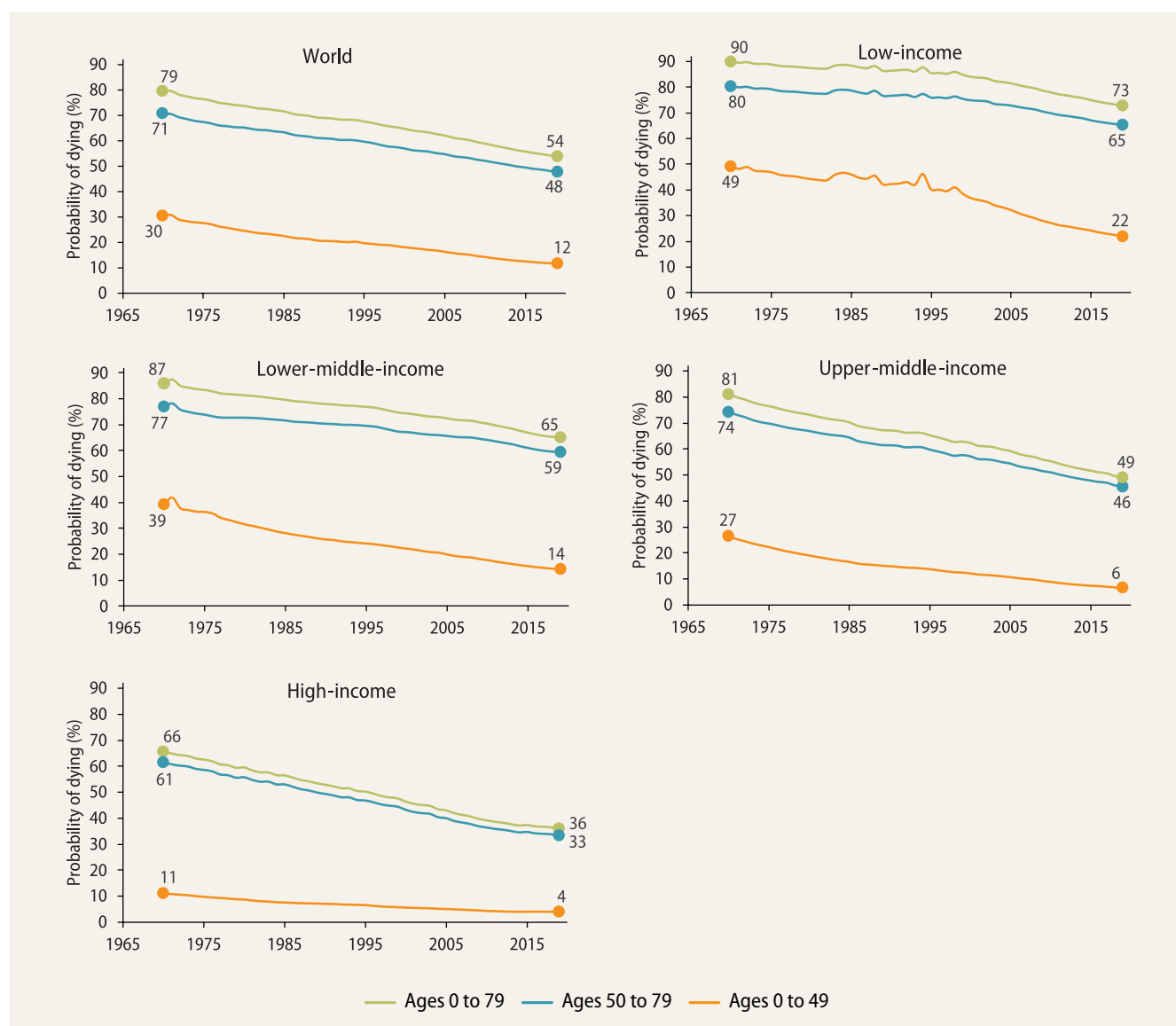


TABLE 1.1 Average annual rate of reduction in mortality between 1990 and 2019 by age (%)

Country income category	Age 0 (until age 14)	Age 15 (until age 49)	Age 50 (until age 69)	Age 70 (until age 79)
World	3.3	1.4	1.5	1.3

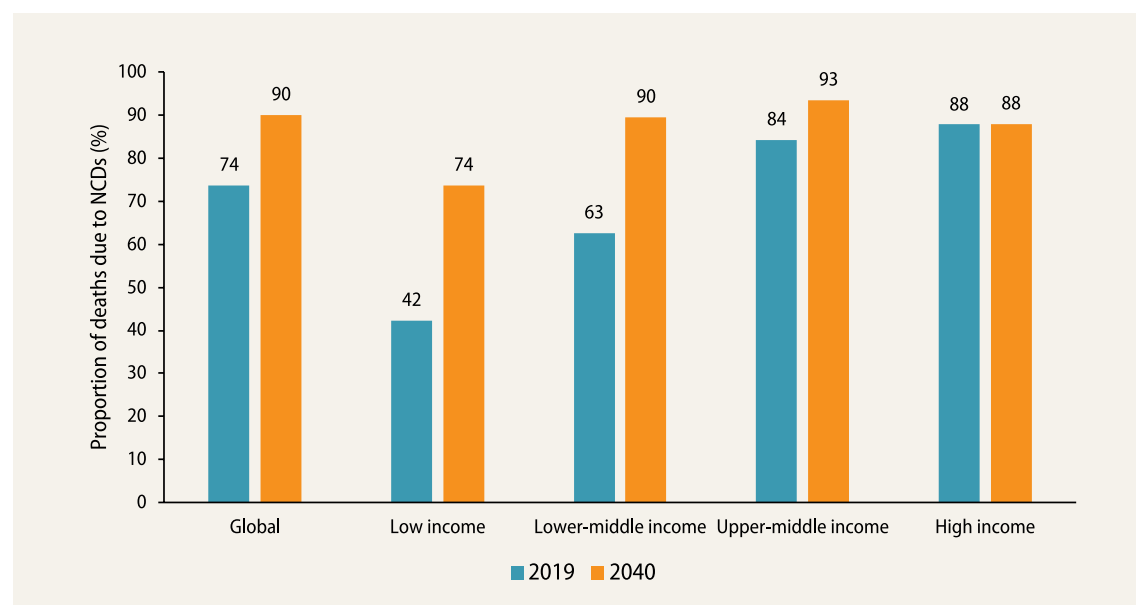
Source: UNPD (2022).

1.5 The epidemiological shifts reshaping life-course health

The rapid demographic changes underway are accompanied by a shift in most LMICs such that NCDs are the leading cause of deaths. These changes arise both from aging—creating larger number of adults who are at the ages where NCDs strike—and also from exposure to key risk factors, such as smoking, alcohol abuse, and obesity. Importantly, NCDs are distinguished from many infectious diseases of childhood in being life-long conditions that require ongoing treatment.

Globally, NCDs cause 41 million deaths each

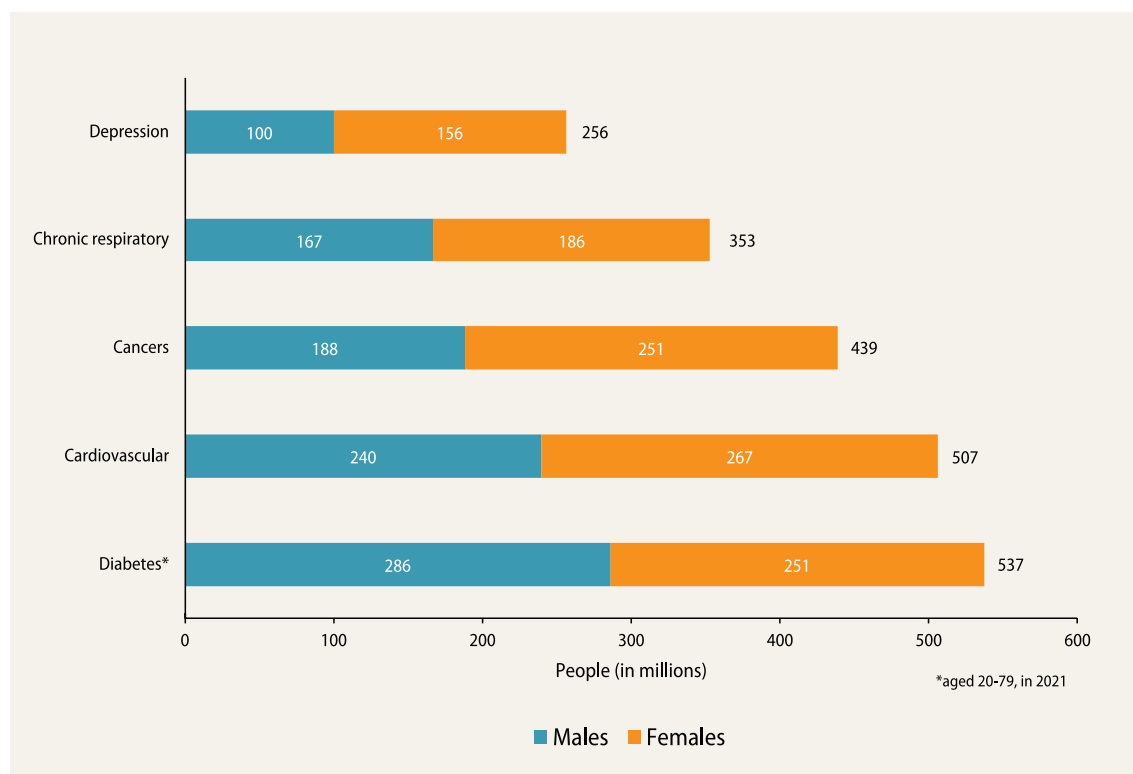
year—accounting for nearly three-quarters of all deaths (WHO 2022a). Five major NCDs—cardiovascular diseases, diabetes, respiratory diseases, cancers, and mental health conditions (of which major depression is the leading cause)—account for the vast majority of these deaths and for three out of four years lived with disability worldwide (WHO 2020b). Most NCD deaths occur in LMICs, and the proportion of all deaths caused by NCDs is set to rise in each LMIC category (Figure 1.6), including in LICs.

FIGURE 1.6 Proportion of all deaths attributable to NCDs, by country income category, 2019 and 2040

Sources: Original calculations for this publication, based on WHO (2020b).

Hundreds of millions of people are living with NCDs today. Figure 1.7 shows how widespread certain NCDs are, with over 250 million suffering from depression and over 1 billion from cardiovascular disease (predominantly ischemic heart disease and stroke) and diabetes. These burdens are rising rap-

idly, and fastest in LMICs. For instance, the greatest increase in diabetes prevalence is expected in middle-income countries (MICs). On current trends, the number of diabetics globally will double from 0.5 billion today to over 1 billion by 2050 (International Diabetes Federation (IDF) 2021).

FIGURE 1.7 Number of adults living with major NCDs in 2019

Sources: IDF (2021); IHME (2019).

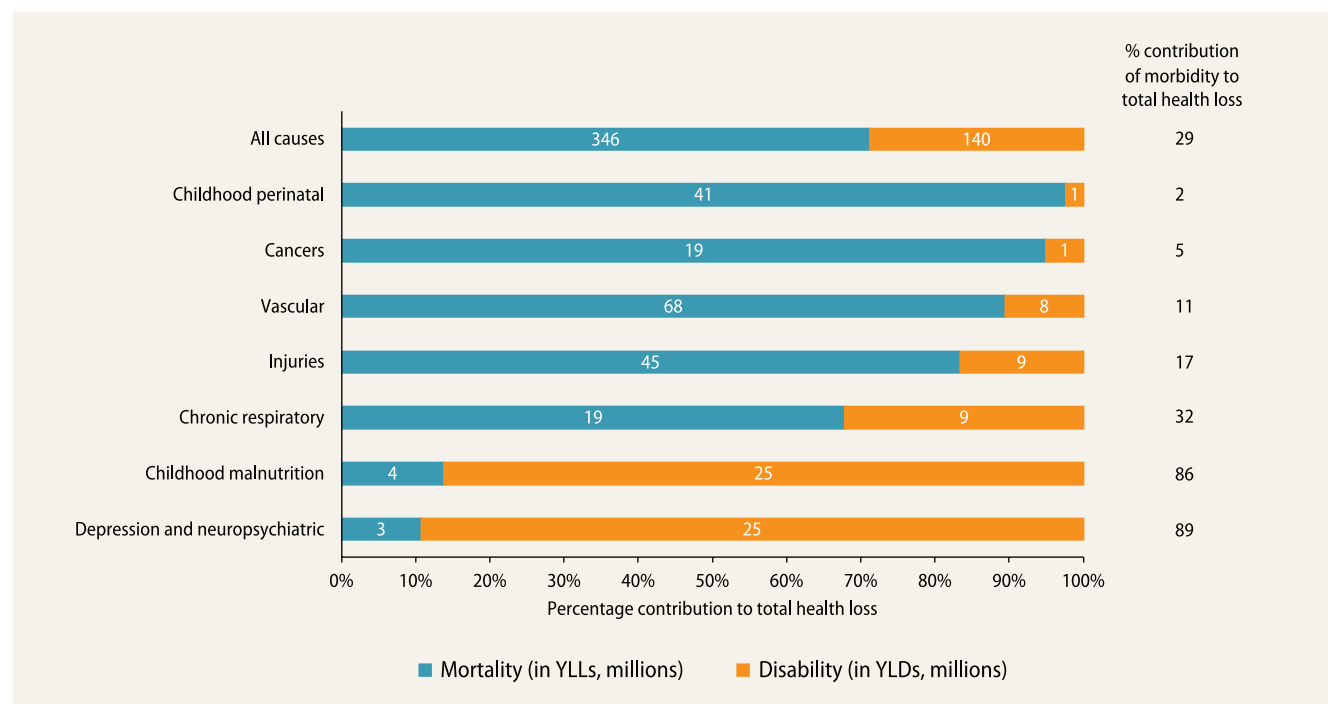
Note: NCDs = Non-communicable diseases.

Morbidity and risk factors for NCDs:

This report emphasizes mortality as the main metric to use in prioritizing diseases and assessing progress. Mortality comprises most of the composite mortality and disability measures, such as disability-adjusted life years (DALYs), particularly among lower-income countries. According to the World Health Organization (WHO), about two-thirds of all DALYs globally are due to mortality, but proportions are higher in LICs (WHO 2020b). Importantly, mortality does not capture all illnesses, most notably excluding depression (Menon et al. 2019); key conditions that disable, notably depression and other mental health conditions, should be priorities for disease control in every country (Menon et al. 2019). However, the correlation between premature

mortality and morbidity is strong for most diseases of public health importance, with only some exceptions (Norheim et al. 2015). Moreover, measuring mortality will be far less uncertain than trying to measure disability and mortality.

Nonetheless, mortality does not capture all illnesses. A deeper examination in India of the contribution of life years lost to mortality and to morbidity noted that 29 percent of overall health loss was due to morbidity, but this proportion approached 90 percent for childhood malnutrition and depression (Figure 1.8) (Menon et al. 2019). Thus, the public attention and intervention programs need to target selectively the conditions that are dominated by mortality, as proposed in the HLI investment package (Chapter 3).

FIGURE 1.8 Contribution of mortality or disability for selected major causes of death in India at various ages, 2017

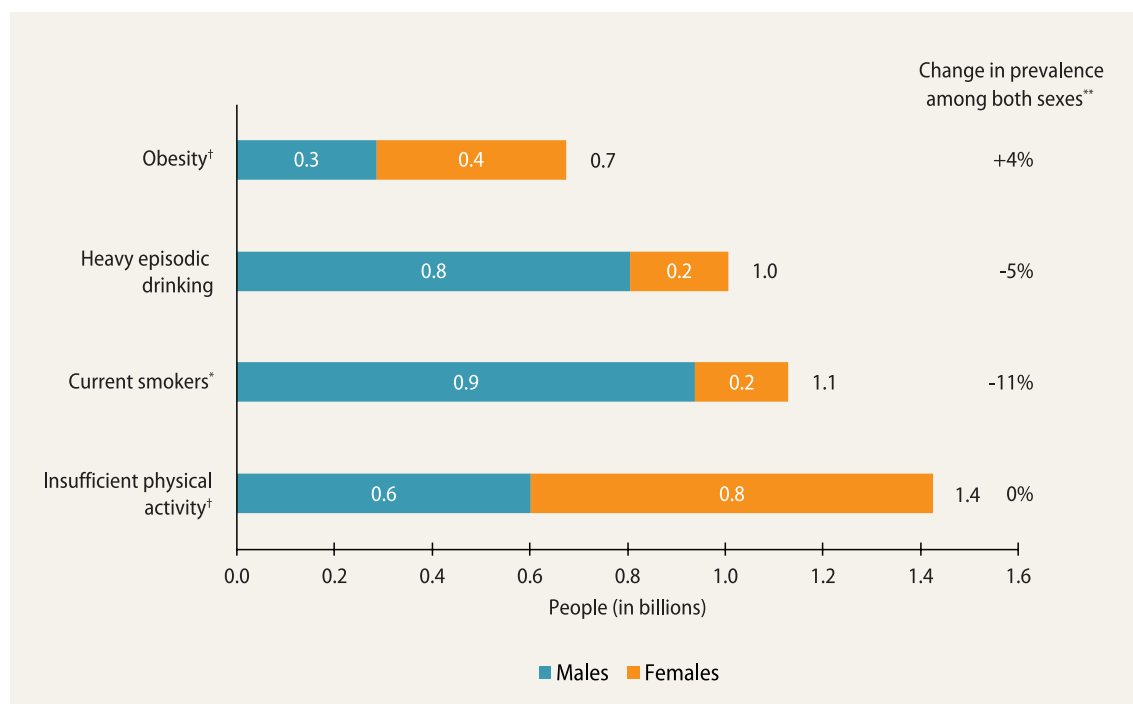
Source: Original calculations for this publication based on Menon et al. (2019).

Note: YLL = years of life lost due to premature mortality, YLD = years of healthy life lost due to disability.

Neglecting key risks factors for NCDs contributes to avoidable mortality. Smoking, obesity, excessive alcohol consumption, and insufficient physical activity are strongly predictive of NCD mortality and cause morbidity by themselves (WHO 2022b). Figure 1.9 shows the prevalence of the selected risk factors globally and trends in prevalence in recent decades (WHO 2020c). It is particularly important to raise cessation rates by the world's 1.1 billion current smokers (GBD 2019 Tobacco Collaborators 2021). Without major increases in quitting, there will be few health gains from reduced smoking before 2050 (Jha and Peto 2014). Considering the key risk factors shown in Figure 1.9, there has been some progress in reducing smoking and alcohol abuse but there have been few advances in increasing physical activity, which contributes to the growing burdens of obesity and diabetes. While heavy alcohol drinking and smoking are concentrated in men, obesity and inadequate physical activity are more prevalent in women. Obesity is driven in part by the effects of weight-gain during pregnancy (or menopause), but more complex factors also operate. For example, low-income families may be working multiple jobs to make ends meet, with little time for person-

al health—and with women's additional responsibilities, they would be particularly disadvantaged. In some countries with more rigid gender norms, women may find it difficult to exercise unless they can access and afford women-only spaces for fitness.

Smoking: Smoking remains the leading avoidable risk factor for adult mortality globally, causing over 7 million deaths or about one in ten of all deaths. Smoking contributes to nearly all of the major NCDs, not only lung cancer. The hazards of smoking are uniquely high. Half to two-thirds of smokers are killed by their addiction. Most smokers who start early in adult life and continue to smoke are eventually killed by their tobacco use. This is because during middle age, the death rates among smokers are about three-fold higher than those of similar non-smokers every year (when controlling for differences between smokers and non-smokers in heavy alcohol use, obesity patterns, or differences in educational or economic status). Therefore, up to two-thirds of the mortality among smokers would not occur if they had non-smoker death rates. Most of this excess risk arises from diseases commonly caused by smoking. This includes disease such as lung cancer, emphysema, heart attack,

FIGURE 1.9 Number of people (aged 15+) with NCD risk factors in 2016 and trends in prevalence

Source: WHO (2018); WHO (2019); WHO (2020c); GBD 2019 Tobacco Collaborators (2021); Guthold et al. (2018).

Note: †aged 18+; *in 2019; **from 2000 for Obesity, Heavy episodic drinking, and Current smokers; from 2001 for Insufficient physical activity

stroke, cancer of the upper digestive areas, bladder cancer, tuberculosis, and various other conditions. Every million cigarettes smoked causes approximately one death (Jha 2020).

Smoking cessation is effective in reducing the increased risks of developing smoking-related disease. Smokers who successfully quit before age 40 avoid nearly all increased mortality risks of continued smoking, and even those who quit by age 50 or 60 gain back some of the lost years of life (Jha and Peto 2014). Moreover, the gains arise reasonably quickly, just within a few years of cessation (Cho et al. 2024). Finally, given the long delay between smoking onset and disease and the far more rapid benefits from cessation, it is particularly important to help the world's 1.1 billion current smokers to quit. Cessation among current smokers will reduce mortality substantially by 2050. By contrast, efforts to prevent youth from taking up smoking will yield benefits only beyond 2050 (Jha and Chaloupka 1999).

Obesity: The WHO estimated in 2016 that global obesity prevalence had nearly tripled since 1975—with more than 1.9 billion adults, 18 years and older, overweight and of them 650 million suffering from severe obesity (WHO 2021b). Body

mass index (BMI) is the most widely accepted marker of overweight and obesity in adults, and it is calculated as the weight in kilograms divided by the square of height in meters. For adults, WHO defines overweight as a BMI greater than or equal to 25, and obesity as a BMI greater than or equal to 30 (WHO 2021b). Obesity is a major risk factor for NCDs such as cardiovascular disease (mainly heart disease and stroke), diabetes, and some cancers (including breast, prostate, and colon cancer) (WHO 2021b). Obesity is also associated with mental health conditions, including depression, and is associated with raised blood pressure, increased levels of blood cholesterol, and decreased levels of high-density lipoprotein (Shekar and Popkin 2020; Romieu et al. 2017). An increase in BMI of 10 units doubles mortality from cardiovascular disease (Armas-Rojas et al. 2021). In general, however, morbidity burden starts at BMI levels regarded as “normal” and the risk of cardiovascular disease and colon cancer increases linearly as BMI rises from about 20kg/m² (weight in kilograms per height measured in meters squared).

Obesity is a result of impaired energy homeostasis: too much energy is consumed and too little is expended. In addition, undetermined hormonal

and neurological factors lead to stored fat inducing a metabolic state that maintains obesity. As a result, some researchers believe that the source and nature of calories is irrelevant. However, others claim that caloric source is important, especially if foods trigger increases in blood glucose that lead to excess fat deposition (Foster et al. 2003; Schwingshackl and Hoffmann 2013). There is agreement that globally there has been a shift in food consumption, with populations opting for energy-dense foods with higher sugar and fat content. The processes of globalization and trade liberalization play a role in nutrition transition, especially in LMICs where they influence modern food supply chains and introduce sophisticated marketing to create an environment that promotes obesity. Concurrently, there has been a global reduction in physical activity. Moreover, many LMICs, such as India, are contending simultaneously with both malnutrition and obesity. The health care costs due to obesity are increasing across the world, but precise data from LMICs are scarce. For example, Brazil projects a doubling of obesity-related health care costs from US\$5.8 billion in 2010 to US\$10.1 billion in 2050 (Rtveladze et al. 2013).

Childhood obesity is also increasing worldwide and there is evidence that obesity in childhood tracks through to adulthood (Simmonds et al. 2016). Childhood obesity may derive from maternal and household factors (Mahmoud 2022). Malnourished and stunted children are at greater risk of becoming overweight or obese as adults if they are exposed to obesity-inducing diets or if they adopt sedentary lifestyles. Prevention of childhood obesity centers on good maternal nutrition in the prenatal period and breastfeeding, coupled with regulatory and fiscal measures to limit the intake of processed and high-calorie foods (WHO 2017a).

At the individual level, the efforts to prevent and control obesity focus on behavioral changes that are difficult to sustain once elevated body weight is maintained physiologically (Kelly and Barker 2016). At the national level, fiscal policies, including taxes on unhealthy foods and taxes on sugar-sweetened beverages have been shown to reduce consumption, especially in children. The corollary is to subsidize healthy foods. Regulatory policies such as front-of-package warning labels have also been adopted to reduce the consumption of ultra-processed foods (Shekar and Popkin 2020). Changes in school feeding programs are another approach to changing family food habits (Shekar and Popkin 2020). There have also been national policies promoting exercise

by modifying urban design but the effectiveness of these interventions is unknown.

Recently, drugs originally developed to treat type-2 diabetes have been approved for weight loss (Garvey et al. 2022). This injectable mimics the glucagon-like peptide 1 and reduces the amount individuals eat during meals as well as snacking between meals. In randomized trials, one such drug (semaglutide) caused a 15 percent weight loss within one year but the majority of the weight returned after cessation of treatment (Wilding et al. 2022). Newer drugs of this class, including some to be taken orally, are under development, but the current high costs are a barrier to widespread use. Drug therapies are likely work better if complemented by individual behavioral change coupled with a whole-of-government or whole-of-society approach that tries to reduce diets rich in processed and energy-rich foods.

Alcohol: The excess mortality from NCDs due to alcohol is heavily concentrated in men. Alcohol consumption is an established risk factor for selected cancers—specifically esophagus, liver, upper airways, colon and rectal and, in women, breast cancer (Rumgay et al. 2021). Alcohol consumption is a risk factor for stroke, in part because higher alcohol intake uniformly raises blood pressure. In China, where stroke deaths are more common than ischemic heart disease deaths, alcohol accounted for 8 percent of ischemic strokes and 16 percent of intracerebral bleeding strokes (a type of stroke particularly sensitive to blood pressure). The effects of alcohol on myocardial infarction were less certain (Millwood et al. 2019). In meta-analyses among populations mostly of European descent, stroke incidence rose steadily with increasing amounts of alcohol consumed, and the effects on ischemic heart disease were also higher among drinkers—only slightly higher in drinkers whose usual intake was quite low, but approximately flat at higher ranges of consumption (Wood et al. 2018). Thus, while earlier studies showed apparently protective effects for ischemic heart disease, they are likely due to methodological limitations, and no clear “safe” level of drinking exists. However, the absolute increases in risk vary by age, sex, and population. Thus, the key guidance is to avoid heavy alcohol use including binge alcohol use, which is strongly related to cancer risk and which most significantly increases blood pressure and stroke risk.

Blood pressure: Blood pressure is a fundamental aspect of cardiovascular health that exerts an impact on mortality. Hypertension is a major risk factor for cardiovascular diseases, which accounted for 32 per-

cent of all deaths in 2019 worldwide (WHO 2020b). High blood pressure damages arteries by promoting the build-up of plaque and narrowing of blood vessels. This, in turn, increases the risk of blood clots, heart attacks, and strokes, all of which can be fatal or lead to severe disability. Hypertension coexists with other health conditions such as diabetes and obesity, further exacerbating the mortality risk. Reducing blood pressure and blood cholesterol paired with aspirin can be remarkably effective in cardiovascular disease (CVD) control among the very large population of adults with vascular disease (Yusuf et al. 2014). These interventions are considered as part of the recommended clinical package in Chapter 3.

Between ages 40–69 years, decreasing systolic blood pressure by 20 millimeters of mercury halves death rates from stroke, ischemic heart disease and other vascular causes (Lewington et al. 2002). Efforts to lessen blood pressure-related mortality involve lifestyle modifications—including a healthy diet, regular exercise, and stress management—as well as medication when necessary. This is particularly challenging in resource-constrained settings where access to information, health care facilities, and nutritious foods as well as adherence to treatment plans affect outcomes.

1.6 The economic value of avoidable mortality

Major global goals, including the SDGs, emphasize reducing mortality rates for various age groups, particularly substantial reductions in child mortality and a one-third reduction in mortality from NCDs at ages 30–69 by 2030. While progress on child mortality remains rapid, both goals are unlikely to be met by the target date.

This report provides a unique lens on NCDs: calling for healthy longevity across the life course, which entails continued attention to child and maternal health and priority infectious diseases as well as accelerating progress on reducing NCDs. The main social and welfare return is not just from a longer lifespan, but also a longer span of healthy life.

The objective is to increase both the lifespan and good health during a longer life, which impacts well-being—primarily through a longer working life—and gender and income equity. Chapter 2 describes this in detail, leading to discussion of country-specific options in Chapter 3. To set the foundation for those discussions, this section presents new work to quantify the economic benefits of healthy longevity.

Previous efforts to estimate the benefits of NCD

control have started with estimates of the costs of major NCDs. These estimates have primarily relied on cost-of-illness approaches or estimates based on lost output from NCDs (Bloom et al. 2011a; Jha et al. 2013). The cost-of-illness involves calculating the sum of several categories of direct costs (i.e., actual direct or indirect expenditures) and indirect costs (mostly comprised of lost output on the assumption that if someone stops working because of an NCD). To give an illustrative idea of costs involved, the total global cost, public and private, of CVD could mount on average to US\$20 trillion per year between 2010 and 2030. In 2010, the cost of new cases of cancer alone amounted to US\$290 billion; this figure is expected to reach US\$458 billion in 2030. Chronic obstructive pulmonary disease (COPD) had a global cost of illness of US\$2.1 trillion in 2010; the total is projected to rise US\$4.8 trillion in 2030. Mental health conditions are especially costly, with an expected increase from US\$2.5 trillion in 2010 — of which about a third was in LMICs — to US\$6 trillion in 2030 (Jha et al. 2013). Related approaches such as those by WHO are based on the assumption that if there were no NCDs, labor and capital would increase and hence output would increase (Bloom et al. 2011b). Lost output from 2011 to 2030 from the five NCD conditions (including mental health) has been projected to be nearly US\$47 trillion, including about US\$13 trillion from tobacco-attributable conditions (Jha et al. 2013).

For this report, new analysis called the Economic Value of Avoidable Mortality (EVAM) was undertaken to better describe the period of life spent in good health, in order to inform priority-setting and decision-making.

The EVAM incorporates the acquisition and protection of health throughout the life course, combining this with a metric of economic value that serves as a monetary proxy for the broader concept of human wellbeing (which is here synonymous with welfare). This approach makes it possible to compare the economic values of various rates of progress toward reducing mortality.

The EVAM is constructed in two stages. The first calculates the lowest observed mortality rates and based on reasonable projections, the lowest projected mortality rates for each age group and sex from all countries. Typically, these frontier rates are observed among women in Hong Kong SAR, China, Japan, and some European countries, but, in reality, no one country or territory has a monopoly on low mortality. Against this frontier, the EVAM compares

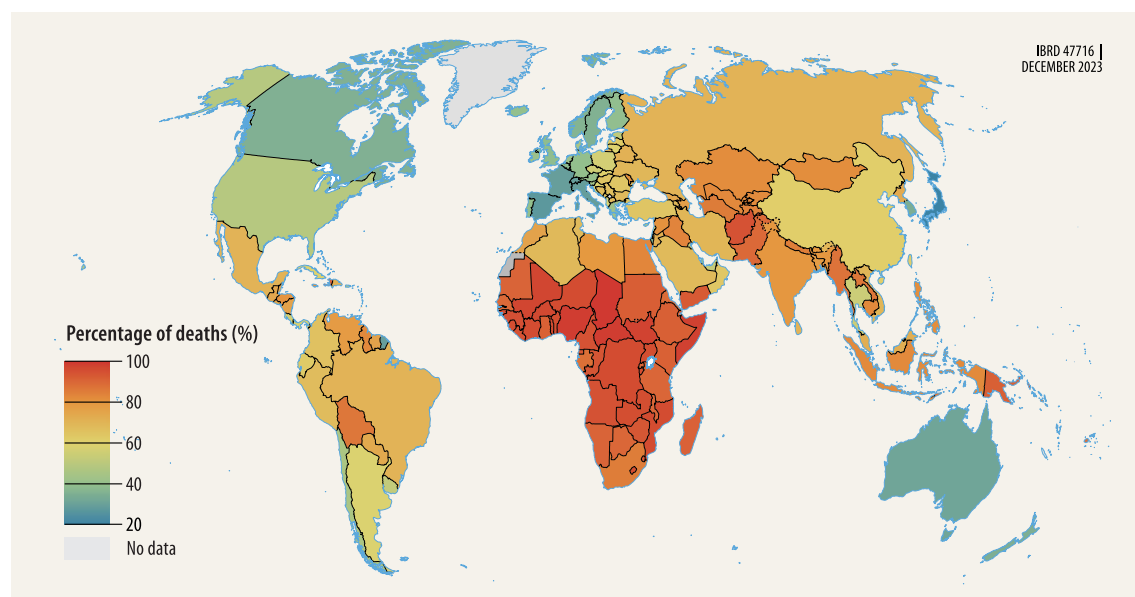
the 2019 actual and 2050 projected mortality rates and defines this as the burden of avoidable mortality. Since death is inevitable in very old age, the EVAM framing defines lives that can be meaningfully extended by reducing avoidable death prior to very old age. The second stage draws from the literature on the statistical value of a life year (VLY) and assigns an economic value to avoidable mortality by estimating the percentage of annual income an individual is willing to forgo to live in a given year at the frontier survival probabilities. Figure 1.10 shows the variation across countries in avoidable deaths using this frontier.

This frontier is obviously artificial, but it does demonstrate that every country and every age group could benefit by achieving the lowest observed rates. But doing that can be difficult, as it suggests that not just the mortality rates—but also the accompanying levels of income, technology, and public and clinical

health services that help to achieve low mortality—can be transplanted from one country setting to another. Moreover, achieving the frontier rates would imply achieving optimal past exposures to risk factors and care. Therefore, some future avoidable deaths are already inevitable due to exposures and care received up to now.

Nonetheless, the frontier demonstrates what is possible and points to the importance of efforts to accelerate progress in reducing mortality. For example, it shows that 88 percent of deaths in 2019 among those aged 20–39 were avoidable, as were 77 percent and 75 percent deaths of those aged 40–59 and 60–79 respectively. Sub-Saharan Africa in particular has a large number of avoidable deaths—about 90 percent of deaths across age groups—due to its younger age structure and the notable role of infectious and vector-borne diseases throughout the life course.

FIGURE 1.10 Avoidable mortality as a percentage of total mortality, 2019



Source: Chang et al. (2024).

United Nations (UN) population projections estimate a global total of 92 million deaths in 2050 (Table 1.2), of which about 77 million will be in LMICs (UNPD 2022). If, instead, the frontier mortality rates are applied, these estimates drop to 28 million deaths at all ages globally, which would mean avoiding 64 million deaths, close to 70 percent.

Using the EVAM, a more realistic comparison can be made against actual rates of progress achieved in the top-performing 20 percent of each age grouping and sex in each year from 2000 to 2019, which includes a substantial number of LMICs along with some high-income countries (HICs). Comparing these “top performers” to projected 2050 death

rates yields aspirational but achievable estimates of how many deaths could be avoided, which, in turn, highlights the importance of strengthening efforts to realize these better rates. These top 20 percent

rates for 2050 are strongly aligned with the annual rates of progress required to achieve the SDGs by 2030, but with the progress rates maintained over a longer, more sustained time period (Table 1.2).

TABLE 1.2 Projected deaths vs. avoidable deaths in hypothetical scenario and with accelerated performance throughout life course

Country income grouping	United Nations projected deaths in 2050 (in millions)	Avoidable deaths if all countries had, hypothetically, lowest “frontier mortality” rates (in millions)	Avoidable deaths if all countries achieved, plausibly, top 20% performance (in millions (% of lowest frontier rates))
Low	9	8	5 (67%)
Lower-middle	38	31	18 (57%)
Upper-middle	30	19	9 (49%)
ALL LMICs	77	57	32 (56%)
High	15	7	4 (66%)
Global	92	64	37 (57%)

Source: Chang et al. (2024).

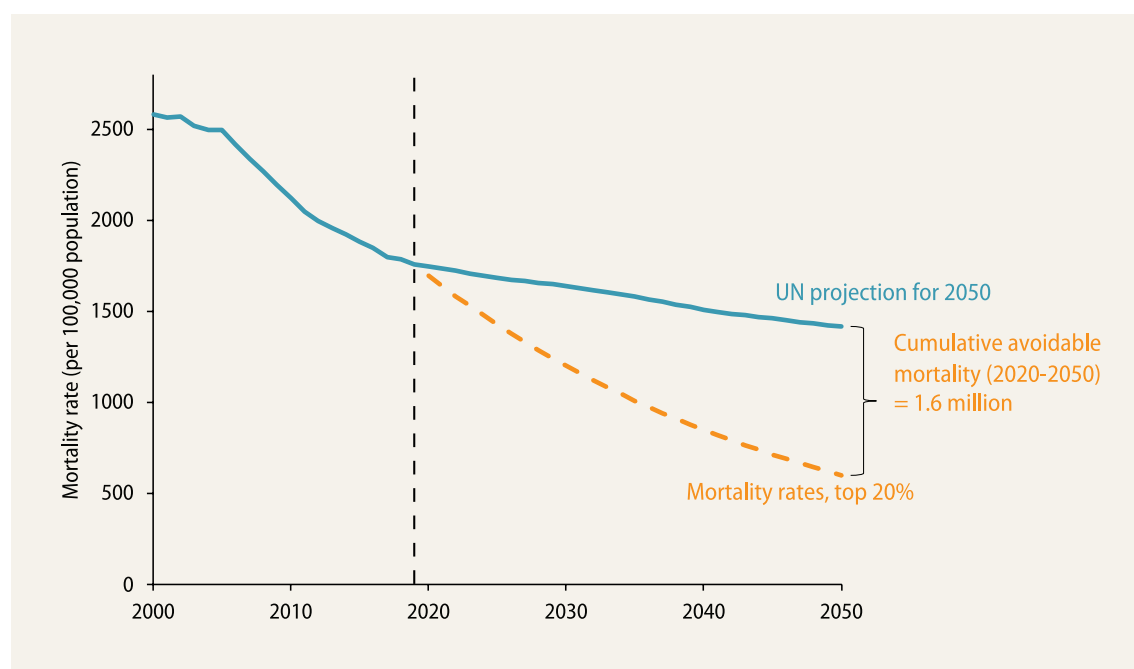
Note: Percentages may not total due to rounding.

Background analysis for this report suggests that overall global progress in mortality reduction slowed from the first decade of the twenty-first century to the second, for all age groups (Wu et al. 2024; Appendix B). This suggests that more countries need to expand life-course investments at all ages.

The impact of efforts to reduce mortality are

even more striking when considered cumulatively. Figure 1.11 illustrates the potential of deaths avoided among Ethiopian men aged 50–69 years. It shows that if Ethiopia can accelerate its mortality declines, it would avoid, cumulatively, 1.6 million deaths compared to current UN projections on mortality in the country.

FIGURE 1.11 Projected mortality decline vs. mortality decline at the rate of top 20% of countries, Ethiopian men aged 50-69

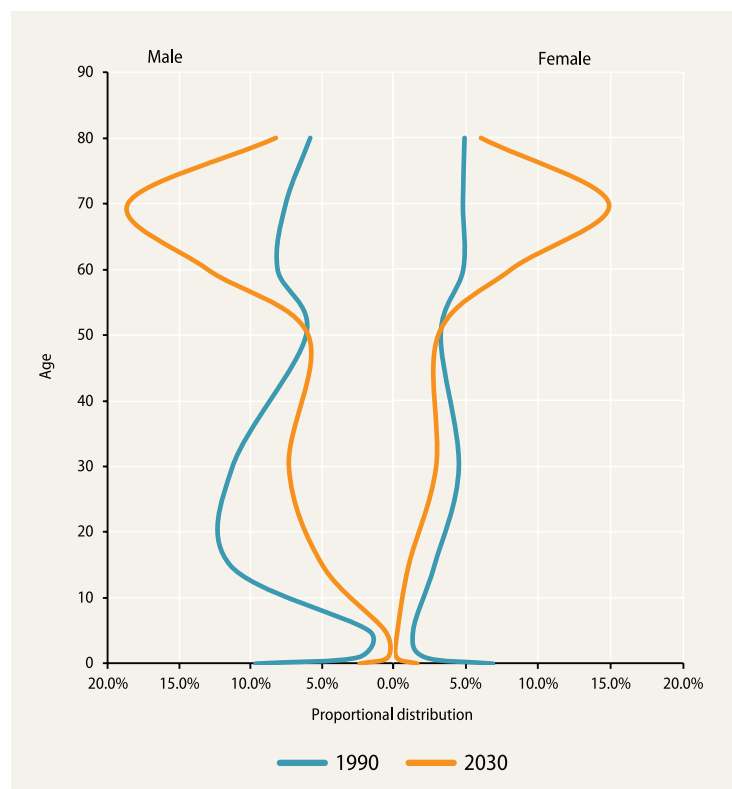


Source: Original calculation for this publication, based on data from UNPD (2022).

Novel estimates based on the EVAM methodology in several Latin American countries show a high level of avoidable mortality at older ages—a sharp change from the scenario in 1990 when most avoidable mortality arose at younger ages. For instance, in Colombia, 58 percent of deaths in 2020 were preventable, with important differences by sex (among men, 66 percent of deaths in 2020 were avoidable as were 47 percent women's deaths) (Figure 1.12). Similar analyses in Mexico found 71 percent of deaths in 2020 were preventable, with important differences by sex. In all countries, the 60+ years age group shows one of the highest levels of avoidable mortality; respiratory infections and heart disease leading the ranking of the prevalence of chronic diseases that are responsible for most of these deaths.

The EVAM analyses also permit regional comparison. For instance, Chile is the best performing country in Latin America, showing the levels of avoidable mortality not too different from the ideal (as represented by survival in Japan). By contrast, Brazil shows the highest levels of avoidable mortality (Figure 1.13). Finally, subnational level data show important spatial differences within countries such as in Colombia, differences that are now informing policy (see Box 4.2).

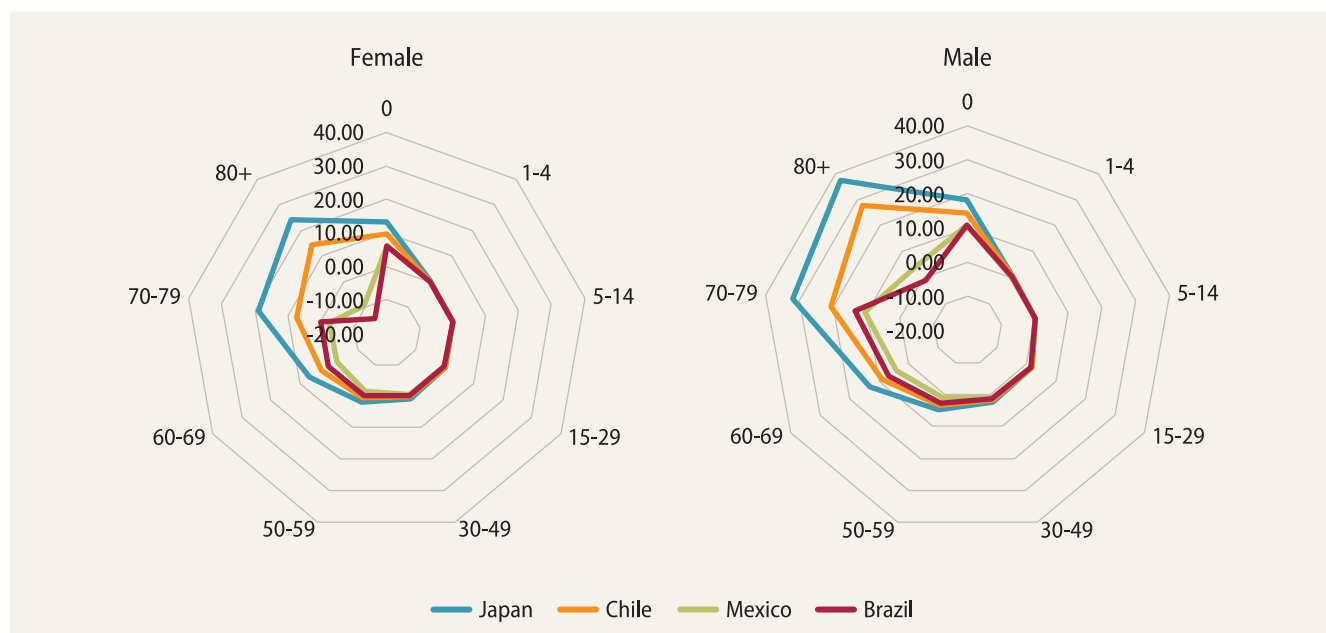
FIGURE 1.12 Trends in the age distribution of avoidable mortality by sex in Colombia, 1990 and 2030



Source: Vega et al. (2024).

Note: The avoidable mortality comparisons are to the lowest level of mortality in Japanese women versus across multiple countries as in the main EVAM; however, results are similar.

FIGURE 1.13 Levels in avoidable mortality, selected countries by age and sex in Latin America and Japan in 2020



Source: Vega et al. (2024).

The EVAM makes it possible to estimate a range of economic values of avoidable mortality, including in VLY terms, reductions in child mortality, or specific diseases. Indeed, the EVAM, measured in VLY terms, is very large. Comparing the forecast of 92 million deaths globally in 2050 with the lowest frontier of 27 million deaths yields an estimated economic impact differential of 24 percent of annual income globally. This translates into an economic val-

ue of US\$61 trillion lost globally, with US\$40 trillion of that total occurring in LMICs. The far more realistic scenario of countries matching the top 20 percent of performers would result in an economic impact of about 16 percent higher annual income globally, with close to US\$13 trillion in LMICs (Table 1.3). These estimates are broadly consistent with reviews of the value of reduced mortality in the US and globally (Murphy and Topel 2005; Nordhaus 2003).

TABLE 1.3 Economic value of avoidable mortality for 2050 as a percentage of annual income and in US\$ trillion, by country income category

Country income category	% of annual income with top 20% performance	Value of avoided mortality with top 20% performance (in US\$ trillion)
LMICs	17	12.7
High	17	5.9
Global	16	18.6

Source: Chang et al. (2024).

Note: LMICs = lower- and middle-income countries.

The EVAM can quantify not just the hypothetical economic value of life-course investments in coming decades, but also the actual economic value of the enormous reductions in child mortality seen in LMICs in recent decades. From 2000 to 2019, child mortality fell by over 60 percent; during this time approximately 65 million child deaths below age 5 were avoided. In 2019 alone, there were 6 million fewer child deaths than would have been the case at the death rates in 2000. In economic value, this represents about US\$45 trillion cumulatively, including nearly US\$5 trillion in 2019 alone. This

underscores the fact that reductions in child mortality are among the best investments ever made.

As Chapter 4 documents, future investments along the life course will also yield large economic values that can build on the returns already achieved in saving children. The EVAM framework can inform priority-setting by comparing the economic value (also measured as a percent of global income) of various diseases. A background paper for this report identifies much faster accumulation of economic value from investing early in the control of CVD (Table 1.4; Verguet et al. 2024).

TABLE 1.4 Economic value of avoidable mortality in 2019 and 2050, globally and compared to the frontier mortality rates, as % of annual income by major disease category

Disease/year	2019	2050
All causes	23%	25%
Communicable, maternal, child, and nutritional	6%	4%
NCDs	13%	18%
Cardiovascular	5%	7%
Injuries	4%	3%

Source: Verguet et al. (2024).

The EVAM has some clear limitations, including the use of uncertain adult mortality estimates, particularly in LICs and at older ages, as well as assumptions made to project mortality rates and

country income, among others. These limitations are extensively discussed in the background papers to this report. Nonetheless, the EVAM framework provides, for the first time, a comprehensive set of

aspirational and achievable estimates of avoidable mortality by region. The HLI “starter” package of health interventions recommended in this report is compared to achievable performance, showing that while the investments would avert 150 million cumulative deaths from 2020 to 2050 and 8 million in 2050 alone, there is still room to improve. These improvements, in turn, require better interventions, including expanded investment in R&D and GPGs.

Finally, as Chapter 2 describes, the EVAM does not reflect the full welfare benefits from healthy longevity or even human capital. It does, however, create the ability to put a monetary value on the gains from healthy longevity. Chapter 3 and Chapter 4 provide greater detail on the investment package recommended in LMICs, and Appendix B Table B5 provides EVAM results by country income category.

Healthy longevity, NCDs, and human capital: Levers for action across the life course

Healthy longevity is increasingly threatened by NCDs, which also imperil human capital and reductions in poverty and inequality. To reap the full benefits of longer, healthier, and more satisfying lives, a broader life-course approach to NCD control is needed.

The life-course approach emphasizes prevention as well as management of NCDs and other policy responses beyond the health sector, including in labor markets, social protection, and long-term care. It addresses behavioral risk factors for NCDs, primarily smoking, alcohol abuse, and obesity. And it focuses strongly on cost-effectiveness and equity to maximize health, productivity, and wellbeing benefits from reducing the incidence and impact of NCDs. As discussed below, NCDs are more common among the poor, with devastating out-of-pocket costs; and women face the double challenge of a higher prevalence of some NCDs and onerous caretaking burdens for older family members (as well as children and grandchildren).

World Bank research analyzes healthy longevity as simultaneously a key component of people's wellbeing and thus a goal for public policy; and as a driver of greater equity and social inclusion (socioeconomic, gender, and intergenerational) and of productivity as well. This chapter describes these linkages in three sections, focused on: (i) impact pathways between NCDs, human capital, and productivity across the life course; (ii) poverty and inequality dimensions of NCDs; and (iii) gender dimensions.

2.1 Impact pathways of NCDs on human capital and productivity

A key underpinning for world's collective response to the COVID pandemic was unambiguous: the lives of older adults, including those no longer in the workforce, are worth saving. The impact of HLI recommendations on prevention and treatment of NCDs is closely related to the concept of "human capital" which has received high priority in work on

determinants of economic growth for well over half a century—or for about two and a half centuries if one goes back to Adam Smith's *Wealth of Nations*. The World Bank's second report on the *Changing Wealth of Nations* (CWON) (World Bank 2021a) focuses on the present value of the flow of increased income from human capital and complements the World Bank Human Capital Project's focus on the stock of human capital. As the CWON states:

"Human capital is measured as the expected future earnings of the entire labor force. It is estimated as the total present value of the expected future labor income that could be generated over the lifetime of the current working population. In other words, human capital is considered an asset that generates a stream of future economic benefits." (World Bank 2021a, 146)

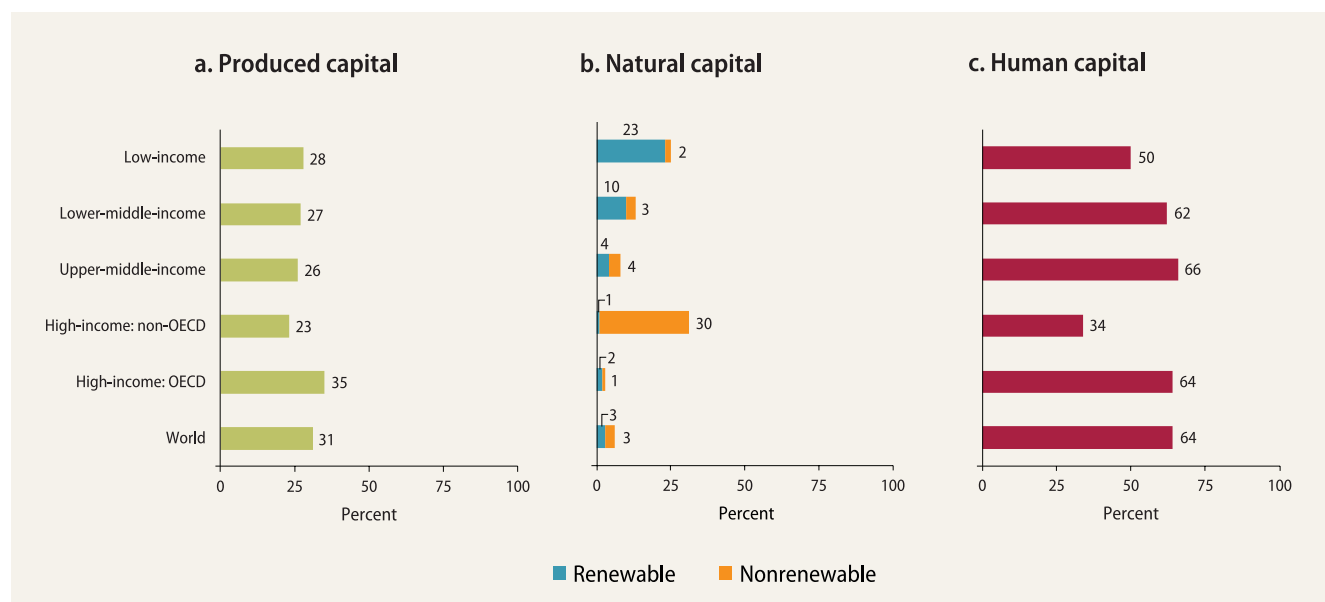
The CWON measure of human capital focuses on education and health without disaggregating them, while related work under the Inclusive Wealth Reports of the United Nations Environment Program attributes around 56 percent of the total share of human capital in national wealth to education and the remainder to health (United Nations Environmental Programme 2018). The complementary definition of human capital, which focuses on the stock rather than the flow of benefits, in the Human Capital Project is: "...the knowledge, skills, and health that people accumulate over their lives, enabling them to realize their potential as productive members of society" (World Bank 2018, 14).

Without the kind of interventions recommended here, NCDs are likely to negatively impact, to varying degrees, both the stock of human capital and returns to human capital through several chan-

nels. The EVAM estimates presented in this report quantify the economic value of additional years of healthy life. Longer lives free of disability and chronic conditions increase human capital (more education and on-the-job skill acquisition) and enable use of that human capital over longer working lives. Lower NCD burdens also improve productivity at work and delay age-related depreciation of human capital. Building on the Chapter 1 findings about demographic changes, extending working lives is particularly important as labor force growth

declines (and eventually becomes negative) in an increasing number of middle-income countries (MICs). This opens the possibility of increased economic growth, depending on the effectiveness of government policies and of their implementation -- not just on NCDs but on labor market and other directly related issues. It depends even more on the evolution of broader underlying determinants of growth, including economic management, education, institutions, and technology.

FIGURE 2.1 Shares of total wealth, by asset type and income group, 2018



Source: World Bank (2021a).

Note: OECD = Organization for Economic Co-operation and Development.

Figure 2.1 shows that human capital accounts for a high share of total capital: 64 percent globally, with shares generally varying across country income categories by only a couple of percentage points. The only exceptions are the “low-income” countries group, in which human capital still accounts for half of total capital, and the “high-income non-OECD” category, which refers to the small group of countries with unusually high per-capita earnings from exports of petroleum or other non-renewable natural resources.

Gender is an important factor. As noted in the CWON report, “human capital estimates reveal a significant disparity between the male and female shares of human capital ... women account for less than 40 percent of human capital at all levels of development.” (World Bank 2021a, p 156-157).

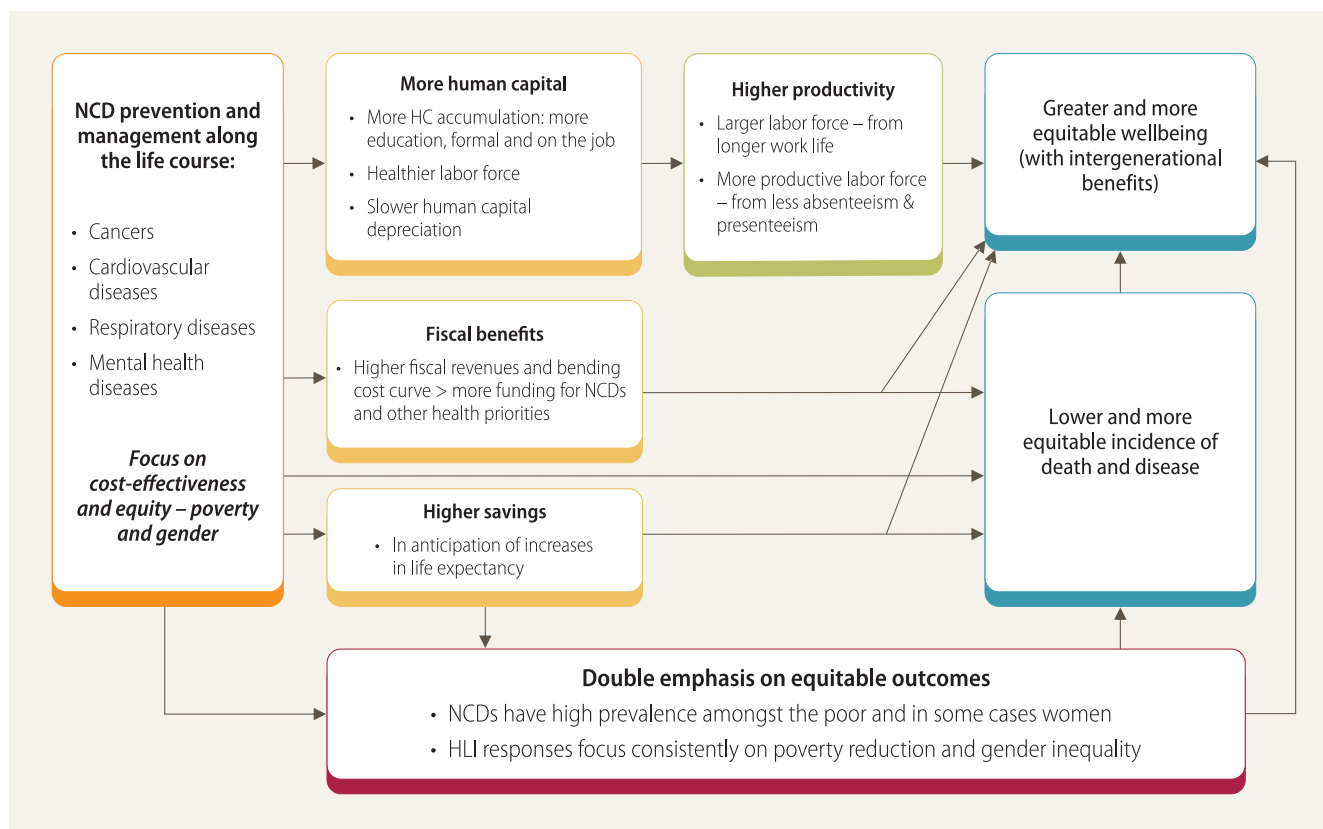
This dramatically highlights just how disadvantaged women are in terms both of human capital and in terms of returns to it through market work. At the same time, tackling the challenge could yield significant benefits. For example, CWON estimates indicate that in LMICs achieving gender parity would raise total human capital between 21 and 36 percent from the baseline depending on the country grouping (World Bank 2021a).

The interlinkages among NCDs, human capital, productivity, and wellbeing are well established and create a powerful impetus for action. Figure 2.2 summarizes how the HLI strategy for NCD prevention and management along the life course influences wellbeing—a key development objective with economic and non-economic elements. For exam-

ple, addressing NCDs directly contributes to human capital by preventing childhood NCDs and reducing children's and young people's behavioral risks for future NCDs such as obesity. This in turn has a positive influence on educational and, ultimately, labor market outcomes. Addressing NCDs also enhances human capital by increasing years of good health. This, in turn, permits longer working lives for those willing or economically obliged to do so. Reducing NCD-induced poor health also increases productivity throughout the working life. The interaction between a longer working life and increased productivity throughout that working life increases the lifetime returns to human capital. In addition,

fiscal benefits from addressing NCDs (e.g., higher tax receipts and bending back the cost curve of addressing NCDs) permit more expenditure on health (and other pro-poor programs), thus reducing the incidence of death and disease as well as directly improving wellbeing. The increased savings generated by an expectation of longer life spans has a similar positive effect. A key feature of the HLI NCD strategy is a double emphasis on poverty reduction and gender equality. Finally, both the higher productivity and lower and more equitable incidence of death and disease feed into greater and more equitable wellbeing. Key aspects of these linkages are discussed in more depth below.

FIGURE 2.2 Conceptual framework to address NCDs, human capital, productivity, and wellbeing



Source: Original figures for this publication, based on O’Keefe and Haldane (2024).
 Note: HC = human capital; HLI = Human Longevity Initiative; NCDs = Non-communicable diseases.

Impacts on labor supply: The effect of reducing NCDs on increasing productivity is all the more relevant in the large and growing number of countries with declining labor force growth. And there is now growing evidence from LMIC country stud-

ies that NCDs impair human capital accumulation and productivity, and accelerate its depreciation (O’Keefe and Haldane 2024). This takes several forms. First, premature mortality shortens work life and so creates a total loss of labor supply. Giv-

en that more than 40 percent of NCD deaths occur before age 70, this is a major loss in labor supply; this impact is becoming increasingly important as the average age of labor forces rises. Second, NCD-based morbidity and disability lower the productivity of labor force, with reduced work time and lower on-the-job productivity. Reduced productivity due to NCDs may take the form of complete non-participation in the labor force (or early withdrawal), unemployment, fewer hours worked, absenteeism, “presenteeism” (being present at work but with low productivity), and delayed return to work from illness. Available estimates suggest that this reduced productivity has an even greater negative economic impact than premature mortality from NCDs, except in some of the poorest countries (Sweeny et al. 2015). Third, NCDs are linked with a lack of investment in further accumulation of human capital over adulthood, through reduction in on-the-job learning, including through negative behavioral impacts on efforts to learn. Periods out of work due to NCDs also accelerate skill depreciation (O’Keefe and Haldane 2024). Fourth, in the later stages of life, NCDs accelerate the depreciation of human capital—the result of the cumulative and accelerating effects of the points described above.

In addition, NCDs in older parents contribute to under-utilization of their adult children’s human capital in the labor market as those adult children, and particularly the women who shoulder care responsibilities for their parents. There is also a ripple effect on the next generation, both because NCDs reduce the care and support that older adults provide to their grandchildren and because NCD risk factors like smoking and obesity increase the chances of children adopting the same behaviors. And where NCDs among grandparents result in transfer of the childcare burdens to younger women in the household, it can reduce or altogether block their work opportunities, especially for formal employment.

Fiscal impacts: NCDs also produce fiscal impacts that affect human capital. In the short term, tackling NCDs increases budget revenues, initially through excise taxes on alcohol, sugar-sweetened beverages, and especially on tobacco. Over the longer run, there could well be substantial increases in labor and income tax revenues that are closely linked to the human capital and productivity channels. There could also be offsetting costs due to a growing number of people living beyond retirement ages, although the relative importance of such costs is the subject of vigorous debate in the literature

(O’Keefe and Haldane 2024). Note, however, that the appropriate comparison is “with and without” adoption and implementation of HLI recommended interventions and policies. Without these cost-effective measures there would still be a demographic transition toward a higher share of older adults in the population, with a resultant increase in the dependency ratio. There would also be more reduction in revenues throughout the life cycle from NCDs. Finally, there is evidence that higher levels of human capital have a direct effect on both work opportunities and also perceptions of wellbeing (O’Keefe and Haldane 2024).

Obesity and healthy longevity: Obesity plays a major role in the effect of health on both the total labor force and the productivity of the labor force (OECD 2020). There is strong evidence that NCDs and poor nutrition (including obesity as well as undernutrition among children) compromise cognitive foundations, school attendance, learning outcomes, and future on-the-job training. All of this negatively impacts labor market outcomes in adult life. There are also immediate effects from the growing burden of childhood NCD mortality and morbidity. For instance, there are important associations among parents’ NCDs and risky behaviors and health, cognitive, and educational outcomes of children (O’Keefe and Haldane 2024).

To take a country example, Mexico has a strikingly high prevalence of obesity. Over 34 percent of adults are morbidly obese (i.e. with a BMI over 40). Moreover, child obesity doubled from 7.5 percent in 1996 to 15 percent in 2016 (OECD 2020). High levels of overweight and obesity could reduce Mexico’s labor force by over 2 million full-time workers per year because people who suffer from overweight and who experience related conditions are less likely to be employed; and, if employed, they tend to be less productive. These conditions together would cost close to 10 percent of total health expenditure between 2020 and 2050, which would, according to the OECD, reduce Mexico’s gross domestic product (GDP) by 5 percent (OECD 2019a).

Economic and non-economic wellbeing benefits: Economists have long debated whether improvements in health have a causal relationship with GDP growth (Bloom et al. 2024; Spence and Lewis 2009). The *correlation* between better population health and growth is clear, but separating out the two-way causal flow and the effect of other variables (particularly institutions and education) that impact both health and growth remains a source of

disagreement. The HLI does not take a position on whether reducing NCDs will necessarily result in increased overall net growth. What it does argue, however, is that implementing the HLI recommendations summarized in the table in concluding section of this report (the core of which are specific, cost-effective, clinical recommendations detailed in the next section) will, holding other things constant, raise productivity for a given demographic and health profile of the population.

While the discussion in this section has thus far focused largely on the links between NCDs, human capital, and productivity and healthy longevity, it is important also to take account of the direct impacts of good health on non-economic measures of wellbeing at the individual and societal levels. In economist-speak, good health has consumption value in terms of improved quality of life, over and above its contribution through impacts on human capital and productivity. Alternatively, Amartya Sen has argued that health should be considered as a “function” that contributes directly to the “capabilities” that are the basis for the wellbeing, freedom, and dignity of people, over and above health’s contribution to production (Sen 1997; Nussbaum 2011). In this context, the most important benefit from reducing NCDs is not economic; it is instead the impact on human wellbeing—as an end, rather than just a means, of development. Even in the hypothetical scenario that NCD control would lead to no income growth, investments would be sufficiently justified because of their impact on health and wellbeing.

Research on the relationships between NCDs and different measures of wellbeing including in developing countries has been growing (Deaton 2008; Steptoe et al. 2015; Steptoe 2019). This research consistently demonstrates that NCDs compromise quality of life across various wellbeing measures, including life satisfaction, the WHO quality of life index which includes multiple domains of wellbeing, happiness, and health-related quality of life (Lee et al. 2015; Arokiasamy et al. 2015). The research also shows a bidirectional relationship: subjective measures of wellbeing matter for health, with lower wellbeing increasing the risks of premature mortality and a range of NCDs; and NCDs negatively impacting subjective (as well as objective) measures of wellbeing. In addition, research suggests that positive, subjective wellbeing may be a protective factor for health and is associated with longer lives and lower morbidity (O’Keefe and Haldane 2024).

2.2 NCD interventions are needed throughout the life course

Historically, action to improve adult health has been undervalued. Direct investments in health at one stage of the life course yield benefits in the other stages. For example, reducing childhood malnutrition and stunting, as demonstrated by analysis of World Bank’s Human Capital Index, raises not only child survival but also adult survival and future earnings (Dsouza et al. 2019).

There are also important effects across generations within the same household. The links between higher maternal mortality and increased death rates in surviving children are well established (Scott et al. 2017). And a study of six diverse MICs found that in households where adults used tobacco and alcohol, children were less likely to receive vaccinations and basic health treatments (Wu et al. 2021).

NCDs blunt human capital at all stages of life, not just in old age. Thus, policy interventions need to address each stage of the life course. Preventing NCDs early in life—most notably reducing malnutrition and childhood obesity, as well as limiting adolescent risk behaviors such as smoking—will reduce adult diseases (Raghuvver 2010). Further, early detection of modifiable or treatable risk factors can limit the diseases’ harms to human capital formation and deployment over a working life. More directly, for instance, hepatitis vaccines administered at birth or early in life help to avoid most liver cancer later (Gelband et al. 2016).

While there is, of course, great variety in life trajectories, what follows is a general, illustrative sketch of the relationship between NCDs and human capital over the course of a life. The seeds of healthy longevity are planted even before birth. For example, 10–15 percent of all pregnancies are affected by inter-uterine growth restriction, which increases the likelihood of some NCDs later in life. Low birthweight may also be linked to a greater risk of NCDs in both childhood and adulthood (Armengaud et al. 2021).

Early childhood is another important period that influences health over the life course and for multiple generations. Breastfeeding is a particularly salient example. Mothers who breastfeed have lower incidence of chronic illnesses, including breast cancer, ovarian cancer, and cardiovascular disease (Pérez-Escamilla et al. 2023). At the same time, infants who are breastfed are less likely to develop into adults with diabetes, overweight, or obesity.

A Chinese study, for example, found a significant association between breastfeeding for over a year and lower BMI in 6–16-year-olds, particularly 9–11-year-old boys (Liu et al. 2022).

Children who are breastfed also stay in school longer, on average (PAHO 2015). One estimate is that globally, the accumulated human and economic costs of not breastfeeding add up to a US\$257–341 billion per year (Walters et al. 2019). Poor nutrition, which is broader than just the absence of breastfeeding, is associated with more under-five mortality as well as more stunting, lower school attendance, and worse learning outcomes (leading to lower incomes as adults). These factors in childhood and adolescence resound throughout the life course. An undernourished child is more likely to develop an NCD, such as CVD or type 2 diabetes, as an adult (UNICEF 2019).

Malnutrition includes undernutrition as well as over-nutrition, both of which lead to more death and disease. Childhood obesity in LMICs is growing at an alarming rate. It is associated with type 2 diabetes, coronary artery disease, mental health conditions, and other NCDs (Gupta et al. 2012). One systematic review found that the median prevalence of hypertension related to childhood obesity was 13 percent in HICs, compared to 36 percent in LMICs (Obita and Alkhatib 2022). Thus, avoiding malnutrition is the foundation of the extensive menu of policy options to combat NCDs and support healthy longevity.

During the adolescent years, adolescent sexual and reproductive health rights (ASRHR) outcomes, including high adolescent birth rates, school dropouts, and exposure to violence, can influence subsequent life-cycle stages (WHO 2023a). This includes women, children (especially girls), and other vulnerable populations—for example, individuals living with disability and peri-urban populations facing adverse environmental exposures; it also includes involuntary internal and international migrants—facing even more challenges, compounded by extreme poverty. This also is the key period when women are able to make autonomous decisions. Finally, emerging areas of ASRHR include avoidance of smoking, and attention to obesity, menstrual health, human papillomavirus (HPV) vaccination, and mental health.

Given the importance of nutrition throughout childhood and adolescence, there is a valuable opportunity to scale up resources for children's health beyond the first few years, leveraging educational investments. In LMICs in 2010, investments in the

education of 5–19-year-olds amounted to around US\$210 billion each year. Investments in health for the same age group were less than 2 percent as high, at roughly US\$3 billion per year. Meanwhile, annual investments in the health of under-five-year-olds totaled about US\$29 billion (Bundy et al. 2018).

China has, for example, expanded health programs for 5–19-year-olds with school-based nutrition and mental health programs to complement additional efforts on education, such as early education, e-learning, and secondary vocational training. Youth programs in varied countries have employed peer-based methods to decrease smoking or binge-drinking initiation, and to increase vaccination of adolescents against HPV, which will avert nearly all cervical cancers (Gelband et al. 2016).

Background research for the HLI examined potential pathways through which NCDs and education jointly affect human capital accumulation, including analysis of survey data from India, Indonesia, Mexico, and the United Kingdom. The research found that NCDs in childhood, such as asthma and diabetes, are strongly associated with about 1.2–4.2 fewer years of completed education in India. NCDs in childhood lower subsequent adult height, which may be an indicator of future NCDs, reduced employment and hours worked, and other life outcomes, including mental wellbeing (Roder-DeWan et al. 2019).

Childhood health clearly influences vulnerability to NCDs later in life, but there is also a significant and growing burden of NCDs among children already. NCDs including cancers, diabetes, and asthma are responsible for roughly one-fourth of deaths between ages 10 to 24 years due to NCDs (Institute for Health Metrics and Evaluation 2019).

Overall, these findings underscore the urgent need to take NCDs in childhood and adolescence seriously, as they have a large, detrimental impact on human capital, which could worsen without action. For adults as well, poor nutrition affects health. It is associated with weak immune systems and with NCDs including heart disease, cancer, and osteoporosis (Kaur et al. 2019). Malnutrition in older people is particularly high in LMICs.

As the working years wear on, it is increasingly important to protect human capital and prevent it from eroding. This extends beyond direct income generation as older people influence the ability of loved ones to accumulate human capital themselves. Not only are older parents with NCDs less able to work, adult children who are responsible for

their care (very often at the same time as they care for their own children) also have less time and energy to devote to work. Healthy older people can also be an essential source of care for grandchildren or for those less healthy in the household, freeing up the working hours of the middle generation, particularly women.

2.3 Health and wellbeing benefits of a life-course approach to NCDs

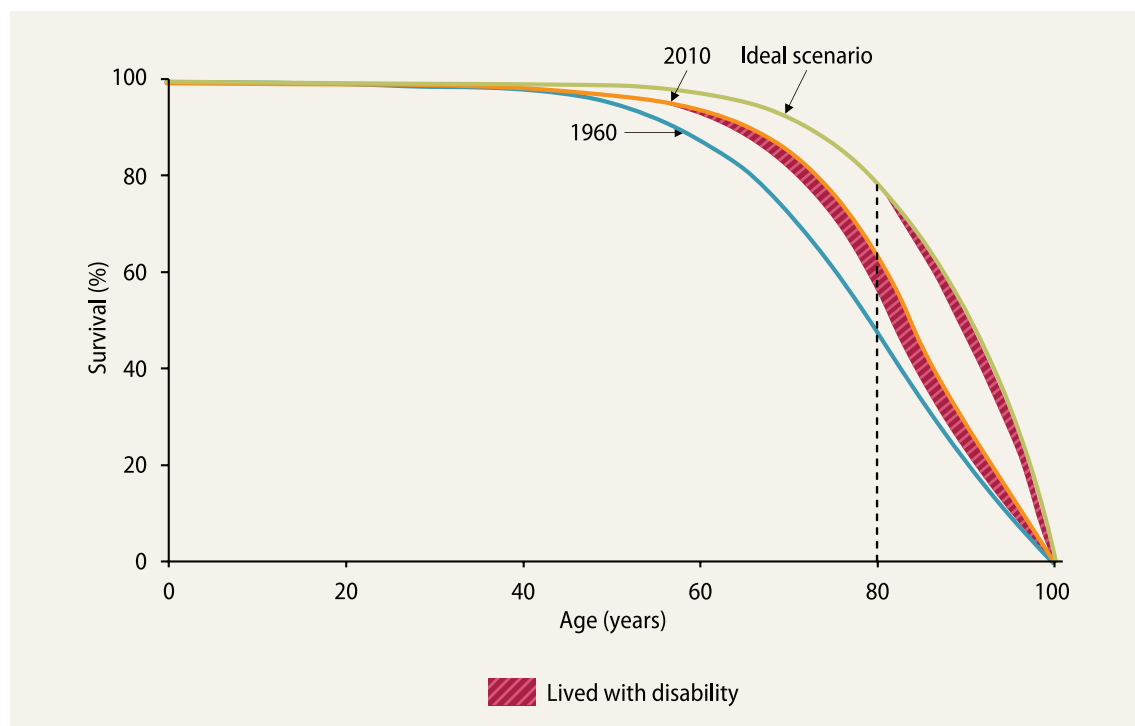
Extending health longevity: Addressing NCDs would both lengthen overall life and ensure that it is mostly lived in good health, with a reasonably short period of disability just prior to inevitable death in very old age. Evidence demonstrating that people can live longer in good health, with sickness compressed to just a short period before death, comes from all regions of the world. This framework is not fanciful. It is achievable, but only with sustained investments throughout the life course. Consider actual survival among British males in 1960 and 2010 versus a hypothetical ideal (Figure 2.3). The 1960–2010 survival rate increased substantially (a gain of about 10 years of life expectancy), driven mostly by reductions in smoking and widespread use of treatments for heart

disease and stroke (Jha et al. 2013). Of course, it is not only mortality but also periods of disability prior to death that matter, including at older ages. An ideal scenario is thus one of low death rates in young age and middle age, paired with sharply compressed time before death lived in any disability state.

The key is to recognize that the interventions that create longer and healthier lives require major investments primarily in youth and middle age. This is the concept of avoidance of serious risk factors prior to middle age (mostly not smoking, not being obese, minimizing consumption of sugar-sweetened beverages, using alcohol minimally if at all, and keeping up physical activity), plus effective secondary treatment for common conditions such as ischemic heart disease.

Life-course interventions are quite feasible, given the current state of knowledge. The Disease Control Priorities project has identified a range of cost-effective interventions from cradle to grave that provide governments with options to help them customize packages of essential, effective health services, delivered either directly or via private providers (Gelband et al. 2016). Chapter 3 of this report also looks in detail at NCD packages and priority interventions across different country groupings.

FIGURE 2.3 Survival among British males in 1960, 2010, and with hypothetical ideal, including years lived with disability



Source: Original calculations using data from Office for National Statistics (2023) and mortality data from UNPD (2022).
Note: No (hypothetical) levels of disability for 1960 are graphed.

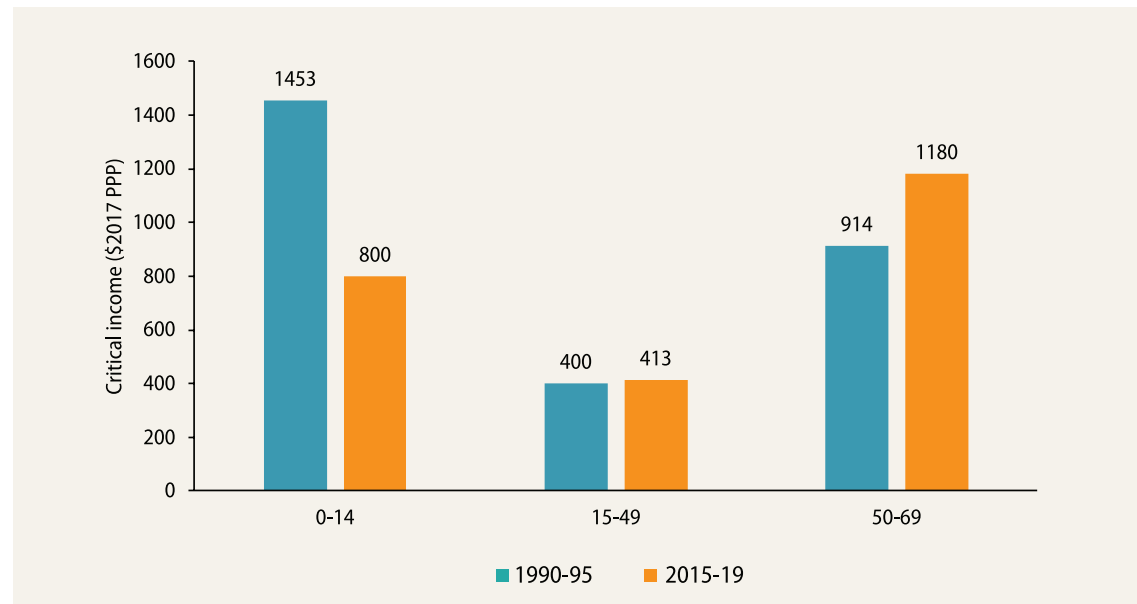
2.4 The role of innovation in the life-course

Chapters 3 and 4 examine the benefits and financing of life-course investments. A relevant question is whether innovations can make investments more affordable, as has happened with globally falling costs for computing, travel, and communication. Indeed, the innovation can be measured through a metric called “critical income,” which represents how much countries would need to spend per capita (adjusted for inflation) to be in the top 20 percent of countries in reducing mortality for given age groups (Hum et al. 2012). Analysis commissioned for this report finds that while it is substantially cheaper to save a newborn from dying before age 15 than it was in 1990, it is more expensive to save a 50-year-old from dying before the age of 70 (Wu et al. 2024). As Figure 2.4 illustrates, to keep up with the top 20 percent of peer countries in reducing mortality in children under 15, LMICs had to spend \$800 (2017 PPP) per

capita in 2019—just over half of the \$1453 needed in 1990. But to achieve similar performance for adults aged 50–69, they had to spend \$1180 in 2019, a quarter more than the US\$914 required in 1990. At the same time, the critical income for survival remained essentially stagnant for 15–49-year-olds, at the low level of \$400–413. Rising costs to save an adult life suggest that acting as early as possible when spending will bring more health per dollar.

Key reasons for the increased costs among people in their 50s and older are limited use of proven tools in most LMICs against tobacco control; insufficient spending on NCDs, which has impeded the economies of scale that can in turn reduce input costs; and insufficient investments in new NCD drugs and protocols (Jha et al. 2013). Each of these elements requires good governance and public-private cooperation to succeed. There is a need for more effective interventions through R&D GPGs to bend the cost curve downward, as has happened for children’s health and which Chapter 4 describes in greater detail.

FIGURE 2.4 Distribution of critical income values for LMICs in 2019, relative to reference 1990 global value



Source: Wu et al. (2024).

Note: LMICs = low- and middle-income countries.

2.5 Poverty and inequality impacts of NCDs

NCDs and risk of absolute poverty: NCDs also are a major cause of catastrophic health spending and loss of income to households, and so are a major driver of

poverty. Losing a breadwinner, whether due to death or disability from a chronic illness, can sink households into poverty. Costs can be immediate and obvious such as catastrophic health expenditure. Indirect costs can also be significant, in some cases preventing people from obtaining care. In India, travel costs can

amount to almost 40 percent of all out-of-pocket medical expenditure for people receiving kidney transplants. Overall, travel costs are the primary out-of-pocket expense for many Indian patients with NCDs (Ramachandran and Jha 2013). Indirect expenses like these further limit low-income people's ability to save and invest in human capital. In some cases, increased expenditures and lost wages can force the sale of some of the families' meager productive assets or the withdrawal of children from education, with significant negative effects on future incomes and health as well.

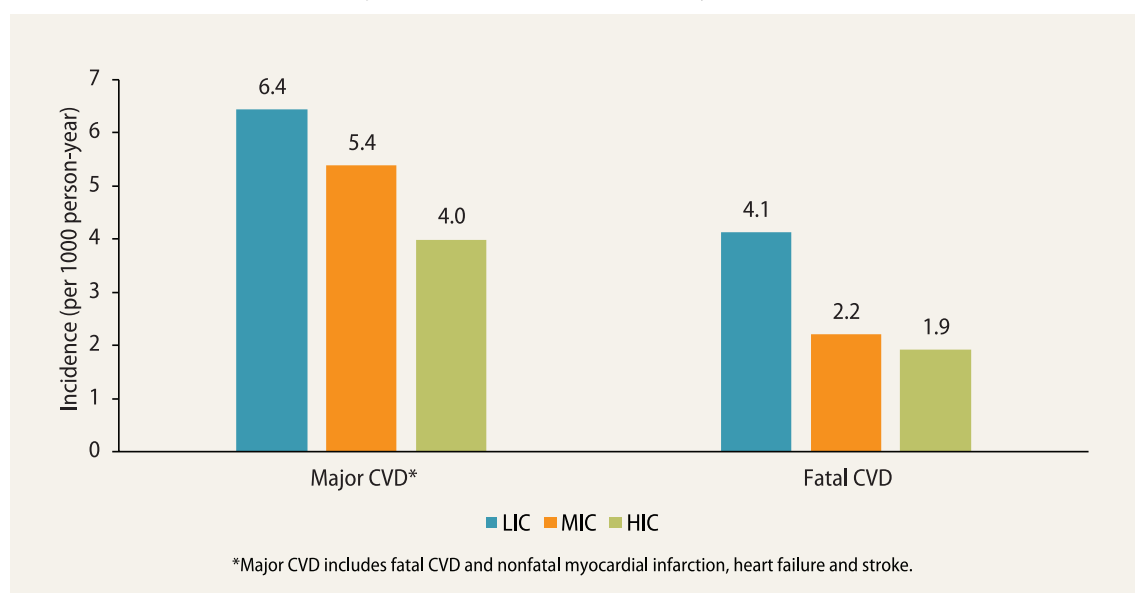
As Chapter 1 showed, there are already billions of adults living with major NCDs or modifiable risk factors, and even larger numbers of children who, on the current course, could face such risks. Thus, beyond mortality, there are even greater economic repercussions from NCD-related ill health, which diminishes labor force participation and productivity.

NCDs and inequality in labor markets: It is also clear that other NCDs and risk factors are connected to being worse-off in labor markets. A study showed that in LMICs, diabetes has a negative relationship with the employment chances of men (but did not find the same negative effect for women) (Pedron et al. 2019). Harmful alcohol use is associated with a lower likelihood of employment, and greater likelihood of taking time off work due to sickness, in studies from HICs. For instance, research from Finland, a country with high levels of education and life expectancy as well as per capita income, links binge-drinking to a substantial increase in working

days lost (Shiri et al. 2021). NCDs limit the skills people develop and their opportunities to exercise them. A background paper for this report examined over 100 studies and found that being overweight or obese was associated with lower rates of employment, lower income, higher rates of sickness absence, and higher rates of disability pensions. Adverse labor market outcomes were also observed among those suffering from depression, those with excessive alcohol use or smoking (Chakraborty et al. 2024).

NCDs and inequality between countries: NCDs affect people unequally. People in poorer countries are much more likely to die from certain NCDs than their counterparts living in wealthier countries. For instance, compared to an individual in a high-income country, an individual in a low- or middle-income country is about twice as likely each year to die from CVD (Figure 2.5) (Yusuf et al. 2014). Among the poorest billion people in the world (mostly in rural parts of Sub-Saharan Africa and South Asia), the mortality and disability burdens of NCDs often exceed those for infections. Moreover, between 19 and 50 million of those billion people incur catastrophic health expenses due to high direct out-of-pocket costs for treatment of NCDs and injuries (Bukhman et al. 2020). And the poorest billion acquire NCDs and sustain injuries at a younger age (partly because of the population age structure) and lose more years of life from these causes (partly because of limited access to health services)

FIGURE 2.5 Incidence rates of major CVDs in selected countries by income region



Source: Yusuf et al. (2014).

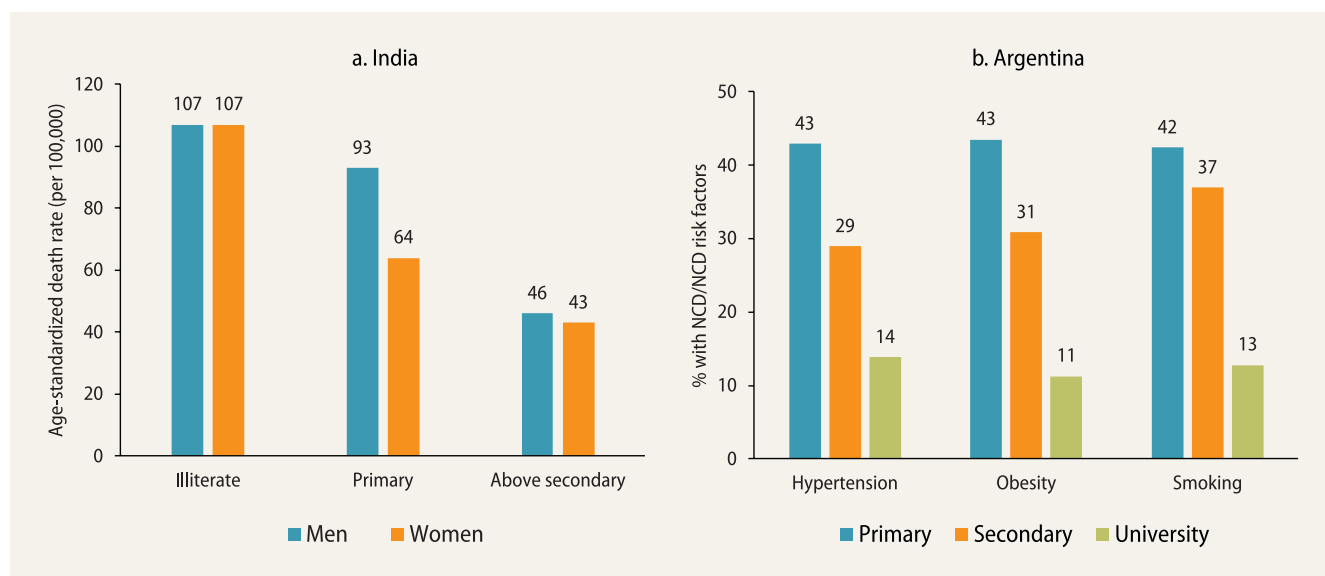
Note: CVD = cardiovascular disease; HIC = high-income country; LIC = low-income country; MIC = middle-income country.

NCDs and inequality within countries: There are also significant disparities within, as well as across, countries. In most countries, the poor or lower-educated have much higher risk of death from NCDs. In Mumbai, the survival from cardiovascular disease is much lower among the least-educated men for example (Pednekar et al. 2011). Across India from 2001 to 2003, cancer death rates among illiterate men and women were over double those of people with secondary or higher levels of education (Figure 2.6, left panel; Dikshit et al. 2012). In Argentina, lower education level is associated with a higher likelihood of having hypertension, obesity, and smoking (Figure 2.6, right panel; Tumas et al. 2022). People with low socioeconomic status are more likely to have to deal with cancers, cardiovascular diseases, and multiple NCDs. They are also less able to bear the costs and less likely to seek timely health care.

Tackling NCDs can reduce income inequality: Some NCD-related outcomes of inequality are re-

versible and can be achieved at affordable costs. High-quality health services expanded to the poor can significantly help to reduce unequal health outcomes. For example, a study of Indian men found that the risk of death following a heart attack was 60 percent higher among the lowest socioeconomic group. However, with access to treatments including clot-busting drugs and after adjusting for risk factors like higher levels of smoking, the social gradient difference in death rates nearly disappeared (Xavier et al. 2008). This still leaves, of course, the challenge of discouraging smoking and other higher-risk factors for the lowest socioeconomic group. There is a widespread belief that tobacco taxes hurt the welfare of the poor since they lose a greater share of their income when cigarettes are more expensive. Evidence suggests that this view, promoted by the tobacco industry, is not just misleading but wrong (Box 3.3) (Paraje et al. 2024).

FIGURE 2.6 Education levels and age-standardized death rates from cancers among adults aged 30–69 in India by sex, 2001–03 (left) and education levels and selected NCD and risk factors among Argentinian adults aged 18 years and older, 2013 (right)



Source: Dikshit et al. (2012); Tumas et al. (2022).

Note: NCD = Non-communicable disease.

2.6 Tackling NCDs is crucial for gender equality

Gender-specific aspects of NCD incidence: A major axis of inequality when it comes to NCDs is gender, which intersects with other dimensions of vulnera-

bility, including ethnicity, indigeneity, illiteracy, disability status, refugee or migration status, poverty, gender identity, and sexual orientation. The interactions between gender and NCD-related ill health are complex. Men smoke and drink more than women, and diabetes limits their work more for example

(Chakraborty et al. 2024). While men have higher mortality from CVD overall, men and women have roughly equal CVD death rates at older ages, and women tend to live longer with morbidity (Saadat et al. 2024; Breton et al. 2013; Rodgers et al. 2019).

Violence against women and girls is a risk factor for poor mental health, as well as a cause of great suffering. Women bear a considerably higher burden of depression globally, while men are more likely to die by suicide (Saadat et al. 2024). Gender also plays a role in mental health outcomes. Due to women's lived experiences across their lifecycle, especially in countries with greater gender inequality, women exhibit higher levels of depressive disorders compared to men. Women and girls are also more likely to experience gender-based violence—a major risk factor for mental health disorders. The prevalence of depressive disorders remains consistently higher for women as they age; and in some cases, such as Japan, there are three times more women than men with a depressive disorder. On the other hand, mortality from self-harm is consistently higher among men. Several epidemiological studies indicate that although women attempt suicide at similar or higher rates than men, deaths remain higher among men. Studies find that men are less likely than women to seek mental health services, especially in LMICs where there is still considerable stigma attached to mental illness, and men are more likely to use more violent methods of self-harm (Saadat et al. 2024).

There are sociocultural reasons and modifiable risk factors for men's greater mortality at every stage of life (Chang et al. 2024). However, women are disadvantaged by NCDs in several ways. Although women are more likely to live longer than men, they are less likely to be in paid work, particularly in MICs (de Silva and Santos 2024). Similarly, in lower-income countries, women's economic participation is more limited and often restricted to informal sectors. Due to women's limited participation in the formal markets along with sociocultural factors, women's limited financial capacity and lower (or missing) coverage under social protection programs acts as a barrier to receiving timely and adequate health care (Guerra et al. 2008; Thorpe et al. 2008; Stankuniene et al. 2015; Hossain et al. 2023).

Women's greater longevity also has specific clinical outcomes related to NCDs. It contributes to women being more affected by dementia and blindness, as well as living longer with major NCDs, even though it lowers their comparative mortality from NCDs in any given year.

Gender affects not only how people provide care, but also how they receive it. In a study of treatment for the five most prevalent chronic diseases in Bangladesh, 53 percent of employed men had used health care services in the past 30 days, compared to just 8 percent of employed women (Mahumud et al. 2023). The lower use among Bangladeshi women has to do with decision-making power, financial capacity, and knowledge—suggesting a complex interplay among human capital, health, and empowerment. In a number of LMICs, women can have limited health care access due to an interplay of factors such as transportation barriers, the cost of care, and the perceived quality of care (Saadat et al. 2024).

Neglect of gender aspects of NCDs: Overall, women's health in relation to NCDs has been relatively neglected and consequently less well understood. This includes women's specific clinical needs, but also their role in caring for people with NCDs, whether as professionals or as loved ones. Women and girls are disproportionately responsible for caring for people with serious NCDs, just as they bear the lion's share of unpaid care overall. Globally, women take on about 76 percent of all unpaid care work—increasing to over 90 percent in countries including Mali and Cambodia (Addati et al. 2018). For nearly half of women in MICs who are not in paid work, and over one-third of those in LICs, unpaid care duties are the main reason for being out of the labor market (O'Keefe and Haldane 2024).

The nature, intensity, and frequency of care in the household matter for women's employment outcomes, depending on the context. In Qingdao, China, caring for a parent-in-law, rather than a parent, is what has a detrimental effect on a woman's paid work (Liu et al. 2010). One study of how caring for older parents affects midlife work across Colombia, Indonesia, Poland, and Egypt, found that providing long-term care to older parents (many of whom had chronic illnesses) was associated with significant reductions in employment, hours worked, and annual earnings for both women and men. But the effect was more pronounced among women and among caregivers providing over 10 hours of care per week (Gatti et al. 2024). Such disparities lead to snowballing gaps in income, wealth accumulation, and old-age security between men and women. Girls caring for women are particularly likely to be taking on those unpaid duties, magnifying their domestic workload.

Cumulative impact of gender inequalities: All of this inequality compounds over time. In later life, this can perpetuate the vicious cycle of lower

income, shorter life expectancy, and poorer health, even as many older adults of limited means continue to work out of necessity. The lack of a cushion for older people, in countries with limited public pension systems, can compel them to work for as long as possible even in conditions of declining health and productivity. There are particular pressures on women, who tend to have lower coverage and levels

of pensions than men despite living longer on average (de Silva and Santos 2024), and who thus may be completely dependent on others.

Chapter 3 further describes formal and informal ways of reducing the impacts of gender inequalities within the framework of expanding high priority, cost-effective interventions to the whole population.

Advancing healthy longevity now: What countries can do

Countries can make major advances toward healthy longevity with well-chosen, cost-effective policies and life-course interventions if implemented quickly.

Previous chapters in this report showed that investing in the prevention and control of NCDs across the life course improves wellbeing, nurtures more gender-inclusive and resilient societies, boosts productivity, and reduces poverty, with benefits that extend across generations and sectors. A key message is the need to substantially accelerate NCD interventions, which have been underused, and to do so early, because delay in adopting interventions will be more costly in human and financial terms. If all countries could accelerate to keep up with those countries that have been most successful at reducing mortality, over 500 million lives could be extended meaningfully cumulatively by 2050, and 25 million lives could be saved in the year 2050. This will require ongoing investment in child and maternal health, infectious diseases, vaccine-preventable diseases and nutrition, plus NCD interventions. Such approaches are consistent with aspirations for universal health coverage (UHC).

This chapter defines and estimates costs for the incremental interventions to reduce NCDs to complement existing programs. The HLI intervention package should be considered a “starter” one, prioritizing only a small set of the most cost-effective interventions, with more NCD interventions that can be added as they become affordable, or as innovations (discussed further in Chapter 4) lower the cost of currently cost-ineffective interventions (for example, the new injectable drugs for obesity). Moreover, the HLI package assumes ongoing relevant investments such as the HPV vaccination against cervical cancer will continue to be supported by existing global initiatives.

The chapter describes policies countries can adopt and evidence-based interventions that they can adapt to achieve strong gains in politically relevant timeframes at acceptable cost. It highlights four lines of action: (i) enhanced spending on health at the population level; (ii) cost-effective interventions to prevent and control NCDs at the clinical and community levels; (iii) policies for financial protection of the poor and long-term care; and (iv) mea-

surement, monitoring, and data to improve performance of healthy longevity programs.

3.1 Tackle NCDs with cost-effective, pro-poor interventions

There is already a set of proven, cost-effective measures that countries can draw on and adapt within their NCD and broader health and social protection strategies to reduce NCD burdens and their human and economic costs (Watkins et al. 2024; WHO 2023d). And further investments in NCD R&D and GPGs can expand the list of cost-effective measures.

The actions recommended here include both population-based NCD prevention measures and personal health care measures. These interventions are essential for all countries to substantially accelerate their performance in reducing avoidable mortality by 2050 (Chang et al. 2024; Paraje and Gomes 2022).

Options for countries

The menu of proven, cost-effective NCD interventions presented in Table 3.1 builds on global evidence and analysis from the Disease Control Priorities Project and is aligned with WHO’s work on “best buys” (Watkins et al. 2017; WHO 2017b). It encompasses 31 recommended interventions. The majority are personal health services—most of which can be delivered through primary health care systems—while six are population-level prevention interventions delivered outside the health sector. Countries can draw on and adapt interventions from this menu, depending on their particular circumstances. Fiscal and regulatory approaches notably include raising taxes on products that damage people’s health especially tobacco and alcohol. Some fiscal measures yield very quick gains. For example, higher tobacco taxes reduced consumption in Mexico the following year (Tobacconomics 2022); and in France, they led to a quick decline in lung cancer rates among the youngest smokers (Jha 2009).

TABLE 3.1 Full list of recommended NCD interventions

Service delivery level	Specific intervention
Population-based, outside the health sector (risk factor reduction)	Alcohol excise taxes
	Alcohol regulations
	Smoking regulations and social and behavior change communication (SBCC)
	Sodium regulations and SBCC
	Tobacco excise taxes
	Trans fat bans
Community platform	Pulmonary rehabilitation
Health center	Aspirin for suspected acute coronary syndromes (ACS)
	Epilepsy acute and chronic treatment
	Heart failure chronic treatment
	Injecting drug use (IDU) harm reduction measures
	Alcohol use screening/brief intervention
	Bipolar disorder chronic treatment
	Cardiovascular disease primary prevention especially hypertension control
	Cardiovascular disease secondary prevention
	Chronic pulmonary disease treatment
	Depression chronic treatment
	Diabetes screening/treatment
	Schizophrenia chronic treatment
First-level hospital	Heart failure acute treatment
	Medical management of acute coronary syndromes
	Management of appendicitis
	Management of bowel obstruction
	Repair of gastrointestinal perforations
	Repair of hernias
	Screening and treatment of early-stage cervical cancer
	Treatment of acute exacerbations of chronic pulmonary disease
Referral and specialized hospital	Advanced care for severe acute-on-chronic pulmonary disease
	Percutaneous coronary intervention (PCI) for acute coronary syndromes
	Treatment of early-stage breast cancer
	Treatment of early-stage colorectal cancer

Source: Watkins et al. (2024).

Note: Italics indicates items in the high-priority package.

In terms of cost and the volume of care, the clinical interventions on the list represent a significant proportion of what health systems can do to manage NCDs. Some of the first-level hospital interventions which are not directly relevant to the management of NCDs are necessary for maintaining institutional technical capacity. Primary or secondary prevention of cardiovascular diseases, diabetes management, and mental health care together address the bulk of primary care for chronic disease

in most countries. Yet most countries are nowhere near full implementation of these interventions. For example, fewer than half of people with hypertension worldwide are receiving treatment. In LICs like Mozambique, the figure is closer to 15 percent (NCD Risk Factor Collaboration 2021).

Scaling up all of the interventions in Table 3.1 to cover even 80 percent of the population in all countries by 2030 would dramatically reduce NCD mortality and would be highly cost-effective. How-

ever, for many countries, this would involve unrealistic increases in health expenditure and institutional capacity. Realistically, most LMICs will need to choose a subset of interventions and sequence their order and the expansion of their coverage. Most countries will likely want to apply “progressive universalism”: moving toward universal coverage of a set of basic services and concentrating public financing initially on the poor and disadvantaged. For instance, Mexico’s *Seguro Popular* expanded public finance of treatment for childhood and breast cancers, and targeted the rollout to the poorest states first (Frenk et al. 2009). Chapter 4 contains details of financing strategies within and beyond the public health sector.

Leverage fiscal tools to save lives and boost revenues

All six of the population-level prevention measures in Table 3.1 are highly cost-effective, feasible, and relatively inexpensive to implement. Many of the most-cost effective policies, such as tobacco and alcohol policies, are feasible not only in countries with higher levels of resources, but also in countries with lower resources or in fragile countries that are recently emerging from war or conflicts (Watkins et al. 2024).

Especially important among these are “health taxes”—pro-health excise taxes levied on tobacco, alcohol, and sugar-sweetened beverages (SSBs). They are crucial because smoking, alcohol, and excessive consumption of sugar (as well as salt) are leading drivers of NCD epidemics worldwide. Taxes on such health-damaging products are powerful interventions that could avert hundreds of millions of early deaths (Global Tobacco Economics Consortium 2018), boost government revenues that can be used for health and other pro-poor programs, and slow the rise in NCD health expenditures (Box 3.1) (Paraje et al. 2024).

Three facts make the case for decision-makers to tax health-damaging products:

- **Health taxes raise economic efficiency.** Extensive evidence from numerous countries shows that excise taxes are the most cost-effective tool to decrease consumption of tobacco and alcohol and are cost-effective for decreasing consumption of SSBs. This is because affordability, which is growing in LMICs, is a primary factor affecting consumption of harmful substances. Taxes on tobacco, alcohol,

and SSBs particularly influence youth, because of their generally low discretionary incomes, so these policies can pave the way for better health and greater opportunity over more years (Paraje et al. 2024). Moreover, they free up the resources of health systems. For example, in Bangladesh, direct care for tobacco-related diseases alone soaks up 20 percent of all annual health spending (U.S. National Cancer Institute and WHO 2016).

- **Health taxes benefit poor people the most.** Some industry interests have promoted the myth that these taxes are regressive. In fact, numerous country studies on smoking and on alcohol consumption show that they are highly progressive once their health consequences are taken into account. It is true that the immediate tax burden is regressive. But because the poor are more responsive to price, they will more often quit or cut back sharply on smoking in response to large excise tax increases. This also frees up money for other household uses. More importantly, given much higher tobacco-related diseases among the poor, a large and growing number of country studies show that higher taxes are highly progressive in terms of health gains, making cigarette taxes progressive overall (Fuchs et al. 2019). Finally, catastrophic out-of-pocket health care costs attributable to smoking often lead to the impoverishment of low-income families—all the more so when a household breadwinner becomes incapacitated or dies prematurely. A large increase in excise taxes on tobacco could lift an estimated 20 million families from these poverty traps (Global Tobacco Economics Consortium 2018). Furthermore, many countries have used some of the increased tax revenues for pro-poor programs, which can include further health promotion.
- **Health taxes are underused.** Many countries tax tobacco and alcohol, and increasing numbers have targeted SSBs. But few go far enough. The opportunities are enormous, particularly in LMICs (Box 3.1) (Verguet et al. 2015; Lane 2022). Taxes on these toxic substances can bring about even more change when combined with non-price measures. For instance, public awareness campaigns about the benefits of quitting smoking increase public support for cigarette taxes (Paraje et al. 2024).

A growing number of countries at all income levels have adopted policies targeting NCD risk factors

(Araújo and Garcia 2024). Uruguay's aggressive tobacco control program—which includes tobacco taxes, bans on smoking in public places, and other measures recommended for global adoption by the WHO—is widely considered a model (Marquez et al. 2019). In Sub-Saharan Africa, NCD prevention has until very recently taken low priority relative to infectious diseases and the unfinished work on maternal

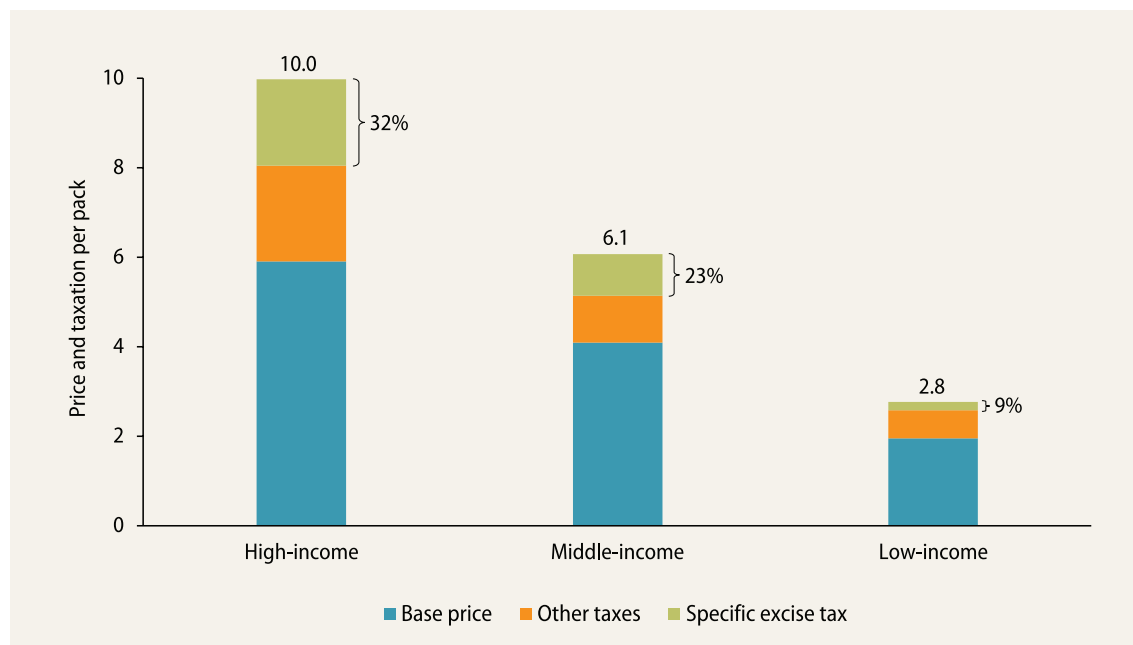
and child health (Araújo and Garcia 2024). However, some LICs, including Rwanda, have developed and scaled up national NCD prevention programs. Fiscal and regulatory tools can be complemented by behavioral and social change interventions (as suggested in Box 3.2), recognizing that individual behavior is embedded within structural forces that shape the context in which the behavior takes place.

BOX 3.1 Impacts of consumption and taxation of tobacco, alcohol, and SSBs

Globally, in 2012, the cost of tobacco use was estimated to be about US\$1.4 trillion, or about 1.8 percent of the global GDP in 2012 (Pan American Health Organization (PAHO) 2022). Of this, about 25 percent is direct health care expenditure, and the rest represents indirect costs attributable to premature mortality, productivity loss due to absenteeism and presenteeism, and opportunity costs such as those of caregivers. For alcohol use, pooled results from 29 locations found that the total cost of alcohol consumption is about US\$817 per adult (international dollars, purchasing power parity), or about 1.5 percent of GDP (Manthey et al. 2021). In addition to the health and economic costs, consumption of tobacco, alcohol, and SSBs is associated with reduced expenditures on food, education, clothing, and health care (Wu et al. 2021; Paraje and Gomes 2022).

Worldwide, smoking prevalence has declined since the 1990s (WHO 2020c), in response to a vigorous—but still not yet adequate—effort by countries to implement the tax and other specific provisions of WHO's landmark Framework Convention on Tobacco Control. However, for alcohol use, although the prevalence has decreased, per-capita volume of pure alcohol consumed has increased (WHO 2018; Manthey et al. 2019). Of the three products, SSB consumption saw the largest increase in consumption: from about 36 liters per person in 1997 to 43 in 2010 (Basu et al. 2013). This increase in global consumption, particularly of SSBs, is partly attributable to rising income in LMICs (WHO 2014).

Well-designed taxation policies around tobacco, alcohol, and SSBs can reduce their consumption as well as NCD-attributable mortality, morbidity, and health care costs, while generating additional tax revenue (WHO 2014, 2017b). Despite being ranked as one of the most cost-effective interventions to reduce NCDs in the WHO list of “best-buys” (WHO 2017b), excise taxes on these harmful products are under-used in LMICs. In high-income countries, excise taxes constitute more than half of the retail price of cigarettes, but they are well below 40 percent in LMICs (Figure 3.1) (Jha et al. 2015). And given faster growth in income, the affordability of cigarettes has increased. Large, one-off increases in tobacco excise taxes are particularly effective, leading to greater reductions than comparable smaller increases spread over time, in part due to signaling to smokers' expectations for future price increases (Irwin et al. 2018). In theory, excise taxes should be “stroke of the pen” interventions, but in practice, vested interests from the tobacco, alcohol, and SSB industries have impeded progress. For example, worldwide, the tobacco industry generates about US\$50 billion in profit, or approximately US\$10,000 per death caused by smoking. Tobacco-industry sponsored exploits, such as smuggling in Canada (Jha et al. 2020) are showcased around the world to deter finance ministers. Yet higher excises do not predict smuggling, but lax tax administration and corruption do (Jha and Chaloupka 1999). Coalitions of civil society and key NGOs that call out vested industry interference and ongoing evidence generation are key to sustained efforts to raise taxation.

FIGURE 3.1 Levels of excise and other taxes on cigarettes by country income group, 2020

Source: Original calculations using data from Office for National Statistics (2023) and mortality data from UNPD (2022).
 Note: No (hypothetical) levels of disability for 1960 are graphed.

BOX 3.2 Tools from behavioral science can strengthen NCD prevention and control

Behavioral science offers insights into better preventing, detecting, and managing NCDs, by spotlighting the barriers that limit people's ability to reach their own healthy longevity goals and by identifying feasible steps to overcome those barriers. For instance, people often believe that they are less likely than others to develop an NCD, even if they are at high risk. This influences the perceived value of screening for disease. Across cultures, medical professionals as well as patients may have biases that impede the best health outcomes. Behavioral interventions can increase the impact of traditional public health tools. Inexpensive behavioral interventions include reminders, nudges, and feedback that encourage people to stick to their medication regimens.

Financial incentives have been shown in some cases to increase medication adherence, physical activity, and avoidance of addictive substances. While the effects tend to be short-lived, for certain interventions even short-term changes can be helpful. One randomized controlled trial of Armenian 35–68 year olds tested whether several demand-side interventions would improve the rate of screenings for diabetes and hypertension. The highest impact was found among the group that received a pharmacy voucher; these participants' screening rates for both tests increased by 31 percentage points (compared to 4 percent of control group participants going for screening) (De Walque et al. 2022).

Choice architecture, which influences decision-making contexts, can help overcome present bias (i.e., the preference for a smaller reward now, like unhealthy food, over a larger reward later, such as sustained health). Another relevant concept is time inconsistency, or the tendency towards impatience when choosing between receiving benefits now and in the future, despite having patience when choosing between two points in the future to receive benefits (Rojas et al. 2023).

A related type of intervention is social and behavior change communication (SBCC), which involves context-specific communications to develop and maintain positive behaviors. In Accra, Ghana, the anti-smoking and girls' empowerment program, SKY Girls involved events and social and traditional media to discourage tobacco use. Key here were the kinds of social influence that behavioral science has highlighted in relation to NCD risk factors. A study of 2,625 girls aged 13 to 16 found that living and studying in Accra during the implementation of the program was associated with an 12 percentage point decrease in their perceived pressure to smoke (Hutchinson et al. 2020).

3.2 Clinical interventions will lower NCD burdens and improve lives

In addition to population-level prevention, personal health care interventions are critical to reduce the impact of NCDs on lives and economies. The framework for prioritization of NCD personal services in Figure 3.2 is based on four criteria for NCD clinical interventions: value for money, equity, financial risk protection, and implementation feasibility. The high-priority recommendations for serious consideration would include six clinical interventions (as well as the six population-level interventions outside the health sector and one at community level, discussed earlier). Health ministries might consider medium-priority interventions as budgets allow.

Strengthen NCD interventions at the primary health care level

Rolling out priority NCD interventions within PHC, targeting populations across their life course, can help advance overall and primary health reform agendas. It can also identify points where social care and health care can complement each other (Hou et al. 2023; WHO 2023c). NCD clinical services will yield the greatest impact within health systems centering comprehensive PHC. Such systems are best suited to support life-course health for several reasons. (i) They bring health care closest to people, especially the older adults who bear the largest share of NCDs and can prioritize prevention and health promotion attuned to community needs and values; (ii) they are an entry point for more specialized care related to NCDs when needed, among the types of institutions listed in Table 3.1; and (iii) as the entry point for other health care issues, they offer economies of scale (Hou et al. 2023).

This focus on integrating NCD prevention and management within PHC models calls for a change in focus from the disease to the person. For example, in a 2018 study from Colombia, of all the patients who sought out health care for at least one chronic disease, roughly half had comorbidities (Alfonso-Sierra et al. 2018). The presence of comorbidities tends to increase the risk of mortality from NCDs. A person-centered approach can identify and treat these illnesses more effectively, helping to reduce costs while improving service delivery.

Many of the recommended NCD clinical interventions are suitable for delivery in PHC settings

(Figure 3.2). Rapidly scaling up these interventions can also contribute to building capacities in countries' PHC systems (Hou et al. 2023; Araújo and Garcia 2024; Chen et al. 2022). Some countries have made strides in strengthening NCD service delivery within PHC (Araújo and Garcia 2024; Hou et al. 2023). Sri Lanka's Ministry of Health has established healthy lifestyle centers within PHC, in part for earlier detection of risk factors for chronic diseases. Other countries, including Peru, have undertaken ambitious health care reforms, building on the expansion of primary care toward UHC, while emphasizing the prevention and management of chronic conditions (Atun et al. 2015; WHO 2017c, 2017b). Evidence regarding the impacts of primary care approaches to managing NCDs in LMICs is limited but promising (Hou et al. 2023; Macinko et al. 2009; Macinko et al. 2016; Kruk et al. 2010).

Community-based PHC holds promise for NCDs

One way to keep down costs of primary health care is to enlist and empower communities, including community health workers. In Viet Nam, volunteers are trained by retired health care professionals to support self-help clubs for older people. These provide home care assistance, health checkups, and other services, including social and economic support. The clubs have at least 10,000 members and over 16,000 caregivers (Asia Health and Wellbeing Initiative 2020).

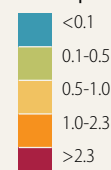
There is evidence that community-based PHC programs are effective for the prevention and control of chronic diseases. Good results have been reported for tobacco cessation programs, blood pressure control (Jeet et al. 2017), and diabetes management (Kaselitz et al. 2017). In Latin America, countries that have invested in building a strong primary care sector have seen increased use of preventive screening services for breast and cervical cancer, which are critical for women's health (Almeida et al. 2018).

Community-based PHC has delivered strong results for older adults, including in reducing socioeconomic and intergenerational health inequalities (Araújo and Garcia 2024), in some middle- and high-income countries (Hou et al. 2023). Overall, countries continue to develop and expand innovative community-based approaches to NCDs. In Bangladesh, the 13,000 community clinics in rural areas have recently incorporated chronic disease screening as part of their functions.

FIGURE 3.2 Prioritization of HLI-recommended NCD clinical interventions, by country income

	LIC	LMIC	UMIC
IDU harm reduction measures	\$57	\$71	\$310
Aspirin for suspected ACS	\$38	\$72	\$470
Treatment of early-stage breast cancer	\$24	\$110	\$670
Epilepsy acute and chronic treatment	\$100	\$180	\$570
Depression chronic treatment	\$250	\$230	\$540
Heart failure chronic treatment	\$100	\$120	\$820
CVD primary prevention	\$250	\$270	\$840
Pulmonary rehabilitation	\$100	\$250	\$2300
Medical management of ACS	\$520	\$710	\$1700
Management of appendicitis	\$350	\$680	\$2200
Heart failure acute treatment	\$330	\$440	\$2500
Asthma/COPD acute treatment	\$800	\$780	\$3300
CVD secondary prevention	\$640	\$930	\$3400
Cervical cancer screening and treatment	\$300	\$1300	\$3400
Treatment of early-stage colorectal cancer	\$520	\$1400	\$5600
Repair of gastrointestinal perforations	\$420	\$1600	\$8200
Alcohol use screening/brief intervention	\$2400	\$2500	\$6100
Repair of hernias	\$1700	\$4600	\$5800
Management of acute ventilatory failure	\$4400	\$2800	\$6100
Management of bowel obstruction	\$400	\$1800	\$13000
PCI for ACS	\$10000	\$5100	\$8800
Asthma/COPD chronic treatment	\$3500	\$4700	\$21000
Schizophrenia chronic treatment	\$1800	\$4800	\$24000
Bipolar disorder chronic treatment	\$5100	\$7600	\$30000
Diabetes screening and treatment	\$2900	\$8100	\$37000

ICER (as a proportion of GDP per capita)



Source: Adapted from Watkins et al. (2024).

Note: ACS = acute coronary syndromes; COPD = chronic obstructive pulmonary disease; CVD = cardiovascular disease; GDP = gross domestic product; ICER = incremental cost-effectiveness ratio; IDU = injecting drug use; LIC = low-income country; LMIC = lower-middle-income country; PCI = percutaneous coronary intervention; UMIC = upper-middle-income country; \$ = U.S. dollar (Watkins et al. 2017). Certain surgical services are included as expansion of surgical capacity at district levels will also help, eventually, NCD control (e.g., for surgical treatment of common cancers) (Gelband et al. 2016).

Address women's needs and expand their opportunities

Reducing NCD Gender Bias: Gender inequalities in NCD incidence, prevalence and mortality, access to care, and financial protection often co-exist with other dimensions of vulnerability. In poorer countries, multiple generations who share a home can also share caregiving responsibilities for young and old—although these responsibilities should not fall automatically to women, depriving them of employment opportunities and potentially exposing them to greater mental and other health risks. As numerous studies have shown, disadvantaged

groups are more likely to have NCDs, including severe cases, and to die from them. As well, being female tends to intersect with other vulnerabilities relevant to NCDs, including less education and fewer financial resources relative to men. Women and girls also may experience lower quality of care due to gender bias in the medical profession, such as women receiving fewer and later interventions for heart disease relative to men (Saadat et al. 2024). PHC-centered NCD programs can be tailored toward the specific needs of women and other underserved groups (Saadat et al. 2024; O'Keefe and Haldane 2024; Araújo and Garcia 2024). At the same time, there is a need for increased research to

better understand sex-specific differences in chronic disease symptoms such as heart disease and their progression, which, where clearly identified, need to be reflected in provider education and training. Encouraging more female participation in clinical trials is thus important. Addressing gender-based barriers also necessitates reducing gaps due to socio-economic and cultural norms that continue to play a role in delays in seeking and receiving care (Altuwaijri et al. 2024).

Some countries have taken promising steps on addressing gender-based gaps in health care, but progress has been mixed. In one district in rural Thailand, in recognition of women's geographical barriers to cervical cancer screenings, a free mobile screening program was implemented. It targeted women aged 25–60 who had never been screened. Within six years, the coverage of cervical cancer screenings rose from 20 to 70 percent of women in the district (NCD Alliance 2011). On the other hand, Sri Lanka's Well Woman Clinics were launched in 1996 to screen peri-menopausal women for breast and cervical cancers, as well as other chronic diseases. Despite progress, coverage levels had fallen short of goals, reaching only 50 percent of 35-year-old women as of 2019 due to a severe shortage of human resources, especially midwives, which remains a key obstacle (UNFPA and Sri Lanka Ministry of Health 2019).

Financial protection and health insurance geared to people with a history of employment risks neglecting women and people who have toiled without pay. One workaround would be to support the entire household with health insurance, not just a single breadwinner. For instance, Uruguay's health care reform of 2007 expanded insurance coverage to not only retirees, but also the children and spouses of the formally employed (Araújo and Garcia 2024). Similarly, social health insurance is family-based in countries such as Viet Nam and Albania.

In addition, interventions that reduce implicit bias, such as social and behavior change communication (Box 3.2) and provider training—along with bringing services closer to people through integrated PHC with community services and expanding universal health coverage—can help address some of the existing gender gaps. Policies and programs that recognize women's roles as caregivers and provide them with platforms for standardized training

or other support are important for improving the quality of care as well as enhancing the quality of life of care providers.

Finally, future migration patterns may be crucial to match the demand for long-term care with its available supply. *The World Development Report 2023* recommended that countries with future demographic profiles that could produce global health and LTC workers (comparable to the role the Philippines plays today) need to prepare for such transitions now (World Bank 2023e). Overall, close attention to the interaction of human development and gender across the life course will be crucial for developing effective and equitable policies for healthy longevity (de Silva and Santos 2024).

Priority NCD interventions: what impact by 2050?

Table 3.2 presents an analysis of a set of high-priority measures. Overall, fully implementing this package of interventions could avert, cumulatively, up to 150 million deaths (or 2.2 billion disability-adjusted life years, DALYs) by 2050, at an incremental cost of US\$1.3 trillion. This translates to US\$9,300 per death averted and US\$620 per DALY averted. The budgetary implications of the high-priority package would be more manageable. The final column in Table 3.2 shows the total cost (at 80 percent coverage) as a share of projected public spending on health in 2050. For the high-priority package, this share would range from a relatively affordable 6 percent in upper-middle income countries to a much more challenging 20 percent in LICs. The cost of the package is calculated based on the assumption that countries invest in the package constantly every year from 2023 to 2050. Given that programs take some years to reach its full operational capacity and the cost to save a life increases over time (even at a low of 0.9 percent per year based on HLI estimates), it is urgent that countries act now in prioritizing and adapting the interventions based on country needs and capacity, and implementing them, so that consequently with economies of scale, scaling up coverage for these interventions remains feasible. While the investments involved would be considerable, these high-priority interventions could substantially advance the healthy longevity agenda.

TABLE 3.2 Estimated cost and impact of locally tailored, high-priority NCD package, by country income

Country income group	Deaths averted through 2050 (millions)	DALYs averted through 2050 (millions)	Incremental cost through 2050 (US\$ billions)	Total cost in 2050 (US\$ billions)	Projected public spending on health in 2050 (US\$ billions)	Total cost per capita in 2050 (US\$)	Total cost vs. projected public spending on health in 2050
Low	9	180	51	6	28	5	20%
Lower-middle	82	1,300	470	57	720	13	8%
Upper-middle	55	650	830	160	2,500	61	6%
All LMICs	150	2,200	1,300	220	3,300	27	7%

Source: Watkins et al. (2024).

Note: DALYs = disability-adjusted life years; LMICs = low- and middle-income countries. Estimates are for a simulated linear scale-up to 80 percent coverage in all countries by the year 2050. Numbers may not add up due to rounding.

Of the total cost, based on an earlier analysis using similar methodology for urban India (Wu et al. 2020), about 80 percent would be invested in health centers and first-level hospitals, while investment in specialized and referral hospitals only account for about 3 percent of the total cost (Table 3.3). Importantly, the HLI investment would enable appropriately large increases in key human and

physical health infrastructure: over 6 million more nurses, 0.8 million more doctors, and 1.7 million additional health facilities (Table 3.4). This major increase in health infrastructure is commensurate with the larger population and needs for NCD prevention, treatment, and palliation, and would also support the relevant other goals of the health system including UHC.

TABLE 3.3 Estimated distribution of cost of NCD package, by level of health system

Health system level	Percentage of package cost (%)
Health centers	59
First-level hospitals	21
Referral and specialized hospitals	3
Community and population-based interventions	17

Source: Wu et al. (2020).

TABLE 3.4 Estimated increase in health care workers and facilities with HLI package

Healthcare workers and facilities density	Country income level	Current density	Increase in density with HLI package by 2050	Density in 2050 for full implementation of HLI package	Increase in number with HLI package (thousands)
Nurses and midwives (per 1,000 population)	Low	0.97	0.27	1.23	348
	Lower-middle	1.83	0.67	2.50	2848
	Upper-middle	3.87	1.05	4.92	2972
	All LMICs	2.62	0.74	3.35	6168
Physicians (per 1,000 population)	Low	0.36	0.04	0.40	56
	Lower-middle	0.79	0.09	0.88	394
	Upper-middle	2.14	0.14	2.28	394
	All LMICs	1.33	0.10	1.43	843
Health facilities (per 100,000 population)	Low	4.30	0.12	4.42	159
	Lower-middle	3.18	0.5	3.72	2320
	Upper-middle	3.39	0.10	3.49	296
	All LMICs	3.51	0.21	3.72	1764

Source: Watkins et al. (2024).

Note: HLI = Healthy Longevity Initiative; LMICs = low- and middle-income countries

Successful implementation of the intervention package could get LMICs about halfway toward the lowest achievable mortality (essentially, only unavoidable deaths (Chang et al. 2024)) by 2050. The package is not sufficient to meet the aspiration outlined in Chapter 1, of countries accelerating progress in reducing mortality in every age group to match the performance of the top 20 percent of countries. This would require the following progress from the mean achieved from 2000 to 2019 for each age group. At ages 50–69 years, the annual declines in mortality would need to approximately double from -1.5 percent (the mean observed from 2000–2019) to -3.4 percent (observed among the top fifth of countries over the same time period). The comparable accelerations needed at other ages are at ages 0–14: mean -2.7 percent to -7.1 percent in the top fifth; ages 15–49: mean -2.0 percent to -5.9 percent; and ages 70–84, mean -1.2 percent to -2.6 percent. While ambitious, these accelerations are possible, especially for the younger age groups. Moreover, they have occurred in the past when commitment has been paired with financing and efforts to create better, faster, cheaper tools. And as Chapter 4 outlines, asking countries to keep up with the best performers is politically salient.

3.3 Leverage social protection, jobs, and long-term care for productive longer lives with dignity

As countries tackle NCDs and people live longer in good health, policies for social protection, jobs, and long-term care will be critical to seize the related opportunities. This report proposes operational recommendations for governments in the following areas: (i) labor market strategies to facilitate longer and more productive working lives; (ii) pensions to protect poor and vulnerable older adults, particularly in the informal sector; and (iii) expanded LTC options for older adults in LMICs. As with health services, strategies must be designed to address women's distinctive challenges and needs.

Harness labor market policies for productive longer lives

Priorities and strategies for productive longevity will differ depending on the formalization of a country's labor market—the extent to which employment is

subject to regulations, social security benefits, and taxation. While informal and casual work is often marked by insecurity, it can also provide useful flexibility, particularly to women and grandparents, to balance paid work with unpaid care. A study of Egypt, Poland, Colombia, and Indonesia found that informal care provision to older parents was associated with significantly reduced labor supply, except among those in the informal sector (Gatti et al. 2024). Allowing formally employed workers more freedom to set their work schedules could help to retain more workers.

But the most direct way to reap economic dividends from healthier longevity, in countries with primarily formal jobs, is to extend the working lives of mature workers who want to continue earning. The benefits for economies could be large. It is important to counter the mistaken perception that older workers who extend their careers take jobs away from the young. This “lump of labor fallacy” assumes that only a finite number of jobs exist, so that one person's employment reduces others' chances of obtaining their own. On the contrary, evidence from nearly all high-income countries suggests that when older adults choose to work longer, overall economic activity expands and younger workers also tend to enjoy higher employment rates (Böheim and Nice 2019).

For instance, US analysis from 1977 to 2011 shows that increased employment of 55 to 64 year olds was associated with increased employment of both 20 to 24 year olds and 25 to 54 year olds, and even higher income for the middle group (Munnell and Walters 2019), with similar findings in China (Munnell and Wu 2013; Zhang 2012). Just as women's increasing take-up of paid work has not necessarily detracted from men's employment, older workers are not perfect substitutes for younger counterparts. They can and often do play complementary roles, as the labor market is not zero-sum (de Silva and Santos 2024). In addition, growth in the labor force is declining in many LMICs, and in some the total size of the working age population is declining, including in China and Thailand, where it has been declining for a decade or more. This complementarity of older and younger workers will be higher where countries follow economic policies that favor inclusive growth.

The current research points to a range of policy options that hold promise, though much of the

available evidence still stems from high-income countries (de Silva and Santos 2024). This analysis foregrounds: (i) supply-side measures that can lower barriers and incentivize healthy older workers to continue working; and (ii) demand-side measures that can make it easier and more profitable for employers to retain or hire them.

Supply-side approaches include the following:

- **Make retirement rules more flexible.** Relaxing partial retirement rules is commonly proposed to retain older workers. Studies show that flexible working arrangements giving workers choice and control are linked to better health and well-being. Workers favor arrangements that would allow them to adjust the timing and speed of labor market exit according to their preferences, achieving a glide into retirement rather than a cliff (Henkens et al. 2021; Munnell and Walters 2019; OECD 2017). However, some evidence suggests that labor regulations can inadvertently dampen the hiring of older workers or be used as an alternative pathway for retrenchment or early retirement. This points to the importance of considering overall policy impacts (Busch et al. 2021).
- **Reconfigure social insurance.** Reforms to social insurance that gradually raise retirement ages and reduce work disincentives can contribute to extended working lives for formal-sector workers. In OECD countries, raising the age to qualify for full retirement benefits has resulted in higher employment rates among older workers. In Austria, this led to an increase in employment of nearly 10 percentage points for the affected group (Riphahn and Schrader 2021; Staubli and Zweimüller 2013). However, reforms to existing social insurance and pension systems can be controversial.
- **Foster lifelong learning.** Countries use various instruments to increase individual access to, and incentives for, lifelong learning. With individual learning schemes, people choose their own options for skills development. Voucher-based systems can help stimulate training, especially for workers in non-traditional or less stable forms of employment. These have had mixed success, however, especially for hard-to-serve groups like

low-skilled workers. Singapore is a leading example which publicly funds individual training accounts during working life under its Skills Future program. Experience shows the importance of simple design, adequate and predictable funding, effective information and guidance, and support for high-quality training (OECD 2019b).

- **Strengthen family support services.** Where affordable, subsidizing childcare or other forms of care for family members can increase labor market participation and earnings. Affordable childcare or long-term care for sick and elderly people can partly relieve older workers (and women) from informal care duties. In Rio de Janeiro, a lottery was used to allocate access to daycare centers for children aged 3 and below. Access was associated with sustainable increases in household income, due to grandparents' higher earnings, along with greater hours worked and social security contributions (Attanasio et al. 2017).

Demand-side measures include the following:

- **Encourage pay based on performance, not seniority.** Regulatory reform, information, and incentives can help reduce gaps between mature workers' earnings and productivity. While this can face strong resistance from those already in a seniority-based wage system, it sharply reduces the economic pressure to push out older, higher-paid workers. Public-sector reform can lead the way in softening seniority wage practices, moving toward performance-based pay. As part of a broader effort to foster the hiring of mature workers, Singapore introduced grants to firms that incorporated worker performance into their wage and personnel systems (OECD 2019c).
- **Modulate employment protections to balance flexibility and security.** Governments can reform social contributions and employment protection laws to lower costs while maintaining adequate social protection. This can include reforming systems for severance pay and entitlements that increase automatically with tenure. Workers should also be better protected from employment shocks, such as through stronger unemployment benefits, which remain underdeveloped in many LMICs (International La-

bour Organization (ILO) 2021b). Reduction in social contributions (as is done for example for older workers in Malaysia and Singapore) would preferably be paired with increased financing of social protection through general taxation rather than payroll taxes, which reduce incentives for employment (Packard et al. 2019).

- **Adapt how work is done.** Investments in organizational change or infrastructure can also have productivity payoffs. Assistive technology, mixed-age teams, and other adjustments can help workers stay healthy and engaged. A much-cited example is the auto manufacturer BMW's plant in Germany. There, a small investment in ergonomics and workstation rotation resulted in a 7 percent productivity increase, exceeded quality targets, and reduced absenteeism on a production line largely staffed by older workers (European Bank for Reconstruction and Development 2020; de Silva and Santos 2024).

Financial protection for inclusive healthy longevity

A key element of promoting healthy longevity is ensuring affordable health services and ensuring financial protection for the population. This is particularly the case for poorer countries and populations, and as people age and face higher health care needs. In LICs, 44 percent of health spending is out of pocket, compared to 21 percent in high-income countries (NCD Alliance and The George Institute for Global Health 2023). Disparities also exist within countries, as poor households with older family members spend a larger share of their income on out-of-pocket health expenditures (Kočíš Krutílová et al. 2021), or delay or forego care (Hossen and Westhues 2010; Lena et al. 2009). In this context, there is an important role for health insurance, pensions, and social assistance systems in providing financial protection to meet health care

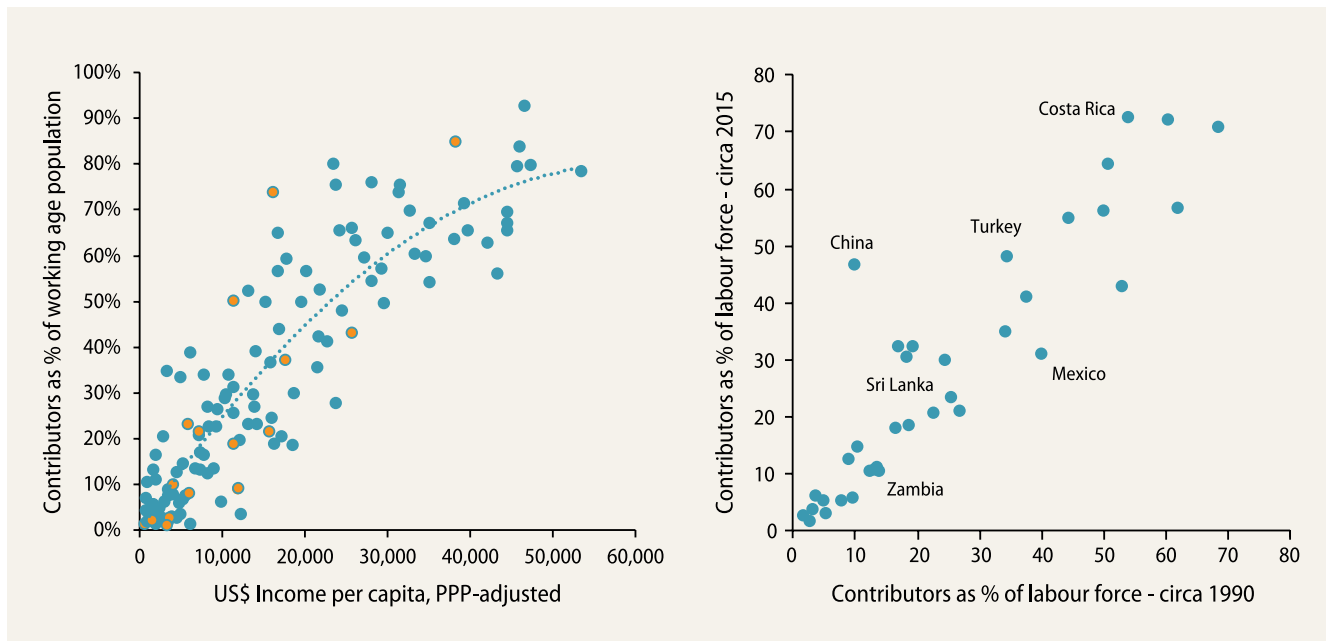
costs. For workers in the formal sector, disability, sickness, and work injury insurance can also play useful complementary roles.

For countries that rely on social health insurance (SHI), an inherent risk is under-coverage of those outside the formal labor force—disproportionately poorer people, women, and those beyond working age. A number of countries (e.g., Viet Nam, Indonesia, and China) are addressing this challenge through full or partial subsidization of SHI premiums for poor households, older populations, and other vulnerable groups. Nonetheless, even where people are covered by SHI or entitled to health services under general revenue-financed systems, financial protection is often shallow due to limited service packages, co-payment requirements, and/or informal payments.

With respect to pensions, in richer countries, contributory pension systems have played a crucial role in providing financial protection for health care needs, with high pension coverage of older populations and in most cases adequate benefits. However, in LMICs, the situation is very different. First, there is often only very partial coverage of contributory pension schemes among the working age population, reflecting high levels of labor market informality (Figure 3.3 left panel). Second, the rate of increase in coverage has, in most countries, been modest in recent decades and lags the pace of population aging (Figure 3.3 right panel). Under-coverage has largely continued to mirror the (often high) share of informal workers.

An additional point is that contributory pension coverage in developing countries is typically regressive, with much higher coverage among those with higher incomes (almost all in the formal sector), higher education, and longer life expectancies. There is also gender bias, both through lower coverage of women and lower adequacy of pensions where they are covered due to gender wage gaps and interruptions of contributions across working life due to child rearing and other domestic duties.

FIGURE 3.3 Coverage of contributory pension systems strongly depends on income level (left) and coverage levels in LMICs have changed little over 15 years (right)



Source: Palacios (2024).

Note: LMICs = low- and middle-income countries; PPP = purchasing power parity. Left panel is for 2018.

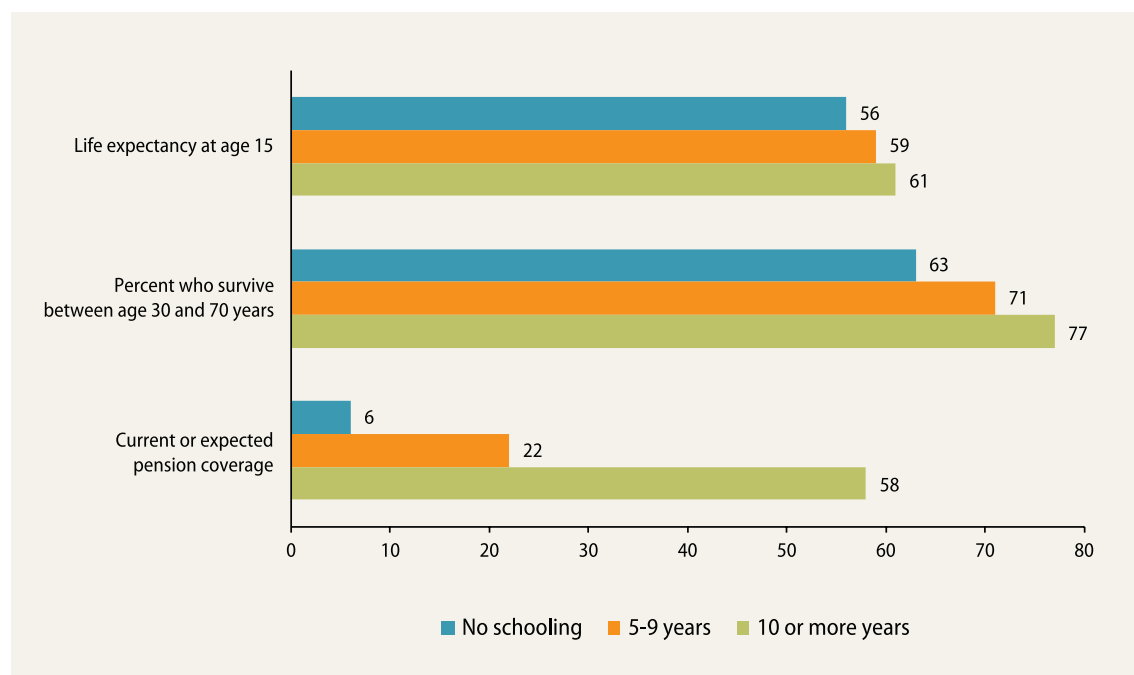
In India, the lowest education group has the lowest life expectancy at age 15, due to higher death rates from NCDs during ages 30–69 years (Figure 3.4). These lowest education groups also face poor financial protection, with only 6 percent of those with no education likely to have a pension. This pattern of higher contributory pension coverage among the better-off and often minimal coverage among lower-income groups is an almost universal phenomenon in developing countries (Demarco et al. 2024).

In response to persistent under-coverage of contributory pension schemes, countries have diversified their instruments for improving financial protection at older ages, often in combination. This includes the following:

- Incentivizing voluntary old age savings from informal workers through publicly financed matching of contributions: so-called matching defined contribution schemes (with matches of between 10 and 100 percent). However, coverage expansion through this route has typically been limited, though in a few notable cases it has been significant (e.g., China, Rwanda, and Korea). Liquidity

constraints, myopia, and high discount rates of informal workers, plus the administrative challenges of collecting from them, are likely drivers of low participation in such schemes (Hinz et al. 2013).

- Introducing non-contributory social pensions designed to ensure that those without contributory pensions receive minimum financial support at older ages (a similar financial protection effect can be achieved through general social assistance programs with broad coverage among older people) (Demarco et al. 2024). Over 80 developing countries have introduced social pensions for older people, with qualification ages typically between 60 and 65 years old but as high as 90 (Demarco et al. 2024; Schwarz and Pallares-Miralles 2024). There is, however, major variation across countries in the coverage of older people in these programs, ranging from universal coverage for older populations (e.g., Bolivia, Botswana, Timor-Leste, and Georgia), to wide but non-universal coverage (e.g., Philippines, Thailand, and Bangladesh), to tightly means-tested coverage (e.g., Malaysia and Egypt).

FIGURE 3.4 Survival rates and pension coverage, by education in India

Source: Original calculations for this publication, based on data from IIPS and ICF (2021) and IIPS et al. (2020).

- There is also major variation across countries in the *adequacy* of benefits, with benefits as low as 1 percent of per capita GDP in India, but as high as 38 percent in Maldives. In many countries, social pension benefit levels (or general social assistance benefits that older people may access) are currently insufficient to provide significant financial protection for health care needs.
- However, even relatively modest social pension benefits may make some difference to the health and wellbeing of older people. For example, in China, modest benefits from the informal sector pension scheme led to improvements in self-reported health, mobility, and self-care of beneficiaries, and women benefited more than men (Nikolov and Adelman 2018). Reductions in consumption of junk food were also observed (Purun et al. 2023). Social pensions can also have positive spillovers on other family members, including improvements in child health and education in Kenya, Brazil, South Africa, and Uganda (Ardington et al. 2009; Moscona and Seck 2021; Kudrna et al. 2022; Kudrna et al. 2024). Striking the right balance between coverage and generosity of social pensions, while also taking account of fiscal con-

straints, is an important agenda as countries seek to strengthen financial protection against health and other shocks as people age. Taking health care costs into account when calibrating the appropriate level of social pension benefits will be important—an approach already used in social assistance programs that provide top-ups for people with disabilities and in countries like Thailand that gradually raise social pension benefits with age.

Another novel approach to improving financial protection against health shocks at older ages is consumption-based pensions, where people micro-save as they consume at points of sale using digital payments and related platforms. This approach is being tried in Mexico, China, and Spain, for example (Hernández et al. 2017). The approach has appeal as digital payments grow but to date is not widespread and will need assessment of take-up, savings levels, effect on gender gaps, etc.

Achieving adequate financial protection against health care costs remains an incomplete but vital agenda. Ensuring wide, adequate and equitable coverage of SHI or general-revenues financed health services is a priority, and budgetary subsidies will be vital to ensure inclusion of poor and vulner-

able people. For pensions, while expansion of pensions to informal workers and poorer populations is a dynamic area of policy development, there remain large “missing middles” in most developing countries between those covered by contributory schemes and those who receive targeted social pensions for older people or social assistance. The most effective mix of pension and savings instruments to close the coverage gap, provide adequate financial protection, and ensure fiscal sustainability will vary according to the degree of labor market formality, inherited social protection systems, and other factors. For countries with large informal sectors, realistically, social pensions will remain the most viable tool to expand coverage in the short term, and fiscal space will be a key consideration. But this is unlikely to ensure adequate financial protection in fiscally constrained environments. Ensuring adequacy over the longer run would also require creative promotion of old-age savings using a mixture of financial incentives, behavioral nudges, and delivery system improvements to encourage saving by informal sector workers. Layering of different instruments and continued innovation will be needed for health financing and social protection systems to play an enhanced role in providing poor and vulnerable populations with adequate financial protection for their health care needs as they age.

Expand and diversify long-term care options for older adults who need care

Even with gains in healthy longevity, many older adults will ultimately face limitations in their functional abilities, necessitating some form of LTC. Around the world, cultural (and sometimes legal) norms often valorize family care, largely by women, as the main way to care for older people. But changing family structures, migration, and women’s increasing take-up of paid work mean that more and more, traditional models of informal care in extended families cannot be the only options.

Yet the formal care systems that would complement traditional models are highly limited and fragmented in nearly all LMICs (Glinskaya et al. 2024). This can impede women’s entry into labor markets or compel them to drop out of work; or it can require them to shoulder massive loads if they juggle paid work and care. In a vicious cycle of poor health, this overload can compromise their health and wellbeing.

Expanding LTC options in LMICs does not

mean replacing informal care, which is both irreplaceable and culturally appropriate in many contexts. But adding to the portfolio of options is important for three main reasons. (i) Decent, affordable LTC is critical to the wellbeing and dignity of many older adults, and informal care cannot scale up to meet the full need. (ii) Enlarging the range of LTC options will free up many informal caregivers, mostly women, to pursue paid employment, community service, or other forms of skill development, improving their wellbeing and human capital. (iii) Building up professionalized LTC systems in the many LMICs where they are non-existent or weak will mean growing an important industry for the emerging “silver economy”—one with the capacity to provide large numbers of additional jobs, especially for women.

Research has identified four key policy directions for LMICs seeking to promote a range of context-appropriate, affordable, and compassionate LTC solutions:

- **Move to a balanced mix of care offerings.** A mixed care system would work best in most LMICs (Glinskaya et al. 2024), helping to balance needs, dignity, and costs. Day care centers, home and community services, and tele-assistance could all form part of the mix. Sources of care are similarly varied, including faith-based organizations, skilled volunteers, neighbors, and older adults themselves. Nonprofit organizations play an especially important role in LMICs (Govindaraj and Gopalan 2024). Crucially, enhancing people’s ability to age in their own homes will benefit their mental and physical health, and a range of creative and context-appropriate services have been developed in the movement away from institutionalization (Araújo and Garcia 2024). In an example of formal support for informal care, Myanmar lends money for home adaptations, encouraging the construction of accessory dwelling units for older relatives (Williamson 2015).
- **Engage the private sector and strengthen government stewardship.** The private sector will have a key role in building LTC provision in most LMICs. Most countries have opted to contract out LTC services to private nonprofit or for-profit organizations. In China, where private residential care facilities have mushroomed in the past 20 years, the government has actively encouraged the private sector through construction subsi-

dies, tax breaks, and other policies (Feng et al. 2020; Feng et al. 2012). Globally, it is essential to strengthen government stewardship and regulatory capacity to set ground rules and ensure service quality. One worrying trend, as seen with some US nursing homes, is privatization and speculation for profiteering in ways that increase costs, shrink access, erode quality, and impose a greater oversight burden on families rather than governments (Glinskaya et al. 2024). In LMICs, regulatory oversight is often lacking and of low priority. Recent work has clarified strategies for LMICs to progressively build LTC regulatory capacity (Hou et al. 2023).

- **Systematize LTC financing.** The lack of organized LTC financing often dissuades firms from entering LMIC markets (Glinskaya et al. 2024). This leads to access gaps, inequalities, and high out-of-pocket payments (Scheil-Adlung 2015). Countries need a systematic approach to financing, ideally working gradually toward a broad-based social insurance model (Glinskaya et al. 2024). It would make sense for public funds to first finance a safety net for disadvantaged older people (Glinskaya et al. 2024), then gradually extend any additional resources to other older adults needing daily assistance. On the supply side, public financing for a LTC system often involves supporting providers through subsidies. Many countries face great challenges in containing public expenditures because they initially funded institutional care. On the demand side, subsidies or vouchers to individuals are effective instruments for increasing the purchasing capacity of the poor and those with greater needs, including women. They are also compatible with promoting aging in place, for example, if vouchers can be redeemed for home- and community-based care (Glinskaya et al. 2024).
- **Build the LTC workforce and support family caregivers.** Skilled human resources are a bottleneck for LTC services in many countries (Glinskaya et al. 2024; Araújo and Garcia 2024), and LTC jobs struggle to attract qualified workers. Women are more likely to work in the care sector, and thus are more exposed to its hallmarks: low wages, work overload, poor career prospects, and stress (Araújo and Garcia 2024). Training to increase the capacity of informal and community caregivers should be a priority

(WHO 2020a). Support can also include in-kind services, such as respite care, leave from work, and counseling. There is debate about whether to compensate women for the typically unpaid care they provide to family members. Doing so provides financial relief and helps to formalize women's often-unrecognized work, but also is costly and runs the risk of entrenching unequal gender norms (Araújo and Garcia 2024).

3.4 Leverage the power of data for healthy longevity

Strengthening country measurement, monitoring and evaluation, and data capacities will be important to track the impact of life-course health investments and continuously improve healthy longevity outcomes. In many settings where monitoring capacities and statistical systems are in early stages, this effort will include expanding vital registration and cause-of-death data through a civil registration and vital statistics system and ensuring that such data are openly available in order to encourage accountability (WHO 2021e). There should be particular attention to gathering data about women, who are often not counted officially, especially in LICs or where more rigid gender norms persist; these gendered measurement gaps can affect policy-making, targeting, and health outcomes.

It is urgent to strengthen countries' surveillance and measurement capacities around NCDs and healthy longevity. A recent study from India found that 11 percent of the sample had diabetes; it then extrapolated from this to estimate that a staggering 101 million people in India have diabetes. This is significantly higher than previous figures, pointing to the need for improved monitoring of NCDs (Anjana et al. 2023)

Recent research and policy dialogue suggest broad agreement among experts on basic principles for NCD measurement in countries. Epidemiological studies of major NCDs that provide local quantification of existing and new risk factors, along with levels and predictors of death and disability, are needed in many countries. NCD data systems should be owned and led by countries, and there should be less reliance on estimates based on modeling rather than actual data. An important goal is to nurture NCD measurement systems that are fully integrated with national statistical systems (Alleyne et al. 2024). These same principles apply to monitoring and evaluation systems, which similarly rely on good data.

As part of this scientific innovation, open data should become standard for twenty-first-century development. Country statistical systems and global development cooperation should adopt open data as the default option for analysis and evaluation. The World Bank and partners in the UN Statistical Division, WHO, and other agencies could play a critical role in helping countries improve the systems and effectiveness of collection and sharing of essential data, while also ensuring privacy.

To realize the aspirations of countries accelerating performance in reducing premature mortality to the top fifth of countries, scaling up core measurement of healthy longevity performance and related interventions is essential. This requires a balance between internationally comparable indicators to maximize learning and country-specific measurement to meet local knowledge needs.

Data tools tailored to country conditions: healthy longevity dashboards

As an important part of strengthening measurement capacity and using it effectively, countries should assemble relevant and actionable data on healthy longevity in a flexible, user-friendly interface, which provides policy-makers, planners, managers, and the public with key information on life-course health and human capital (Haldane et al. 2024). For doing so, performance dashboards are a promising instrument already widely used in the private sector. Dashboards are data visualization tools that organize indicators in a single interface, allowing users to track performance across dimensions that they select. In the health field, institutions are increasingly aggregating indicators through dashboards to monitor progress toward health goals in near-real time. Such dashboards typically leverage vital statistics, demographic and census data, and data on program management outcomes across a range of diseases. Dashboards have also been used to inform health and wellbeing projects centered around older people (WHO 2021a).

As part of the HLI, World Bank teams have worked with national counterparts in three pilot countries to design and test a methodological framework for country-specific healthy longevity dashboards based on a life-course approach. The goal is

to support country stakeholders in a wide range of settings in producing, using, and institutionalizing their own healthy longevity dashboards, adapted to their unique epidemiological contexts and data infrastructure (Haldane et al. 2024; Wu and Jha 2023).

The three pilot countries are Colombia, India, and Sierra Leone (with examples for India and Sierra Leone in Box 3.3 and Figure 3.4). These countries present a wide diversity in income, epidemiology, demographics, health systems, and statistical institutional capacity.

Building and making effective use of dashboards requires use of available relevant capacity. This entails dedicated budgets and institutional arrangements, including strong local ownership and commitment, to maintain them and integrate them into program management and public information. Keeping them as simple as possible can help to ensure their continued use.

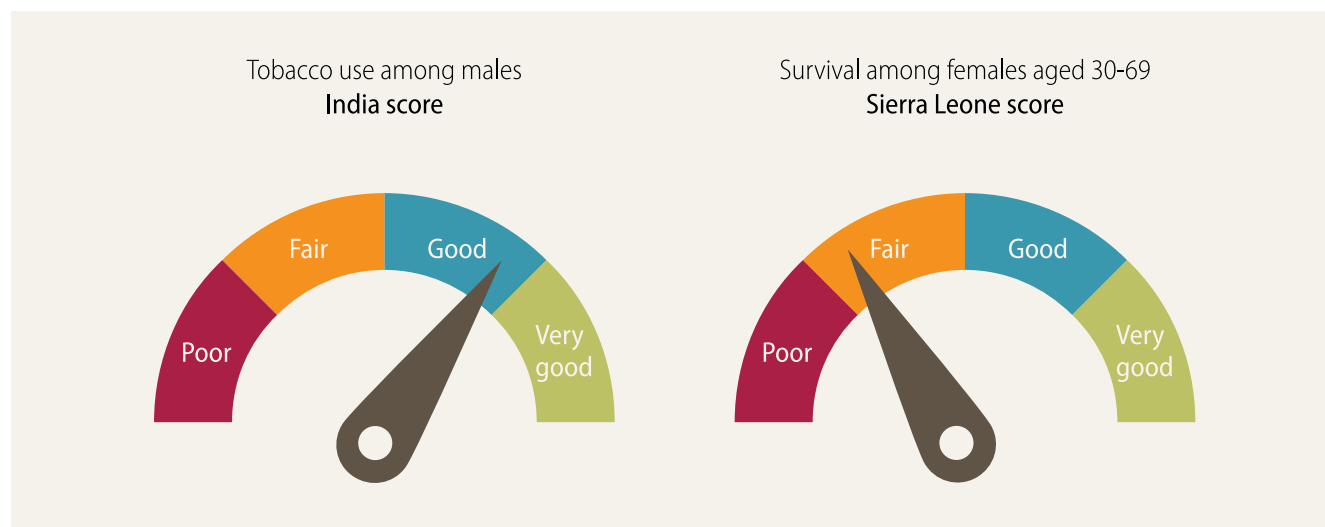
At the same time, efforts to create and sustain dashboards are an opportunity to promote robust and reliable statistical independence at a national level. Ultimately, a healthy longevity dashboard represents a broader commitment to the health, productivity, and wellbeing goals that underpin the indicators. It is an opportunity to use data for targeted interventions and to promote strategic approaches to investing in people across the life course.

Overall, this chapter has shown that there is extensive evidence of an effective portfolio of options for improving health at all ages, spanning the following: population-level health spending; NCD interventions at the clinical and community levels; and social protection, care, and labor policies. Drawing on this evidence to develop a context-appropriate mix of options will help countries to prepare for the demographic and epidemiological shifts associated with the future needs of a large working-age or aging population. A healthy longevity dashboard is one tool that can support rapid scale-up and assessment of life-course interventions. Yet even the most sophisticated tools will have limited effect without sufficient financing. The next chapter explores strategies for financing the ambitious NCD and healthy longevity agendas set out in this report—strategies that will ultimately pay for themselves in terms of human capital gains and savings on health care costs.

BOX 3.3 Healthy longevity dashboards for India and Sierra Leone

To develop the healthy longevity dashboards for India and Sierra Leone, World Bank researchers reviewed health, economic, and sociodemographic data from international institutions for comparability of data across countries. From the global review, the researchers gathered a list of 37 indicators of the accumulation, deployment, and depletion of human capital, with a focus on NCDs.

For each indicator in the dashboard, each country was assigned a score indicating its performance relative to all countries in the same income stratum. These scores are visualized in a speedometer (Figure 3.5) as very poor (score of 0 – <25), poor (25 – <50), good (50 – <75), and very good (≥ 75). This dashboard can be used by LMICs where local good-quality data are sparse, to monitor human capital and guide investments in NCDs and human capital.

FIGURE 3.5 Sample HLI dashboards for India and Sierra Leone

Source: WHO (2020c); World Bank (2021b); OECD (2021); ILO (2021a); UNESCO Institute of Statistics (2021).

Financing for healthy longevity: Country leadership and key supporting roles for development partners

Meeting the healthy longevity agenda and reducing NCDs is ambitious. The necessary financing will be considerable requiring country-led investments and development finance, with strong attention to global public goods. Such investments will deliver strong returns on investment, contributing to human capital while reducing poverty.

This chapter emphasizes the need, and potential ways, to marshal funding domestically, paying attention to political economy concerns. It also addresses the complementary support that external actors should provide in order to meet shared goals. Strong country ownership is essential for successful, context-specific healthy longevity agendas. And it is at the country level where the bulk of the financing will need to be mobilized. While substantial investments are needed, these investments more than pay for themselves in gains in health, productivity, income and gender equity, and wellbeing.

4.1 Country-led financing for healthy longevity agendas

The recommended high-priority package across LMICs entails a steady increase in spending between 2020 and 2050, rising to US\$220 billion in 2050. But during this period, incomes and public expenditure on health will also rise. Between 2020 and 2050, LMIC GDP is projected to increase from US\$31 trillion to US\$123 trillion, and public health expenditure would also increase. Drawing on assumptions used by the Commission on Investing in Health (Watkins et al. 2024; Watkins et al. 2018), the high-priority package would constitute an average of about 0.2 percent of GDP in 2050. These projections of future costs are necessarily approximate. To the extent that new technologies or other GPGs reduce unit costs, total costs would decline. But to the extent that countries add other interventions, based on their specific circumstances, to their NCD programs or run into serious implementation issues, they would increase.

These costs must be compared to the benefits. With the high-priority package, cumulatively,

at least 150 million deaths across all LMICs would be avoided by 2050, and about 8 million in 2050 alone. Analysis of the economic value of avoidable mortality suggests that this would correspond to over US\$3.2 trillion in economic value just in 2050 (Chang et al. 2024). Thus, the benefit-cost ratio is very favorable, at about 16 to 1 overall for all LMICs. Countries need to customize interventions to various context and over time. The overall cost-benefit ratio of the HLI is sufficiently high to suggest that various combinations that include many of the HLI interventions should be attractive investments.

The high-priority package will be reasonably affordable over time, at 8 percent and 6 percent of projected public expenditures on health in 2050, for lower-middle income countries and upper-middle income countries respectively. For LICs, even in 2050, the package would cost a sizable 20 percent of health expenditure. Thus, LICs would clearly need external financial support and at concessional (ODA) terms. In MICs, external assistance on non-concessional terms could play an important role in accelerating expenditures and policy actions, as it has in other sectors. That external support could be significant, including in terms of political economy, to counter the implication that all hard-pressed countries need to do is to put off rapid scaling up for a number of years until they have a lot more fiscal space.

The HLI agenda outlines interventions that can begin quickly to major effect. Indeed, its analyses suggests that to reduce future costs, countries should accelerate progress in the life-course interventions with the goal of matching the progress in reducing age-specific death rates by the top fifth of countries. The combination of greater spending on NCDs

paired with global public good investments can also potentially lead to cheaper future interventions, as has occurred with child health (Wu et al. 2024).

Realizing the full benefits of the HLI agenda, including financing additional interventions as they become affordable, takes time. At the moment, most LICs and lower-middle income countries are spending relatively small amounts of their budgets on health (Watkins et al. 2024). For instance, with the 2001 Abuja Declaration, African Union countries pledged to devote at least 15 percent of their annual budgets to the health sector. Yet a sample of Sub-Saharan African countries has shown a far lower figure: just 7 percent (Piatti et al. 2022). The neglect of NCD financing within current too-low health budgets reinforces the argument for increasing the share of health in overall budgets.

Yet there are also successes to build upon: the Millennium Development Goals (MDGs) triggered large increases in expenditures across LMICs, with huge gains. For example, India spent roughly US\$30 billion on its National Health Mission, which over 15 years saved the lives of about 1 million children under the age of 5 (Million Death Study Collaborators 2017). Since children who died would have lost at least 60 to 70 years of good life, this translates to less than US\$500 per life year saved—a clearly cost-effective investment (Jha and Laxminarayan 2009). The additional financing needed for life-course health should be in addition to the investment in the critical ongoing work to save maternal and children's lives, while drawing on relevant lessons learned from that work.

Given scarce resources, countries will need to set priorities and phase in increased resources to support healthy longevity, building a broad and deep base of support to assure sustainability. The principle for doing so is progressive universalism, which aims at universal coverage of a set of basic services, prioritizing poor and marginalized groups, and adding more publicly financed or provided ser-

vices to the list of covered interventions as national incomes rise (Gelband et al. 2016).

A pro-poor focus also has implications for priorities in health institutions. The recommended interventions would particularly strengthen primary health care and first referral hospitals, as in urban India and Bangladesh (Wu et al. 2020). In general, lower-level institutions are more cost-effective and reach more people, particularly the poor and disadvantaged, than higher-level facilities (World Bank 1993). *Mohalla* clinics—neighborhood facilities serving poor and medium-income people in India—are an example (Tiwari 2020).

Adopting the healthy longevity agenda offers an important way to generate at least partially offsetting additional budgetary resources, with the concurrent benefit of improving health. Specifically, excise taxes on tobacco, alcohol, and SSBs not only have health benefits but also have a highly proven record of raising funds that can be used for NCD interventions, overall health, and other pro-poor policy measures in countries at all income levels. For example, revenues from the Philippines' pioneering cigarette excise tax enabled the country to triple the coverage of poor families under its public health insurance scheme (Nugent et al. 2018).

Despite clear evidence of their effectiveness, tobacco taxes remain, as indicated earlier, underused. WHO recommends that tobacco taxes make up at least 75 percent of the retail price, yet few countries meet this threshold (WHO 2017c). Globally, 90 percent of people live in countries where tobacco taxes are lower than the recommended level (WHO 2017c). In the medium and longer term, the significant positive impact of the healthy longevity agenda on productivity, through the human capital, extended working life, and other channels described in Chapter 2, should contribute to generating additional tax resources.

BOX 4.1 Small island developing states

Small island developing states (SIDS) face complex existential health and development threats. The interventions and policies set out in this report have special and immediate significance for the 62 million people living in these 39 states. The intersection of economic, health system, and environmental vulnerabilities common to many SIDS has created an NCD crisis. In SIDS, 52 percent of people with NCDs die prematurely—among the highest figures globally. SIDS have championed a collective voice and collaborative approach to address these multi-faceted and intersecting crises.

The growing burden of NCDs in SIDS is driven by a high prevalence of risk factors for developing one or more of these conditions. SIDS are particularly affected by commercial determinants, trade agreements, policies, and ecological situations that influence price, availability, and promotion of food, cigarettes, and alcohol (Food and Agriculture Organization, and Caribbean Development Bank 2019). As growing numbers of people living in SIDS require care to prevent or manage NCDs, health systems continue to be under-financed, under-resourced, and ultimately unable to provide models of care that support prevention, diagnosis, and person-centered management of NCDs in communities. Given the immediate and catastrophic threat of climate change, the very existence of SIDS is threatened. SIDS experience the highest relative losses from climate-related disasters each year (WHO 2021c). The existential threat of catastrophic disaster shapes all other challenges, including those driving the NCD crisis.

In response, SIDS have come together and committed to reducing premature mortality from NCDs, determining cost-effective NCD interventions, and promoting health system strengthening for universal health coverage (WHO 2021d). This work includes developing and advocating for a multi-dimensional vulnerability index to better characterize and capture the unique vulnerabilities of SIDS and guide programmatic support (United Nations 2021). Achieving these goals calls for additional and sustainable funding to strengthen capacities in SIDS and support them to face these existential threats today and in the future. The HLI agenda presents complementary actions to these ongoing efforts to improve health and wellbeing in SIDS.

The political economy of going from ideas to action at the country level

The extent to which the NCD and healthy longevity frameworks outlined here will lead to action and implementation depends on the mobilization of whole-of-society political support. It also depends to some extent on external financial and other support. This report supplies evidence on the health and wellbeing impacts of a life-course approach. The synthesis of evidence on the effects on death, disease, and related impoverishment and inability to afford treatment is particularly important to health ministries and national and global health communities.

The large fiscal outlays might make country leaders hesitate. In fact, the time for action is now. Going beyond the economic benefits described above, delaying NCD-related interventions will result in increased NCD deaths, disease, suffering, and worsening of poverty. For example, avoidable mortality from cardiovascular disease alone constituted 10 percent of global annual income in 2019, and this will rise to 14 percent by 2050. This underscores the urgency of acting early on cardiovascular disease (Verguet et al. 2024). And NCD programs cannot be

turned on like a light switch. It will take some years after launching programs for them to have the financial and institutional capacity—and needed political support—for adequate national coverage and reduction of unit costs through economies of scale. Large-scale programs will also be able to benefit from, and help drive, cost-reducing GPGs as well as economies of scale, thus helping “bend the cost curve downward”—lowering future costs of reducing adult mortality, as has occurred with child survival. Governments should look favorably on investments in life-course health that will yield such benefits and compare these costs to the costs of delaying action.

Other investments will, however, take time to set up appropriate high-quality and more expensive services. In the case of cancer, good-quality pathology, diagnostics, treatment, safe surgery, radiotherapy, and chemotherapy have all been identified as key elements of scaling up national cancer control programs (Gelband et al. 2016), which requires more financial outlays and a longer-frame to implement.

Civil society can play a major role in urging political support. This includes coalitions of NGOs like the NCD Alliance, bringing in the many patient groups and the billions of people living with NCDs.

But it also encompasses foundations, researchers and policy analysts, the media, civil society organizations working with vulnerable groups, and the population at large. They all contribute to informed debate and policy change. For example, in Brazil, Kyrgyzstan and Pakistan have expanded access to insulin at affordable prices, drawing upon public advocacy and large-scale procurement (Lepeska et al. 2021)

The strong cost-effectiveness of the priority NCD interventions and the societal benefits of improved health make compelling arguments for efforts to mobilize whole-of-government support for tackling NCDs. In almost all countries, this will require agreement and joint action between health ministries, finance ministries, and political leadership. Ultimately, investment in life-course health is likely to pay political dividends as well as economic ones. But the reality is that proposals that are viewed as affecting health rarely attract support of other parts of government. This reemphasizes the role of civil society as a key part of a whole-of-society coalition, to generate ultimate approval by the head of government or by central decision-making authorities

National NCD strategies will also involve direct action by other ministries. For instance, while the Chilean Ministry of Health spent the largest sums on NCD activities in 2013, the Ministries of Sports, Environment, Social Development, Interior and Public Safety, and National Assets also provided funds for health (Govindaraj and Gopalan 2024). Regional and other collective action can also help to mobilize country-level support as well as to pool knowledge. For example, some highly NCD-affected countries, notably small island developing states (SIDS), have gone further by joining forces to tackle common challenges (Box 4.1).

4.2 Support from external partners

Increased assistance from development partners will also be vital to make progress on ambitious NCD and healthy longevity agendas compatible with SDG target 3.4: to reduce premature mortality from NCDs by one-third between 2016 and 2030. The slow progress thus far against this target, even before the COVID pandemic roiled health systems, suggests that countries and development partners continue to under-invest in NCDs and life-course health.

The majority of financing for NCD programs and other aspects of healthy longevity will need to come primarily from domestic resources. However, external financing can help, and in low-income countries it is indispensable. As of now, development

partners have allocated less than 2 percent of their development assistance for health to NCDs; and there have been even smaller proportions in bilateral financing, amounting, for example, to only 0.48 percent of US bilateral health funding in 2019 (Jailobaeva et al. 2021). This is far from sufficient given the need and disease burden. Yet other global health agendas, notably the MDGs, have demonstrated the inspiring progress that can be achieved with sufficient global mobilization of resources and effort.

Development partners can best contribute to combating NCDs and promoting healthy longevity—and in so doing, contribute to equitable growth and wellbeing and to accelerating lagging progress on the SDGs—through dual lines of action: (i) investing in and fostering the uptake of relevant GPGs; and (ii) directly supporting country action and programs.

Terms will vary according to the source of finance and the income and debt servicing capacity of a given country. External financing from multilateral and bilateral development partners in many cases also helps government and other domestic “champions” in their efforts to scale up programs and build support for increased domestic financing.

Private philanthropies are also important partners (Jailobaeva et al. 2021). Foundations can play a strong role at the country level through direct financing and through advocacy to help mobilize political support. They, along with bilateral agencies, can also play an important role on GPGs for NCDs, as they have for infectious diseases. Significant support may also come from local NGOs, using their established means of resource mobilization, and, particularly in middle-income countries, from domestic foundations. Support from local NGOs and foundations is also important for the advocacy needed to secure significant increases in public financing for NCDs and the healthy longevity agenda.

Overall, a whole-of-society approach—which includes relevant coalitions from civil society, academia, and the private sector—can increase buy-in for healthy longevity strategies. Indeed, leveraging private-sector investment and know-how for healthy longevity will be important in countries at all income levels. The private sector can mobilize substantial additional funding and related capacity to supplement public sector support. In addition, it can, in some cases, provide technological innovation and supply chain efficiencies (Watkins et al. 2024). These advantages may be leveraged to foster public-private partnerships, engage industry constructively, and secure increased financing and service provision in NCD and care-related markets (Govindaraj and Gopalan 2024).

However, private-sector involvement requires strong government stewardship. Account needs to be taken of diverging interests and of incentives for corruption and rent-seeking (Govindaraj and Gopalan 2024). Analysis of the commercial determinants of health points out that many actors in the tobacco, alcohol, and ultra-processed food industries (as well as fossil fuels) have incentives to encourage consumption of health-damaging sub-

stances—incentives that are in tension with public health interests. Lawsuits have been among the strategies used to counter the influence of the tobacco and SSB industries (Gilmore et al. 2023).

Governments should exercise careful and effective oversight concerning private-sector involvement by setting clear policy goals, establishing clear regulatory frameworks, and ensuring transparent reporting and benefit sharing.

BOX 4.2 The relevance of multilateral development financing to healthy longevity

Annual official development assistance (OECD 2022b), excluding refugee funding and support to Ukraine, averaged US\$166 billion from 2019 to 2022. While this is a notable increase from a decade earlier (Prizzon and Getzel 2023), it is widely recognized as far from adequate to meet ongoing major global development priorities around education, health, poverty reduction, and other sectors. Moreover, additional resources will be needed to tackle the added challenges of climate change, antimicrobial resistance, pandemic threats, and unhealthy aging and NCD burdens among other global challenges.

Multilateral development banks (MDBs) are well suited to assist both low- and middle-income countries with analysis and whole-of-government, multisectoral approaches required for HLI investments (Linn 2022). MDBs can also leverage appropriate private-sector investment, suited to the range of products and services needed to tackle NCDs (Govindaraj and Gopalan 2023). Finally, global public goods that support cross-country direct investments can also benefit from MDB financing (Ahluwalia et al. 2016).

The World Bank is expanding its overall financing both for countries and for global public goods (Banga 2023; World Bank 2023b). It has begun engaging with countries to support their healthy longevity agendas and will continue to leverage its knowledge and financing to support the implementation of scalable solutions through its existing instruments: investment projects, development policy operations, and results-based operations.

The World Bank support for healthy longevity programs can also make use of its ability to support multi-country operations. For example, to respond to the COVID pandemic, the World Bank's multi-country Regional Disease Surveillance Systems Enhancement program, which focuses on multi-country surveillance in Western Africa, was well-placed to help its 16 member countries pivot to launch their COVID responses (World Bank 2020). The Bank has also supported 12 African countries under the Sahel Women's Empowerment and Demographic Dividend Project since 2015. This project aims to: (i) increase women and adolescent girls' empowerment and their access to quality reproductive, child, and maternal health services in selected areas of the participating countries; and (ii) improve regional knowledge generation and sharing (World Bank 2023d, 2019, 2023a).

More recently, the World Bank has begun assisting three countries in Latin America to implement the HLI, starting with analysis of avoidable mortality (Araújo and Garcia 2023). This will lead to collaborative country reports analyzing demographic trends and the NCD burden and to proposing a costed program of cost-effective and evidence-based interventions to improve health, poverty, and gender outcomes. Based on the results of this analysis and dialogue, countries may decide whether to seek World Bank or other financing.

Finally, the HLI agenda would benefit from partnership with other key MDBs, such as the Asian Development Bank and the Inter-American Development Bank, which are active in healthy longevity (Asian Development Bank 2022; Inter-American Development Bank 2023), and with the WHO and with bilateral donors and foundations, particularly on global public goods.

4.3 Navigating the intersections of healthy longevity, climate change, and pandemic vulnerability

The major new challenges of demographic transformations, climate change, and vulnerability to pandemics co-exist. The same countries and the poorest within each country are at greatest risk for each of these three global phenomena. The HLI agenda and its interventions provide the opportunity to build synergies with efforts to combat climate change and reduce pandemic vulnerability.

Links of healthy longevity to climate change

Changing climate is one of the biggest health-sector threats, and an existential threat to survival of human life (WHO 2023b). Burning fossil fuels contributes to over 75 percent of global greenhouse gas emissions and 90 percent of all carbon dioxide emissions, which lead to global warming and climate change (United Nations 2023). Climate change not only leads to biodiversity loss and extreme weather patterns, it also has severe impacts on human health and exacerbates poverty (Hallegatte et al. 2016). It is already having significant impacts on health systems through increased risk of natural disasters, water- and vector-borne diseases, heat stress, and other disruptions. This is especially true amongst the most vulnerable populations of developing countries, such as individuals in small island nations (Box 4.1). Climate change could result in 78 million more people facing hunger by 2050 (Sulser et al. 2021) through lower crop yields. Increases in heat-related mortality and morbidity are already occurring, and future increases in the risk of accidents and impacts from extreme weather events (floods, fires, and storms) can be expected. Related changes in the seasonal distribution of some allergenic pollen species, and virus, pest, and disease distribution are expected as well as possible changes in air quality and ozone.

Given the strong overlap geographically of vulnerable regions for climate change and regions where people live and where NCDs are increasingly common, the healthy longevity and climate change agendas are deeply connected (Figure 4.1). For example, interventions to mitigate heat stress require strengthening health care facilities and delivery platforms to cope with changing burdens and NCDs (Watts et al. 2015), which the HLI investments would expand. Also, in some cases, the same measures could contribute to reducing car-

bon footprints. For example, enabling access to locally produced, unprocessed, largely plant-based diets not only reduces carbon emissions, but may also reduce vascular disease and cancer (McCurdy 2022; WHO 2022c).

Importantly, the HLI agenda adopts a timeline to 2050, consistent with long-term climate change horizons. Both agendas involve long-term planning and adaptation. However, both agendas also present cogent arguments for the urgency of immediate action. They both include rethinking longer-term development assistance and the role of GPGs. Moreover, they draw upon behavioral economics and regulatory approaches that can change individual behavior. Third, both highly cost-effective tobacco taxes and carbon taxes are underused, with strong efforts by the tobacco and fossil fuel industries to sway public and political opinion. Inefficient or poorly targeted fossil fuel subsidies constituted US\$7 trillion, or 7 percent of global GDP, in 2022 and are expected to increase further by 2025 (International Monetary Fund 2022). Tackling the enormous, vested interests of the industries requires political action and careful tactics to change government policies. Eventual removal of harmful subsidies for fossil fuels can free up major amounts of government budgets that can be used for far more productive and sustainable goals (WHO 2023e).

Links of healthy longevity to pandemic vulnerability

The COVID pandemic brought healthy longevity challenges into focus. The pandemic revealed the vulnerability of older populations, health systems, and economies in all countries. The pandemic caused about 16–17 million excess deaths, or an average of 12,000 deaths per week over the last 2.5 years—many of these among people over the age of 70. NCD killers exact even more deaths: globally, cardiovascular disease and cancer account for 100,000 and 80,000 deaths a week, respectively, just for people aged 30–69.

The COVID pandemic was also an example of the direct link between communicable and Non-communicable diseases. COVID mortality was notably higher in those with NCDs. In the UK, people with three or more diseases or risk factors had nearly 12 times the mortality rate of the overall population (Banerjee et al. 2020). In Cameroon, diabetic adults had nearly a threefold higher risk of death from COVID if hospitalized (Nzinou-Mbiaketcha et al. 2023). In LMICs, the presence of chron-

ic diseases was particularly important in increasing COVID-related deaths among younger adults. In Mexico, about 40–50 percent of COVID-related deaths among adults below the age of 60 were due to chronic diseases (Reyes-Sanchez et al. 2022). More recently, long COVID has emerged as a global, but as yet poorly understood, phenomenon that may lead to prolonged increases in NCD morbidity, including poor mental health. Finally, the pandemic disrupted NCD health services in three-quarters of countries surveyed by the WHO (WHO 2020d).

The catastrophic pandemic yielded some positive lessons for resilience, relevant to both the climate change and healthy longevity agendas. For instance, it mobilized the political will for unparalleled global scientific cooperation, resulting in vaccines and other health tools being developed at unprecedented speed. That global scientific cooperation is now much needed for GPGs to increase effectiveness and reduce costs of addressing NCDs.

A recent analysis (Madhav et al. 2023) suggests that another pandemic (killing at least 10 million people worldwide) is far more probable than assumed, and indeed climate change may well accelerate the interaction of lethal pathogens with human populations. Reducing pandemic consequences requires tackling NCDs, since future respiratory pathogens are, like SARS-CoV-2, likely to raise death rates in those with chronic diseases. In addition, improved

epidemiological surveillance and data systems work best not when designed just for emergencies but also for routine diseases, including nationwide studies to monitor deaths and detect outbreaks, as is now in place in Sierra Leone (Nolen 2022). Recognizing that the global pandemic ended outside of Africa largely due to vaccination, a key lesson from COVID is to adopt an “always-on” global adult vaccination program bundling routine vaccines with new vaccines and manufacturing capacity (Berry et al. 2022). A cost-effective global adult vaccination program that builds upon the hugely successful childhood vaccination programs will be far better placed to provide surge capacity to vaccinate in response to new pathogens (Angus et al. 2022). Since countries have learned how to get adult populations vaccinated at scale, it may be possible to scale up such innovations rapidly within a few years as new technologies become available. This could be linked to novel platforms to reach adults with NCD-related services.

Finally, demographic change and the need for healthy longevity, climate change, and pandemic vulnerability are all global challenges, and thus require attention to GPGs and other collective global action. There is a need for more effort to share learning and good practice on the development and scaling up use of GPGs across these, and other, global challenges. The next section outlines possible approaches for GPGs relevant to healthy longevity.

FIGURE 4.1. Intersections of demographic change, NCDs, climate change, and pandemics

4.4 Accelerated development and uptake of global public goods for healthy longevity

This report refers to global public goods (GPGs) as goods or services with global or regional benefits beyond the country of discovery or application. As people in all countries should be able to enjoy them, international cooperation and resources are needed to develop them. The term GPGs is used broadly here. It includes regional as well as strictly global public goods and covers R&D for new health tools (covering drugs, diagnostics, vaccines, and protocols), as well as related areas of high returns on collective action. From a healthy longevity perspective, these include lowered LTC costs, novel forms of

community-based LTC, social protection, lifelong learning, and job training.

A key strength of GPGs is bringing down costs along with providing additional benefits. The future costs of the interventions recommended in this report would fall with the deployment of relevant GPGs, as has occurred with falling expenses for saving the lives of children under 15. This analysis shows how the amount of income needed to avoid previously unavoidable deaths can decline with sustained scientific progress (Wu et al. 2024).

Apart from stimulating scientific advancement, GPGs can lower costs by leveraging the buying power of large entities, using instruments such as medical subsidies, advanced market commitments, and bulk purchases of medicines. They can also

bring more equity, across and within countries, to the provision of NCD-related goods. Both are necessary to achieve the inclusive vision of healthy longevity advanced in this report.

Among key lines of research on life-course health, partners can support operational and implementation research on NCD interventions and LTC. There is an urgent need for a comprehensive research agenda on LTC models that are replicable and sustainable in LMICs. Delivery research is also crucial to improve the integration of primary health care and LTC, which has proven elusive even in more technologically advanced economies (Araújo and Garcia 2024; Hou et al. 2023; Chen et al. 2022).

Innovation encompasses general technologies with potential applications for global health, including shared artificial intelligence (AI) tools as well as specific technologies to reduce NCD burdens. For instance, mobile technologies offer promise for expanding outreach and screening programs and delivery of mental health services. Indeed, GPGs are particularly needed for mental health conditions, a field that does not have the same widely documented evidence base of implementing consistently effective tools and interventions as, for instance, smoking and cardiovascular disease. One example of the cost-effectiveness of mental health interventions comes from Iran, which has been transitioning toward a more comprehensive model for addressing mental health conditions. It has been estimated that each healthy life year gained through this new approach will only cost about US\$800 (Hosseini Jebeli et al. 2021).

AI could be harnessed to accelerate efforts on NCD control and for global health in multiple ways, including disease diagnosis using mobile-based telemedicine, given its ability to quickly analyze and organize vast amounts of medical data. For example, in Sierra Leone, generative pre-trained transformer (GPT) methods have proven comparable to dual-physician diagnosis of the causes of death (Wen et al. 2024). AI tools could be linked to personal cellular or wearable devices to provide customized health promotion advice. AI is already playing a powerful role in drug discovery and development, including in identifying promising molecules, key proteins and other biologics that can then be tested in clinical trials. Moreover, AI can also inform repurposing of drugs for new purposes. However, much of the attention is focused on diseases and conditions in HICs, and less on low-cost drugs or repurposing of existing compounds that are widely applicable in LMICs. Finally, AI could help improve

the quality of care, serving for example to check adherence to standard guidelines in management of common clinical conditions, such as asthma.

There are obvious constraints that need to be overcome to ensure that AI is relevant and helpful to healthy longevity. First, many of the training datasets that inform GPT models are from HICs and tend not to capture the grey literature of government, NGO, and civil society reports as much as they capture formally published studies. Thus, very often current GPT results are not representative, and they risk being misleading with regard to LMICs or of other dimension of inequity such as gender, particularly in the lowest-income countries. Leading AI-technology firms can make a deliberate decision to substantially expand the input training data to include LMIC datasets and experiences. Efforts to identify, call out, and remove fake news items generated by AI, particularly those with disinformation and misinformation on health, are needed. Ensuring transparency in the input data and training datasets is also a reasonable global standard.

Moreover, the benefits from AI-triggered discoveries, such as new drug targets or repurposing of drugs need to be shared widely and avoid creating rent-seeking opportunities for selected companies. Various scientific consortia have signaled such intentions (Melliou 2023). Transparency about who funds AI and who stands to profit from its uses can also help build trust. Similarly, global stewardship of AI is needed. The mechanisms to do so are being actively debated by global organizations.

There is also great scope for GPGs to address the major NCDs. Consider the example of cancers, which account for about 4 million deaths globally just at ages 30 through 69 (Gelband et al. 2016). Cancers are common to countries of all income levels, and hence a GPG agenda would have global applicability.

To give some examples, R&D for health tools could lead to improved diagnostics of estrogen levels for people with breast cancer. Global efforts for efficient procurement and cost reductions of key inputs for recommended interventions could make pathology tests and other relevant goods more affordable, as has occurred with infectious disease control commodities. Technical networks for cancer control could expand on international and regional collaborations that already exist for many aspects of cancer care, to foster institutional twinning and other collaborations among LMICs.

Within countries, peer-based professional standards could improve the quality of care delivered to

patients. Other in-country pathways for GPGs would include harmonization of specific treatment guidelines, tracking of national cancer burdens, clinical trials, and development of widely practicable low-cost technologies. Finally, the sharing of global intellectual property related to cancers could involve licensing arrangements or tiered pricing favorable to LMICs.

More broadly, GPGs can connect adult health efforts throughout the life course to pandemic preparedness. The emergence of new technology from the COVID pandemic, notably messenger RNA technology, generated new vaccines for adults that could dramatically reduce the morbidity and mortality related to cancer and cardiovascular disease, as well as several infectious diseases. Clinical trials are underway of injectables for blood pressure control that would replace daily tablets with twice-yearly injections. This could improve treatment adherence (Berry et al. 2022), another useful arena for development of NCD GPGs.

Despite the innumerable benefits of GPGs for transforming life-course health, there is broad agreement that there has been significant under-investment. Because of this and the crucial importance of GPGs, the World Bank's new vision gives much increased emphasis to GPGs (World Bank 2023b). Global health funders have tended to support reactive and country-specific efforts, rather than globally beneficial preparation for the demographic and health challenges evident on the horizon. In 2017, international funding for health that included a very broad definition of global functions accounted for 24 percent of all ODA for health plus international R&D spending for poverty-related and neglected disease (Schaferhoff et al. 2019). Review of the 10 NCD-focused projects financed by the World Bank that started between its 2016 and 2020 fiscal years shows that only four included global functions (in the form of outbreak preparedness and response) (Govindaraj and Gopalan 2024).

The high economic returns of GPGs provide a compelling reason to reverse this neglect. Evaluations of R&D in high-income countries have demonstrated outstanding returns. In the US for example, medical advances producing 10 percent reductions in mortality from cancer and heart disease alone are estimated to add roughly US\$10 trillion to the US national wealth. And the average new drug approved by the US Food and Drug Administration yields benefits worth many times its cost of development (Murphy and Topel 2003).

GPGs need institutional and governance arrangements. These, in turn, require multi-stakeholder and expertise-driven coalitions. Models such as the Tropical Disease Research Program at WHO and the Consultative Group on International Agricultural Research provide examples and insights on how to do this (WHO 1997).

Foundations are also important for assembling financing, intellectual inputs, and political support for GPGs. GPGs could be attractive for MICs, or when done in partnership with possible reprogramming of some developmental assistance towards R&D and other GPGs. For example, the African Development Bank plans to spend US\$3 billion to expand African pharmaceutical capacities (African Development Bank 2022). Enhanced structures for GPGs would be aided if there were a way to identify and recognize part of the spending by HIC research institutions on global health that is not already eligible for reporting as ODA, at least as part of a supplementary category to ODA. This calls for a more detailed study of GPG priorities, implementation, and funding. Since NCDs are the leading causes of death in every region of the world, R&D and GPGs could well be supported and financed by research agencies in HICs. Operational research efforts such as the Global Alliance for Chronic Diseases have tried to leverage research funding agencies in countries of all income levels (Global Alliance for Chronic Diseases 2023).

Conclusion: From knowledge to action

This report comes at a critical moment in global development. It is linked to dominant global concerns, climate change and pandemics, that have recently acquired even more urgent salience. The report has identified demographic transformation, which shapes prevention and control of NCDs, as a grand challenge for the first half of the twenty-first century.

The report acknowledges the universal desire for healthy longevity, and it cites the role of NCD control in ensuring both longer lives and less sickness, allowing for greater productivity and wellbeing. This research shows that it is possible to sharply reduce excess mortality, especially through prevention and control of NCDs throughout the life course, while adopting an equity lens. Ultimately, if all countries improve their health performance to the level of their most successful peers, billions of lives could be meaningfully extended, and avoidable mortality could be halved by 2050.

The report's overall main recommendations is for country-specific and investment, with strong support from development partners and the private sector, in life-course measures to prevent and manage NCDs, with complementary reforms of labor markets, pensions, and long-term care. The main recommendations cover three areas: (i) scale up

high-impact interventions for NCDs, (ii) address financial protection and long-term care needs for the poor and vulnerable, and (iii) support data and global public goods for healthy longevity. Specific recommendations are provided in each chapter of this report, such as those for financial protection, affordable LTC options, using the HLI agenda to advance UHC and help meet the SDGs, and linkage to interventions to combat climate change and reduce pandemic vulnerability.

HLI recommendations would contribute to achieving three linked key outcomes: (i) reduced avoidable death and disease from NCDs and improved wellbeing; (ii) reduced poverty and gender inequality; and (iii) improved productivity, choice, and equity in paid work or in household or community care for children or adults needing care. Table 5.1 summarizes the relevance of these main recommendations to HLI outcomes.

TABLE 5.1 Summary of the HLI agenda recommendations and their impact

Instruments/Key outcomes	Reduced avoidable death and disease from NCDs and improve wellbeing	Reduced poverty and gender inequality	Improve productivity, choice, and equity in paid (and household) work
Adopt high impact fiscal, public health, and clinical interventions			
Levy health excise taxes to reduce disease and raise fiscal resources	✓	✓	✓
Integrate cost-effective, high-impact clinical services in primary and first-referral facilities	✓	✓	✓
Provide financial protection and address long-term care needs			
Adopt financial protection strategies for the poorest and most vulnerable including women	-	✓	✓
Lower cost and expand availability of long-term care, including community-based care	✓	✓	✓
Promote data and global public goods			
Invest in data systems, open data, and dashboards to track performance and provide accountability	✓	✓	✓
Create and fund global public goods for healthy longevity	✓	✓	✓

Note: ■ Somewhat ■ Strongly

Moving from knowledge to action:

This report provides a knowledge base for action that is considerable and of proven high impact. A strong evidence base is not enough, however.

At both the country and global levels, what is required is building strong support at top levels of political and other leadership for adopting and advancing this agenda. It will take a strong and coordinated whole-of-society effort. This includes within governments, ministries of finance, social protection, labor, and gender, as well as championing by health ministries. And the effort required goes far beyond governments and external partners to include the private sector, academia, NGOs, foundations, the media, the broader global and national development communities, and health epistemic communities including people living with NCDs. A strengthened role for the multilateral development banks can encourage and support country ownership and seed learnings across many settings.

This effort has been sustained by the prospect of countries, especially LMICs, adopting the basic

approach behind the healthy longevity and NCD control agendas and adapting it to their specific individual situations. The realization of that prospect is eminently feasible.

Demography may not be destiny, but the ongoing demographic transitions demand a focused and forward-thinking approach to seize the benefits of older populations. This report presents such an approach and the supporting evidence for it, to enable countries to adopt and adapt the approach to their individual country situations and to urge development partners and the wider global community to provide support at both country and global levels.

The world can celebrate the remarkable progress in health and wellbeing that started near the end of the twentieth century. The challenge facing all who recognize the feasibility and importance of healthy longevity is to help realize highly effective interventions, leading to remarkable gains in human welfare during the first half of the twenty-first century.

Appendix A: Data sources, methods, and analytic processes

Key Data sources

Demography: United Nations, Department of Economic and Social Affairs, Population Division (UNPD 2022). World Population Prospects 2022 (UNPD 2022).

Disease incidence and prevalence: World Health Organization (WHO) (WHO 2020c); Institute of Health Metrics and Evaluation, Global Burden of Disease 2019 (IHME 2019).

Cause of death: WHO, Global Health Estimates 2019 (WHO 2020b).

Gross domestic product (GDP): World Bank, World Development Indicators 2022 (World Bank 2023c).

used to establish a trend using a regression model; this trend is then interrupted by an intervention at a known time-point (Bernal et al. 2016; Kontopantelis et al. 2015). The difference in the trend before and after the intervention quantifies the effect of the intervention. In our analysis, we define the interruption point as 2010 to examine if there are notable differences in the rate of mortality decline in the second decade of 2000 compared to the first, using the logic that trends which had been established from 2000–2009 should accelerate after 2010 if more attention was given to health and action on health during the second. The analysis includes all countries and was performed by grouping countries by income (World Bank 2020 classification) (World Bank 2021c), World Bank region, SDG region, and membership in the Organization for Economic Co-operation and Development (OECD).

Methods

Rates of progress in mortality reduction during 2000–09 and 2010–19

We use interrupted time-series (ITS) analysis to examine any significant difference in the rate of change in mortality rates between the two decades of 2010–19 and 2000–10. An ITS design provides a robust quasi-experimental design that affords a high level of certainty of evidence to evaluate the longitudinal effects of interventions where a randomized controlled trial is not possible (Bernal et al. 2016). In an ITS analysis, a continuous series of observations on an outcome of interest for a population over time is

Rates of progress in cause-specific mortality reduction

We measure rates of progress in cause-specific mortality decline from a list of 20 major diseases and conditions using the standard average annual rate of reduction (AARR) calculation for the period from 2000 to 2019 (UNICEF 2007). The 20 diseases and conditions were selected based on expert consultation, primarily due to the high burden of mortality from these causes and areas of public interest and funding in the past. The list of 20 diseases is presented in Table A1. Data on causes of death, by country, age, and sex were obtained from the WHO Global Health Estimates (WHO 2020b).

TABLE A1 List of diseases and conditions selected for studying rates of progress, classified by disease group

Communicable, maternal, perinatal and nutritional conditions	Non-communicable diseases (NCDs)	Injuries
Tuberculosis	All cancers	Road injury
HIV/AIDS	Tobacco-attributable cancers*	Falls
Diarrheal diseases	Infection-attributable cancers†	Drowning
Childhood-cluster diseases	Stomach cancer	Suicide
Malaria	Breast cancer	
Respiratory infections	Cardiovascular diseases, excluding stroke	
Maternal conditions	Stroke	
Neonatal conditions	Respiratory diseases	

Note: *Mouth and oropharynx, esophagus, trachea, bronchus, lung, and larynx cancers. †Liver, cervix uteri, and corpus uteri cancers. AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus. All diseases and conditions are defined based on the WHO Global Health Estimates (WHO 2020b) unless stated otherwise.

Economic value of avoidable mortality (EVAM)

Avoidable mortality

Avoidable mortality comprises deaths that may be prevented through public health or prevention interventions that reduce incidence (preventable mortality) and those that can be avoided through curative health care interventions that reduce case-fatality (treatable or amenable mortality) (Nolte and McKee 2003; OECD 2022a; Rutstein et al. 1976). We propose estimating avoidable mortality as the difference between current (estimated/projected) mortality levels from the World Population Prospects 2022 (UNPD 2022), and unavoidable, or frontier mortality levels, which are the lowest mortality levels that can be obtained for each age given past and current technologies and knowledge. Frontier mortality levels are estimated as the lowest contemporary mortality rates at each age in either sex, obtained from the Human Mortality Database for the years 2000–2019 and projected to 2050 (Barbieri et al. 2015; Human Mortality Database 2022; Wilmoth et al. 2021). We apply a single age-year-specific frontier to all countries and to both males and females, consistent with our belief that all populations have the opportunity to reach the frontier with the necessary resources, even though it may be more challenging for some than others. We compared both male and female mortality to the lowest sex-specific mortality rate, which in all cases is female mortality. Most of the sex differences in life expectancy has been shown to be due to non-biological factors, namely gender differences in health behavior and risks, such as smoking,

alcohol use, and injuries (Luy 2016).

To provide context and assess the feasibility of achieving the frontier mortality rates, we created a scenario (called “rapid progress”) in which countries experience fast but plausible mortality reductions from 2019 to 2050. Specifically, we calculated the historical average annual rate of change (AARC) for all country-sex-age mortality rates between 2000 and 2019, and applied the top 10th percentile AARC to all countries from the years 2020 to 2050.

Economic value of mortality reduction

We first define the economic value of remaining lifetime income for an individual at age a with current annual survival probabilities and annual income. We then identify the point at which she is indifferent between continuing under the current survival probability and a hypothetical scenario where she forgoes a proportion of this year’s income in exchange for higher survival probability (no avoidable mortality) that year. The economic value of avoidable mortality in a given year is thus measured as the maximum percentage of annual income an individual is willing to forgo to live that year at the frontier survival probabilities.

We closely followed the recommendations made by the Harvard Benefit Cost Analysis Reference Case (Robinson et al. 2019). We set the ratio between value of statistical life (VSL) and income per capita (VSLr) at 160 (the ratio comes from a United States VSL of \$9.4 million and gross national income (GNI) per capita of \$57,900), and income elasticity of 0.8 when extrapolating across countries with higher GNI per capita than the United States,

and 1.2 for countries with lower GNI per capita. We apply a lower bound constraint for the VSLr at 20. We choose to estimate income using GNI per capita expressed in 2017 international dollars and adjusted for purchasing power parity (PPP), as recommended by the reference case. Data on GNI per capita (PPP constant 2017 International \$) between 2000–2021 came from the World Bank (World Bank 2023c); income levels for 2050 are projected using the OECD projected country-specific growth rates between 2021 and 2050 for listed countries (OECD and G20 countries), and the world average growth rate during the same time period for all remaining countries. The annual discount rate is 3 percent. The economic value of avoidable mortality is presented as a percentage of annual income.

We present the results by the World Bank's geographic regions, with China and India presented separately. We focus on the years 2000, 2019, and 2050, which represent the beginning of the era of major international investment in global health, current conditions just prior to the COVID pandemic, and future projections. We also discuss estimates for 2021, which is the latest observed year available from *World Population Prospects* (WPP) (UNPD 2022) and reflects the unique mortality profile during the COVID pandemic.

For cause-specific EVAM, we used cause of death data from the WHO Global Health Estimates for 2000–2019 for 31 causes of death (WHO 2020b) to quantify the avoidable mortality for each cause of death, for 2000–2050 for 113 countries over six world regions (China, Eurasia & the Mediterranean, High-income, India, Latin America & the Caribbean, Sub-Saharan Africa). We then applied the value per statistical life approach as described above to assign economic values to these estimates of avoidable mortality.

Critical income

In 1975, Samuel Preston, in a classic paper, showed that life expectancy is related to national income (Preston 1975). He found that life expectancy increases with national income per capita in poorer countries, but plateaus at higher income levels. He also noted an upward and lateral shift in the curve over time, indicating that for the same level of income, life expectancy increases over time. This re-

lationship was mathematically studied by Hum and colleagues in 2012 using the Michaelis-Menten enzyme kinetics (Hum et al. 2012). Treating income as the substrate that is catalyzed to increase survival, Hum and colleagues investigated the change in the level of income that is needed to achieve half of the period-specific maximum survival (“critical income”). Here, we extend the 2012 analysis by Hum and colleagues to assess the trend in the critical income for ages under 15, 15–49, and 50–69 from 1990 to 2019. We redefine critical income here as the income needed to achieve 80 percent of the global maximum life expectancy.

Using data from the WPP (UNPD 2022), we used country specific population by age groups (both sexes) and country-specific deaths by age-groups, to derive a survival rate for children aged 0 to 14, adults 15 to 49, and seniors 50 to 69 from 1990 to 2019. For this analysis, we included only countries with a population of over 7 million (which covers 99.9 percent of the world population in 2019). GDP per capita (PPP, constant \$2017) was sourced from the World Bank (World Bank 2023c). We used five-year averages to limit the influence of sudden, dramatic, changes in health or economic development in that country.

We adapted the Michaelis-Menten model for age-specific global critical income estimates (k_{inc}) and maximal survival rates such that:

$$child\ survival = \frac{child\ survival_{max} * GDP}{GDP + k_{child,inc}}$$

$$adult\ survival = \frac{adult\ survival_{max} * GDP}{GDP + k_{adult,inc}}$$

$$senior\ survival = \frac{senior\ survival_{max} * GDP}{GDP + k_{senior,inc}}$$

We used a mixed effect model to calculate the global, as well as country-level, critical incomes for all countries in the analysis. We also calculated the income required to achieve 80 percent of the maximal health in high income countries—which is, mathematically, four times the critical income. Using the country-level critical incomes derived from the mixed-effects model, we ranked the top countries with the lowest critical income values for each age-grouping.

NCD investment packages

Intervention selection and aggregation

The starting point of this analysis is a set of interventions recommended in the third edition of the *Disease Control Priorities* series (DCP3) (Jamison et al. 2018). The DCP3 covered a particular health topic (e.g., tuberculosis, cancer screening, neurological disorders) and synthesized the evidence in a series of recommended interventions that (i) provide good value for money, (ii) are feasible to implement in LMICs, and (iii) address a significant cause of death or disability. These criteria were applied to systematic reviews of economic evaluations of health interventions done in LMIC settings, supplemented by other information such as clinical and implementation studies and expert judgment. The DCP3 final list of recommended interventions was separated into 218 health sector interventions and 71 inter-sectoral interventions. For this analysis, we selected 30 interventions that are proven to reduce mortality from NCDs and can achieve meaningful impacts by 2030 (Table A2). Our analysis looks at both clinical and inter-sectoral interventions through a benefit-cost lens.

Modeling intervention costs

Our cost estimates build on those done for the DCP3 and the *NCD Countdown 2030* report (NCD Countdown collaborators 2022; Watkins et al. 2020). Costs borne by governments in implementing the inter-sectoral policies were estimated on a per-capita basis, using published costing studies or grey literature (e.g., government budget reports). For the clinical interventions, the focus was on unit costs (e.g., cost per patient-year of chronic treatment, cost per episode for acute care, etc.) to health care sector. All interventions were assumed to be publicly financed (i.e., through universal health coverage

systems), so out-of-pocket costs currently paid by households would be shifted to governments and accounted for in our estimates.

We primarily sourced unit cost data for the clinical interventions from DCP3 systematic reviews of cost and cost-effectiveness studies. Since NCD costing studies are few, we selected the highest-quality study that we identified that most closely reflected the medical components of the intervention in question. All costs were updated to 2020 US dollars using procedures recommended by the Global Health Costing Consortium (Vassall et al. 2017). They were then extrapolated to other countries in two stages. First, we decomposed costs into traded and non-traded components. Traded components were assumed to be constant across countries. Nontraded components were adjusted based on ratios of gross national income (GNI) per capita across countries.

Unit costs were then multiplied by the population requiring each intervention and further by the target coverage level of the intervention each year. For example, the cost of an intervention costing US\$20 per patient-year that addressed a chronic disease with a prevalence of 1 million cases and a current coverage of 30 percent was calculated as $\text{US\$20} \times 1,000,000 \times 30\% = \text{US\$6,000,000}$. The “incremental” cost of increasing coverage of that intervention by a certain amount would be calculated as the difference in coverage year over year. We defined full coverage of each intervention as 80 percent of the population covered by the year 2030, consistent with DCP3 and WHO assumptions (Jamison et al. 2018; Stenberg et al. 2017). Epidemiological and demographic data used to estimate population in need were taken from the WHO (WHO 2020b; WHO 2020c), WPP (2022 edition) (UNPD 2022), and Global Burden of Disease 2019 Study (IHME 2019). Coverage data were taken from the literature, WHO, or expert opinion.

TABLE A2 Interventions considered in this analysis

Intervention cluster	Specific interventions
Interventions outside the health sector (risk factor reduction)	Tobacco excise taxes
	Alcohol excise taxes
	Smoking regulations and information/education/communication
	Alcohol regulations
	Sodium regulations and information/education/communication
	Trans fat bans
Outpatient cardiometabolic and respiratory disease care	Diabetes screening/treatment
	Cardiovascular disease primary prevention
	Aspirin for suspected acute coronary syndromes
	Cardiovascular disease secondary prevention
	Heart failure chronic treatment
	Chronic pulmonary disease treatment
Outpatient mental, neurological, and substance use disorder care	Injection drug use harm reduction measures
	Alcohol use screening/brief intervention
	Depression chronic treatment
	Bipolar disorder chronic treatment
	Schizophrenia chronic treatment
	Epilepsy acute and chronic treatment
First-level hospital cardiometabolic and respiratory disease care	Medical management of acute coronary syndromes
	Heart failure acute treatment
	Treatment of acute exacerbations of chronic pulmonary disease
First-level hospital surgical care	Screening and treatment of early-stage cervical cancer
	Management of bowel obstruction
	Management of appendicitis
	Repair of hernias
	Repair of gastrointestinal perforations
Referral hospital services	Percutaneous coronary intervention for acute coronary syndromes
	Advanced care for severe acute-on-chronic pulmonary disease
	Treatment of early-stage breast cancer
	Treatment of early-stage colorectal cancer

For the non-health sector interventions, there are two major types of costs that are borne outside the government/health care sector. The first type is the cost to firms of implementing government regulations. Again, we used literature-based estimates of these costs and extrapolated them across countries, like we did for the clinical interventions (above). The second type of cost is the forgone consumer surplus due to taxes and regulations on unhealthy products. We used recommendations from US-based regulatory impact analyses to inform our approach 9 (U.S. Food and Drug Administration

2014), which used an offset parameter that was applied to the estimated economic benefits from improved health (see below). For tobacco and alcohol policies, the offset value was 0.9, and for sodium and trans-fat policies, it was 0.5.

Modeling intervention health and economic outcomes

We quantify improvements in health as a reduction in mortality and disability rates following the scale-up of an intervention. To do this, we used

a population model we developed for the *NCD Countdown 2030* report (NCD Countdown collaborators 2022). In brief, this model combined demographic projections (including population counts and all-cause mortality rates) (UNPD 2022) with cause-of-death data (WHO 2020b) and disease incidence and prevalence rates (IHME 2019). The baseline projection that we used as a reference for calculating intervention-specific health gains was calibrated to the UNPD medium projections, representing a business-as-usual scenario for intervention implementation.

Changes in disease-specific mortality and disability rates were a function of (i) the effectiveness of the intervention on these outcomes, and (ii) the change in intervention coverage. Effectiveness data were usually taken from clinical trials, favoring meta-analytic estimates when available. Intervention-specific effectiveness parameters are detailed in the online appendix to the background paper and in the Github link below. We multiplied each literature-based effect size by 0.70 to account for imperfect implementation in real-world settings (NCD Countdown collaborators 2022).

To calculate the economic value of reduced mortality and disability, we multiplied projected DALYs by the standardized time series estimates for the value of a DALY that were used throughout the Copenhagen Consensus project (Jha et al. 2013). One potential benefit of tobacco and alcohol taxes is a gain in revenue for governments. We took a societal perspective on costs and benefits, so these revenue gains are fully offset by additional costs to consumers—i.e., they are, functionally, transfer payments.

All input data, including citations of the literature used to estimate the cost of each intervention, are available at <https://github.com/Disease-Control-Priorities/CCC>.

Country-specific HLI dashboards

Selecting indicators

The healthy longevity dashboard is an ongoing effort to develop and refine a suite of indicators that bring together relevant data to measure and monitor country progress towards healthy longevity. As part of these efforts, a common framework for healthy longevity and harmonized approach has been proposed (O’Keefe and Haldane 2024). Under this approach, indicators were selected that map to the overarching HLI conceptual framework and that can be distilled across three key actions and ten related domains to be prioritized when developing a healthy longevity dashboard (Table A3). This approach allows us to identify indicators that map to data infrastructure maturity in a given country, while ensuring comparable and consistent conceptual underpinnings.

Indicators of context and HLI Indicators. Details of the selection of indicators are provided in the relevant background paper (Haldane et al. 2024).

Performance Score

To assess the performance of a country relative to other countries with respect to an indicator, we normalized the data across countries to calculate the score based on two approaches: percentile rank approach and z-score approach. Details of the two approaches are described below. In both approaches, the study country is compared with other countries that fall under the same income stratum as the study country, based on the 2021 World Bank country classification (World Bank 2021c), and have a population of more than 7 million (or 0.1 percent of the world population) in 2021, based on the *World Population Prospects* (UNPD 2022). A score of 100 percent indicates best performance, 50 percent indicates average performance, and 0 percent indicates worst performance relative to the other countries.

TABLE A3 Key actions and related domains when developing a healthy longevity dashboard

Life course stage	Intensive human capital accumulation	Human capital accumulation, deployment, and depreciation	Declining human capital accumulation, accelerated depreciation and depletion
Key action	1. Promoting enabling factors for human capital accumulation	2. Ensuring adequate prevention and control of NCDs across the life course	3. Creating supportive conditions for healthy and productive aging
Supporting domains	• Disease prevention • Education outcomes • Youth focus • Gender norms	• NCD risk factors and behaviors • NCD management • Reducing avoidable mortality	• Healthy population • Productive aging • Wellbeing in old age

Percentile rank approach. In the percentile rank approach, the score for an indicator is represented by its percentile rank. The percentile rank is calculated using the standard formula:

$$\text{Percentile rank} = \frac{M + (0.5 * R)}{Y}$$

, where M is the number of values below the value for the study country, R is the number of values equals to the value for the study country, and Y is the total number of values.

For indicators where a higher value indicates better performance, such as life expectancy and employment rate, the percentile rank is directly interpreted as the score, whereas for indicators where a lower value indicates better performance, such as mortality and morbidity rate, the score is further calculated as 1 – percentile rank. We use “P” to denote the score calculated based on this approach.

Z-score approach. While the percentile rank approach provides the performance of a country relative to all other countries, it does not take into account the distribution of the indicator across countries. To take into account the distribution, including the mean and standard deviation, a score

is computed based on the z-score. This approach assumes that the indicator values are normally distributed and a z-score for a country is calculated using the standard formula:

$$z = \frac{(x - \mu)}{\sigma}$$

, where x is the value for the study country, μ is the mean value across all countries, and σ is the standard deviation.

Based on the z-score, we then used the z-table to obtain the percentage of countries that are performing below the study country. This percentage is used as the score for indicators where the higher the value, the better the performance, such as life expectancy. For indicators where the lower the value, the better the performance, such as mortality rate, the score is further calculated as 1 – calculated percentage. The score calculated using this approach is denoted by “Z”.

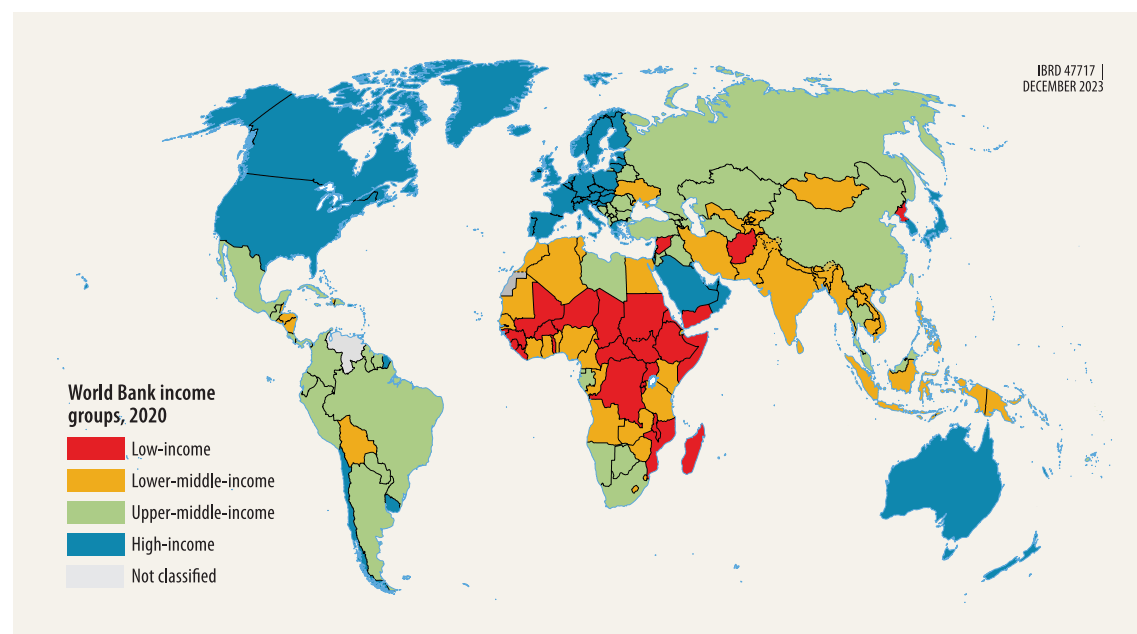
Based on the scores calculated from the two approaches, we assigned the study country into one of four quartiles: <25%, 25–<50%, 50–<75%, and ≥75%.

Appendix B: Supplementary analytic materials

This appendix includes the following supplementary analytic materials that were used in developing this report and its recommendations.

Figure/Table	
Figure B1	Country classification used in this report, based on the 2020 World Bank income classification
Table B1	Population in 1990, 2023, and 2050 by country income category
Table B2	Average annual rate of reduction in mortality between 1990 and 2019 by age and income region (%)
Figure B2	Population by selected age groups, 25 most populous countries and Colombia and Sierra Leone, 2023 and 2050
Figure B3	Annual rates of change in mortality rates, by country and age groups, 2000–2019
Table B3	Demographic changes, by age group from 1990 to 2050
Table B4	Median age at death, projections by country income category from 2022 to 2050
Table B5	Economic value of avoidable mortality as % of annual income and in US\$, by income region for 2050
Table B6	Economic value globally of avoidable mortality as percentage of annual income, by disease
Table B7	Rates of progress in mortality decline 2000–19, by diseases and country income category

FIGURE B1 Country classification used in this report, based on the 2020 World Bank income classification



Source: World Bank (2021c).

TABLE B1 Population in 1990, 2023, and 2050 by country income category

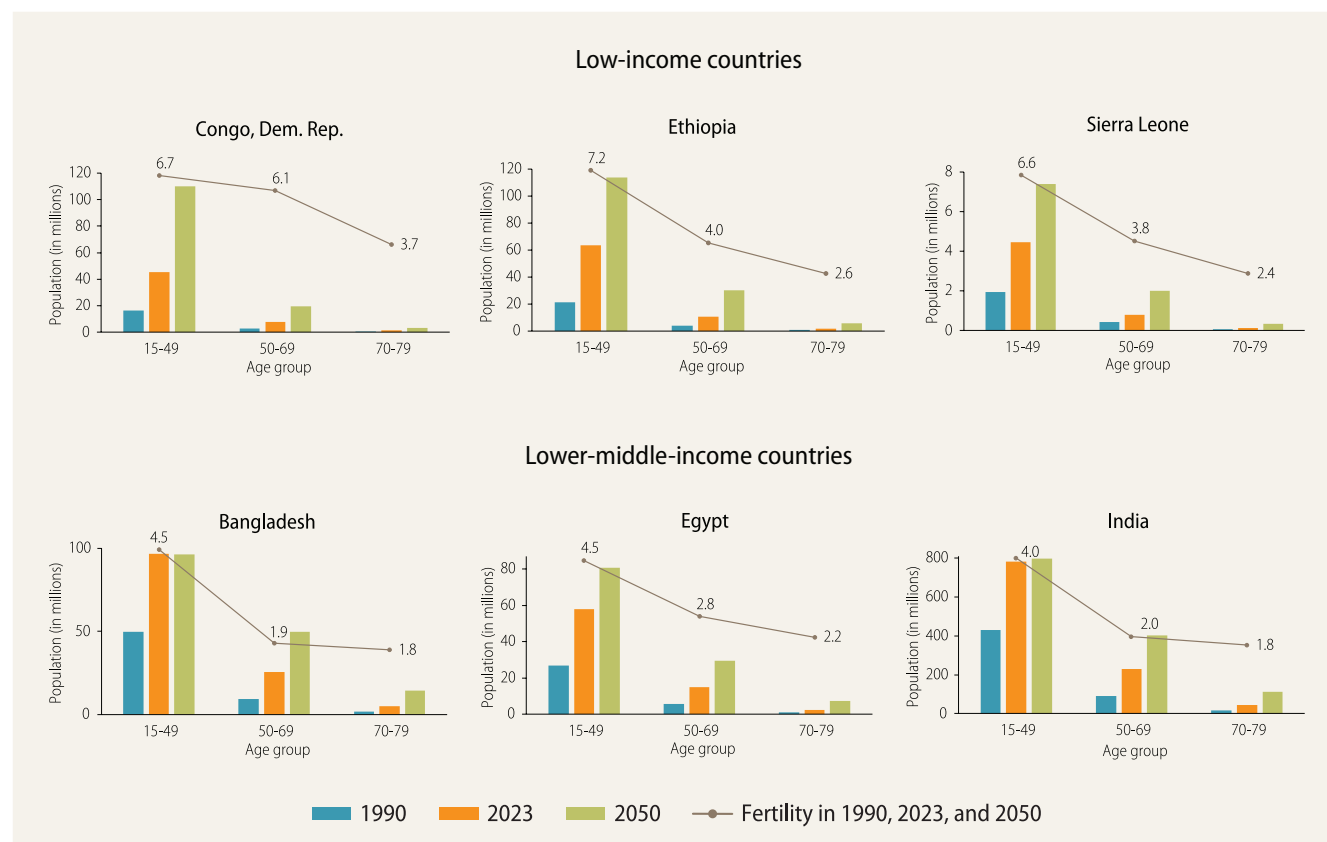
Category by income	Population in 1990 (millions)	Population in 2023 (millions)	Population in 2050 (millions)
Low	295.1	737.2	1,329.6
Lower-middle	2,020.7	3,486.4	4,502.2
Upper-middle	1,978.7	2,561.2	2,564.0
All LMICs	4,294.4	6,784.8	8,413.9
High	1,001.7	1,231.0	1,258.8
World	5,316.2	8,045.3	9,709.5

Source: UNPD (2022).

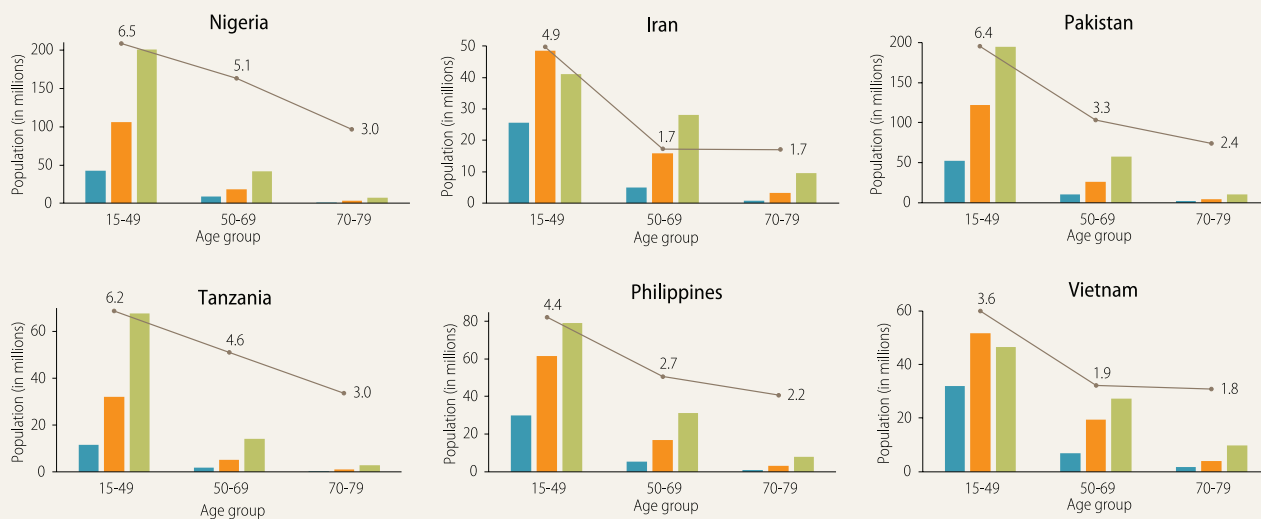
TABLE B2 Average annual rate of reduction in mortality between 1990 and 2019 by age and income region (%)

Country income category	Age 0 (until age 14)	Age 15 (until age 49)	Age 50 (until age 69)	Age 70 (until age 79)
Low	4.2	2.6	1.5	1.1
Lower-middle	3.6	1.5	1.3	0.9
Upper-middle	5.1	1.7	1.8	1.4
High	3.2	1.7	1.8	2.0
World	3.3	1.4	1.5	1.3

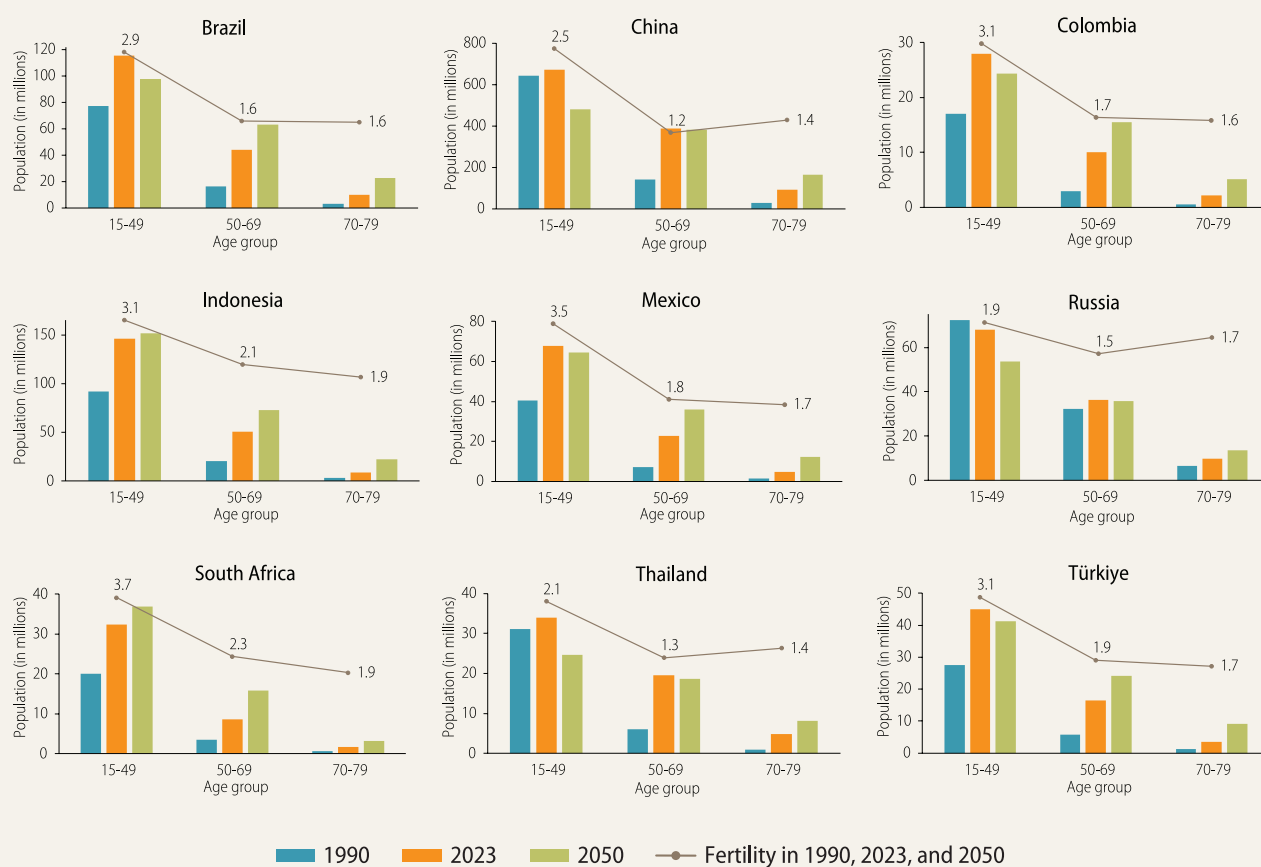
Source: UNPD (2022).

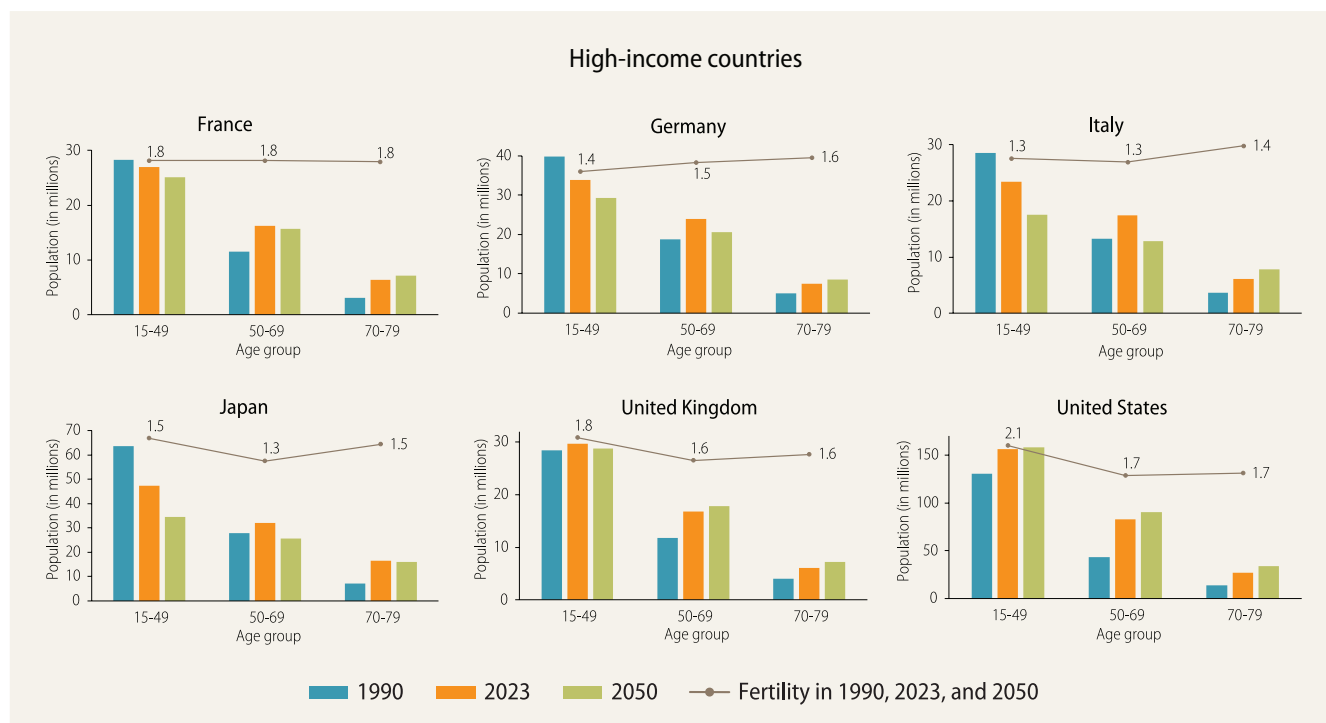
FIGURE B2 Population by selected age groups, 25 most populous countries and Colombia and Sierra Leone, 2023 and 2050

Lower-middle-income countries (continued)

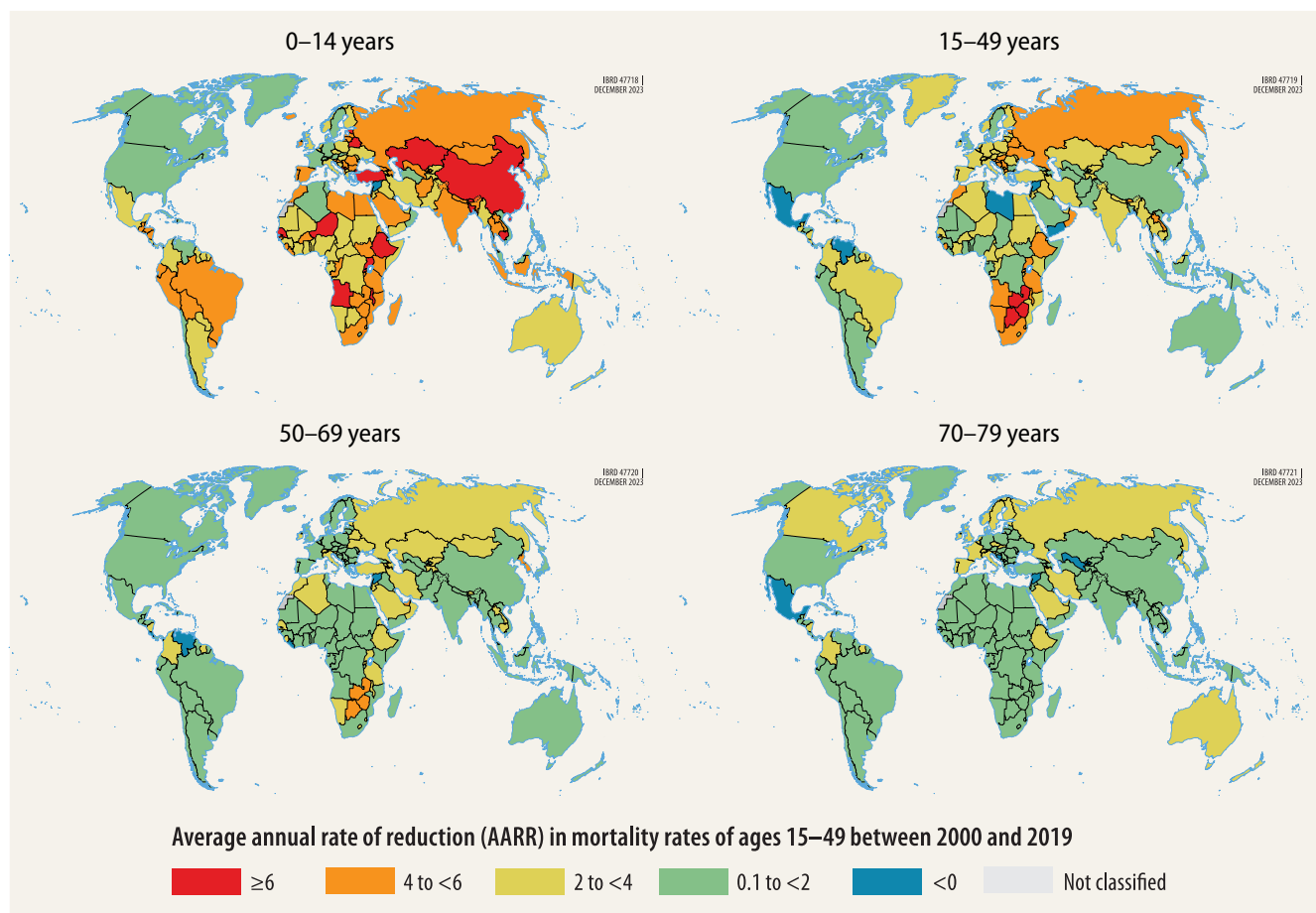


Upper-middle-income countries





Source: UNPD (2022).

FIGURE B3 Annual rates of change in mortality rates, by country and age groups, 2000–2019

Source: UNPD (2022).

TABLE B3 Demographic changes, by age group from 1990 to 2050

Age group	Population in 1990 (millions)	Population in 2023 (millions)	% change from 2023 to 1990	Population in 2050 (millions)	% change from 2050 to 2023
0–14	1,749	2,011	+15%	2,010	+<0.0%
15–49	2 689	4,013	+49%	4,463	+11%
50–69	677	1,502	+122%	2,089	+39%
70–79	146	359	+146%	688	+92%
80+	55	160	+193%	459	+186%

Source: UNPD (2022).

TABLE B4 Median age at death, projections by country income category from 2022 to 2050

Region and income group	2022	2030	2040	2050
Low	40	42	52	59
Lower-middle	64	66	70	72
Upper-middle	73	76	79	82
High	80	82	84	86
World	69	72	75	78

Source: Chang et al. (2024), based on UNPD (2022).

TABLE B5 Economic value of avoidable mortality as % of annual income and in US\$, by income region for 2050

Country income grouping	% of annual income in US\$ with 20% top performance	Value of avoided mortality with top 20% performance (in US\$ trillions)
Low	17	0.1
Lower-middle	18	4
Upper-middle	16	8
All LMICs	17	13
High	17	6
Global	16	19

Source: Chang et al. (2024).

Note: LMICs = lower- and middle-income countries.

TABLE B6 Economic value globally of avoidable mortality as percentage of annual income, by disease

Disease/year	2019 (%)	2050 (%)
Communicable, maternal, child, and nutritional	6.3	3.9
Infectious and parasitic	5.1	3.0
Maternal and neonatal	1.1	0.7
Nutritional deficiencies	0.1	0.2
NCDs	13.1	17.5
Cardiovascular	5.2	7.0
Ischemic heart	2.6	3.8
Stroke	1.9	2.1
Other cardiovascular	0.7	1.1
Diabetes mellitus	0.6	1.0
Digestive	1.1	1.2
Cirrhosis of the liver	0.7	0.7
Other digestive	0.4	0.5
Malignant neoplasms	3.4	4.4
Breast cancer	0.2	0.4
Cervix uteri cancer	0.2	0.2
Liver cancer	0.3	0.3
Mouth and oropharynx cancers	0.2	0.3
Esophagus cancer	0.2	0.2
Stomach cancer	0.4	0.2
Trachea, bronchus, lung cancer	0.9	1.0
Other malignant neoplasms	1.2	1.9
Respiratory diseases	1.2	1.5
Chronic obstructive pulmonary	0.9	1.1
Other respiratory	0.3	0.4
Other Non-communicable	1.7	2.5
Injuries	3.6	3.2
Intentional injuries	1.1	1.0
Unintentional injuries	2.4	2.2
Road injury	1.2	1.1

Source: Verguet et al. (2024).

TABLE B7 Rates of progress in mortality decline 2000–19, by diseases and country income category

Disease/ condition category	Diseases/ conditions	Male						Female					
		Fastest			Slowest			Fastest			Slowest		
		Region	Age group	AARR %	Region	Age group	AARR %	Region	Age group	AARR %	Region	Age group	AARR %
All Causes	UMICs	0–14	4.6	UMICs	70+	0.7	UMI	0–14	4.6	HICs	70+	0.9	
Communicable, maternal, perinatal, and nutritional conditions	Tuberculosis	UMICs	70+	6.3	LICs	70+	4.1	HICs	50–69	6.3	HICs	70+	3.3
	HIV/AIDS	HICs	15–49	8.1	UMICs	15–49	1.9	LICs	15–49	8.0	UMICs	15–49	2.4
	Diarrhea	UMICs	0–14	6.9	HICs	0–14	4.1	UMICs	0–14	7.2	HICs	0–14	4.1
	Childhood-cluster	UMICs	0–14	9.1	LICs	0–14	5.2	UMICs	0–14	9.2	HICs	0–14	5.3
	Malaria	LICs	0–14	6.3	LMICs	15–49	0.4	LICs	0–14	6.4	LMICs	15–49	1.1
	Respiratory infections	UMICs	0–14	6.5	HICs	0–14	4.5	UMICs	0–14	6.5	HICs	40–14	4.5
	Maternal		LMI	15–49	5.8	HICs	15–49	0.6					
	Neonatal conditions	UMICs	0–28 days	4.8	HICs	0–28 days	2.2	UMICs	0–28 days	4.8	HICs	0–28 days	2.1
Non-communicable diseases	All cancers	HICs	50–69	1.8	LICs	70+	-0.2	UMICs	50–69	1.2	LICs	70+	-0.2
	Tobacco-attributable cancers ^a	HICs	50–69	2.1	LICs	70+	-0.4	UMICs	50–69	1.3	LICs	70+	-0.7
	Infection attributable cancers ^b	UMICs	50–69	4.1	HICs	70+	0.3	UMICs	50–69	2.2	HICs	70+	0.4
	Stomach cancer	HICs	50–69	3.9	LICs	70+	0.5	UMICs	50–69	3.4	LICs	70+	0.8
	Breast cancer		HICs	50–69	1.5	LICs	70+	-1.2					
	Cardiovascular (excluding stroke)	HICs	70+	2.3	UMICs	70+	-0.2	UMICs	50–69	2.5	LICs	70+	0.2
	Stroke	HICs	50–69	3.4	LICs	70+	0.9	HICs	50–69	3.9	LICs	70+	0.7
	Respiratory diseases	UMICs	50–69	4.8	HICs	50–69	0.7	UMICs	50–69	5.3	HICs	50–69	-0.3
Injuries	Road injury	HICs	15–49	3.5	LICs	70+	-1.2	HICs	70+	3.7	LICs	70+	-1.0
	Falls	LICs	50–69	1.1	UMICs	70+	-2.3	LICs	50–69	1.3	UMICs	70+	-2.3
	Drowning	UMICs	0–14	6.2	LICs	0–14	2.7	UMICs	0–14	7.6	LICs	0–14	2.8
	Suicide	UMICs	50–69	3.7	HICs	15–49	0.5	UMICs	15–49	6.2	HICs	15–49	-0.3

Source: WHO (2020b); Wu et al. (2024); original estimates for this publication.

Note: AARR = Average annual rate of reduction; AIDS = acquired immunodeficiency syndrome; HICs = high-income countries; HIV = human immunodeficiency virus; LICs = low-income countries; LMICs = lower-middle-income countries; UMICs = upper-middle-income countries. ^aMouth and oropharynx, esophagus, trachea, bronchus, lung, and larynx cancers. ^bLiver, cervix uteri, and corpus uteri cancers.

Appendix C: Acknowledgments

This report benefited greatly from ideas, technical inputs, and critical review from a broad range of individuals and organizations. Contributions to specific chapters are acknowledged in the Bibliographical Note. Reviewers for the background papers are noted below. In addition, valuable input was provided by participants in a series of workshops.

Reviewers for Background Papers

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Workshops and Consultations

1. NCDs and Human Capital Workshop

December 6–7, 2018, in Washington D.C. Sponsored by the World Bank.

Chair: George Alleyne and Tim Evans

Participants: Jean-Louis Arcand, Kathryn Gilman Andrews, Zelalem Debebe, Michele Gragnolati, Dean Jamison, Prabhat Jha, Aart Kraay, Jeremy Lauer, Aakash Mohpal, Rachel Nugent, Dena Ringold, Sanam Roder-DeWan, Rosa Sandoval, Miriam Schneidman, Jeremy Veillard, and Stéphane Verguet

2. Non-Communicable Diseases and Human Capital Analytic Work and Key Messaging Workshop

July 9–10, 2019, at the Dalla Lana School of Public Health at University of Toronto. Sponsored by the Access Accelerated, the University of Toronto, and the World Bank.

Co-Chairs: George Alleyne, Daniel Dulitzky, Timothy Evans, and Rachel Nugent

Participants: Francisca Akala, Jean-Louis Arcand, Adriana Blanco, Sarbani Chakraborty, Pedro Conceicao, Erica Di Ruggiero, Vivek Goel, Sue Horton, Alexander Irwin, Dean Jamison, Prabhat Jha, Alexey Kulikov, Jeremy Lauer, Aakash Mohpal, Miriam Schneidman, Daniel Sellen, Jeremy Veillard, Stéphane Verguet, and Daphne Wu

3. Healthy Longevity Initiative Technical Workshop I

May 18–20, 2022, in Mexico City. Sponsored by Instituto Nacional de Salud Pública and the World Bank.

Co-Chairs: George Alleyne, Sameera Altuwaijri, Michele Gragnolati, and Prabhat Jha

Participants: Tonatiuh Barrientos, Luis Benveniste, Diego Cardoso, Debapriya Chakraborty, Angela Chang, Beverly Essue, Gisela Garcia, Elena Glinskaya, Ramesh Govindaraj, Daniel Halim, Nedim Jaganjac, Dean Jamison, Julian Jamison, Venus Jaraba, Blanca Llorente Anaas, Hugo López Gatell, Claudia Macias, Norman Maldonado, Laura Vivian Mendoza Ardila, Ellen Moscoe, Ana Maria Munoz Boudet, Phillip O’Keefe, Truman Packard, Guillermo Paraje, María Luisa Latorre Castro, Eduardo Lazcano Ponce, Luz Myriam Reynales, Seemeen Saadat, Belen Saenz de Miera Juarez, William Savedoff, Gretchen Stevens, Florence Theodore, Angela Vega Landaeta, Jeremy Veillard, Stéphane Verguet, David Watkins, Daphne Wu, and Feng Zhao

4. HLI Dashboards Workshop

September 20–22, 2022 in Bogotá, Colombia. Sponsored by the World Bank.

Co-Chairs: Gisela Garcia and Jeremy Veillard

Participants: Sameera Altuwaijri, Debapriya Chakraborty, Beverley Essue, Victoria Haldane, Cristian A. Herrera, Prabhat Jha, Maria Luisa Latorre Castro, Seemeen Saadat, Gretchen Stevens, Angela Vega, and Daphne Wu

5. *Healthy Longevity Initiative Technical Workshop II*

October 26–28, 2022, in Washington D.C. Sponsored by the World Bank.

Chair: Sameera Altuwaijri

Participants: George Alleyne, Meriem Boujadja, Angela Chang, Debapriya Chakraborty, Gisela Garcia, Elena Glinskaya, Sundararajan Srinivasa Gopalan, Ramesh Govindaraj, Victoria Haldane, Daniel Halim, Anselm Hennis, Alexander Irwin, Paul Isenman, Prabhat Jha, Toni Joe Lebbos, Ellen Moscoe, Ana Maria Munoz Boudet, Philip O’Keefe, Guillermo Paraje, Seemeen Saadat, Gretchen Stevens, Jeremy Veillard, Stéphane Verguet, and David Watkins

6. *HLI Analytic Meeting*

February 8–9, 2023, in Washington D.C. Sponsored by the World Bank.

Chair: Sameera Altuwaijri

Participants: Rythia Afkar, George Alleyne, Debapriya Chakraborty, Daisy Demirag, Gisela Garcia, Anselm Hennis, Alexander Irwin, Paul Isenman, Prabhat Jha, Bente Mikkelsen, Seemeen Saadat, Ifath Sharif, and Michael Weber

7. *Economic Value of Avoidable Mortality*

March 16–17, 2023, in Toronto. Sponsored by the World Bank and University of Toronto

Co-Chairs: Dean Jamison and Prabhat Jha

Participants: George Alleyne, Sarah Bolongaita, Debapriya Chakraborty, Angela Chang, Ryan Hum, Alexander Irwin, Paul Isenman, Gretchen Stevens, Stéphane Verguet, and Daphne Wu

Appendix D: Background papers

Theoretical base and economic costs

1. O’Keefe, Philip, and Victoria Haldane. *Towards a framework for impact pathways between non-communicable diseases, human capital and healthy longevity, economic and wellbeing outcomes.*
2. Chang, Angela Y., Gretchen A. Stevens, Diego S. Cardoso, Bochen Cao, and Dean T. Jamison. *The economic value of avoidable mortality.*
3. Verguet, Stéphanie, Sarah Bolongaita, Angela Y. Chang, Diego S. Cardoso, and Gretchen A. Stevens. *The economic value associated with avoidable mortality: a systematic assessment by cause of death across regions.*
4. Wu, Daphne C., Debapriya Chakraborty, Ryan Hum, Prabhat Jha, and Dean T. Jamison. *Rates of progress in mortality decline, 2000–2019.*
5. Alleyne, George, Timothy Evans, Alec Irwin, Prabhat Jha, and Jeremy Veillard. *Enhancing human capital and boosting productivity by tackling non-communicable diseases: results of a research initiative.*

Behavior change

6. Rojas, Ana Maria, Ana Maria Munoz Boudet, Ellen Moscoe, Julian Jamison, and Carlos Rumi-allo Herl. *Behavioral aspects of healthy longevity.*
7. Paraje, Guillermo, Prabhat Jha, William Savedoff, and Alan Fuchs. *Taxation of harmful products, including tobacco, alcohol and sugar-sweetened beverages, and related topics.*

Financial and social protection and jobs

8. Demarco, Gustavo, Johannes Koettl, Miglena Abels, and Andrea Petrelli. *Adequacy pensions and access to healthcare: maintaining human capital during old age.*
9. de Silva, Sara Johansson, and Indhira Santos. *Productive longevity: what can work in low- and middle-income countries?*
10. Chakraborty, Debapriya, Daphne C. Wu, and Prabhat Jha. *Exploring the labor market outcomes of the risk factors for non-communicable diseases: a systematic review.*

Long-term care

11. Araújo, Natalia Aranco, and Gisela M. Garcia. *Health and long-term care needs in a context of rapid population aging.*
12. Glinskaya, Elena, Xiaohui Hou, Zhanlian Feng, Marco Angrisani, Guadalupe Suarez, Jigyasa Sharma, Drystan Phillips, et al. *Demand for and supply of long-term care for older persons in low- and middle-income countries*

Gender

13. Gatti, Roberta, Daniel Halim, Allen Hardiman, and Shuqiao Sun. *Gendered responsibilities, elderly care, and labor supply: evidence from four middle-income countries.*
14. Saadat, Seemeen, Meriem Boudjadja, and Sameera Altuwaijri. *Gender gaps in health and well-being of older adults: A review of the burden of non-communicable diseases and barriers to healthcare for women and men.*

Prioritizing action

15. Watkins, David, Sali Ahmed, and Sarah Pickersgill. *Priority setting for NCD control and health system investments.*
16. Govindaraj, Ramesh, and Sundararajan Srinivasa Gopalan. *Control for non-communicable diseases for enhanced human capital: the case for whole-of-society action.*
17. Haldane, Victoria, Gisela M. Garcia, Tahir Bockarie, Daphne Wu, Cristian A Herrera, Maria Luisa Latorre Castro, Debapriya Chakraborty, Beverly Essue, Prabhat Jha, and Jeremy Veillard. *Healthy longevity initiative: a performance dashboard for decision-making in low- and middle-income countries.*
18. Wu, Daphne C., and Prabhat Jha. *Assessing human capital, non-communicable diseases, and healthy longevity in low- and middle-income countries: healthy longevity dashboard and the case for India.*

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The Healthy Longevity Initiative

Demographic change, aging populations, and the rising burden of non-communicable diseases (NCDs) pose formidable challenges worldwide. The drastic shifts in global demographics underway include an increased population of adults, higher mortality and hospitalizations, and heightened caregiving burdens, particularly impacting women.

The World Bank's Healthy Longevity Initiative (HLI) has undertaken comprehensive analyses to offer solutions, turning demographic challenges into opportunities. Key HLI recommendations focus on life course investments to improve health, reduce poverty, address gender inequity, enhance productivity, and increase overall wellbeing. A holistic, country-led approach is crucial, emphasizing the interdependence of responses to demographic shifts, pandemic threats, and climate change.

Governments worldwide can prioritize life course HLI investments to control NCDs, delivering tangible benefits that grow dramatically and swiftly over time. Cost-effective measures, such as expanding low-cost treatments for common vascular diseases and cancers, can have a profound impact on households and societies. Fiscal interventions such as higher excise taxes on tobacco yield remarkably quick benefits. The HLI proposals involve increasing healthcare personnel, including essential nurses and doctors, along with upgrading primary care facilities, which yield substantial returns on investment. The HLI builds upon the remarkable achievements in reducing childhood, maternal and infectious disease mortality. The HLI emphasis on research and development, coupled with global public goods, provides a means to "bend the cost curve" for NCDs.

At its core, the report underscores the imperative for country-driven initiatives to invest in Healthy Longevity. This presents a viable route to alleviate poverty and elevate well-being, utilizing the strength of the entire life course. The life-course approach can increase the impact of human capital, enabling progress and prosperity for all societies.

