



Alma-Ata at 40 years: reflections from the *Lancet* Commission on Investing in Health

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Executive summary

In 2013, the *Lancet* Commission on Investing in Health published its report, “Global health 2035: a world converging within a generation” (GH2035). The report concluded that a grand convergence in health—a reduction in infectious, child, and maternal mortality to rates seen in the best-performing middle-income countries—is technically and financially feasible for all but the poorest countries by 2035. Mortality from non-communicable diseases could be reduced through inexpensive population-based and clinical interventions, especially fiscal policies such as heavy tobacco taxation. Pro-poor pathways to universal health coverage, such as publicly financed insurance, would provide financial protection and essential health-care interventions to everyone—ensuring high-quality, low-cost services at the point of care. And the returns on investing in health, based on methods that include both the benefits of improved economic productivity and the intrinsic value of health, would far exceed the costs.

The 40th anniversary of the Alma-Ata Declaration gave the *Lancet* Commission on Investing in Health an opportunity to assess progress towards grand convergence, and to reflect on the future of primary health care in the context of the modern universal health coverage movement. We also reflected on the future of official development assistance for health and its role in achieving grand convergence and the health-related Sustainable Development Goals.

In GH2035, we emphasised the dynamic features of unprecedented demographic and epidemiological changes and the threats associated with globalisation. In this report, we re-evaluated the feasibility of grand convergence, given that several factors appear less favourable now than in 2013 (eg, rates of economic growth in middle-income countries, deceleration in mortality rates from some infectious diseases). The good news is that if the global trends in mortality achieved in 2010–16 were to continue, the convergence targets for under-5 and HIV/AIDS mortality would be achieved worldwide close to the year 2035. However, if the rates of decline for maternal mortality and tuberculosis remain similar to 2010–16, the convergence targets would not be achieved until 2067 and 2074, respectively. This slow progress underscores the need to identify underperforming countries, and assist them in scaling up proven interventions. For tuberculosis in particular, there is a clear need for new health technologies.

For this report, we adopted a definition of primary health care that centres on the platforms required to

deliver essential interventions close to the population: population-based (public health) interventions, community-based interventions, health centres, and first-level hospitals. We refer to public financing (understood to include social insurance) of a package of priority interventions as essential universal health coverage. Interventions included in essential universal health coverage provide financial protection and prioritise the people who most need them. In addition to the GH2035 convergence agenda of maternal, child, and infectious disease mortality, essential universal health coverage includes prevention, care, rehabilitation, and palliation for non-communicable diseases, such as cancer and cardiovascular disease, as well as for injuries and mental health problems. Cardiovascular disease is likely to be an early priority.

Based on our projections of available domestic resources for health and cost estimates of essential universal health coverage, by 2035 most middle-income countries will be able to afford primary health-care platforms for delivery of essential universal health coverage. However, for many middle-income countries achieving the mortality reduction target for non-communicable diseases from the third Sustainable Development Goal will remain out of reach in the 2030 timeframe. For many low-income countries, domestic health financing systems lack the capacity to complete even the unfinished agenda of grand convergence.

This report develops and sharpens the case made by GH2035 for reorienting health official development assistance to areas where governments have natural incentives to underinvest. Although direct support of high priority health interventions in the poorest countries will still be needed, international collective action for health to support global functions needs to be emphasised. Such functions include supplying global public goods (eg, product development and research), managing negative cross-border externalities (eg, pollution and drug resistance), market shaping, and fostering global health leadership and stewardship. Ensuring support for these global functions is particularly relevant to middle-income countries that will transition out of health official development assistance in the coming years. Global functions can also help middle-income countries reduce internal inequalities in population health, which are often large.

From a long list of potential high return investments in international collective action for health, five priorities emerge:

- Development of improved drugs and vaccines against tuberculosis;
- Preparedness for pandemics, especially a severe influenza pandemic (eg, accelerating efforts to develop a universal influenza vaccine, building reserve vaccine manufacturing capacity, and financing national preparedness and international response efforts);
- Providing international support to national non-communicable disease control programmes (eg, through distribution of best practice guidelines and collective purchase of drugs and other key commodities);
- Development of measurement tools and an evidence base to improve the quality of health systems and their resilience to heterogeneous health threats;
- Providing the resources for WHO and other UN agencies to strengthen their financial and legal capacity to reduce cross-border transmission of drug resistance (eg, to tuberculosis), pollution, harmful substances (eg, tobacco, alcohol, and highly processed foods), and counterfeit drugs and vaccines.

Introduction

In December, 2013, the *Lancet* Commission on Investing in Health (CIH) published “Global health 2035: a world converging within a generation” (GH2035).¹ Written by an international group of 25 economists and health experts, the report laid out an ambitious investment framework for achieving global health transformation within just one generation. Four major propositions were offered.

The first proposition by GH2035 pointed to the historically unique opportunity for low-income countries (LICs) and middle-income countries (MICs) to reduce infectious disease, child, and maternal mortality to rates seen in the best-performing MICs. Existing medical and public health tools, coupled with emerging health technologies, would enable this grand convergence by 2035 at a cost affordable to all but the poorest countries. To fulfil this opportunity for grand convergence, national decision makers need to make a set of priority health investments. The CIH estimated that achieving convergence would cost an additional US\$70 billion annually from 2016 to 2035 (in 2011 US\$). Given the projected economic growth of LICs and MICs, the CIH made the case that most of these costs could be paid through domestic financing, if governments invested around 1–3% of such growth to the grand convergence agenda.

The second proposition by GH2035 was that mortality from non-communicable diseases (NCDs) could be reduced in LICs and MICs. As the threat from infection declines, cardiovascular disease, cancers, chronic respiratory diseases, and injuries become dominant determinants of life expectancy. Mortality rates resulting from such conditions have markedly reduced in

high-income countries (HICs) in the past decades. The CIH made the case for scaling up packages of clinical “best buy” population-wide interventions, such as multidrug therapy for cardiovascular risk reduction and pain relief for palliative care. Fiscal policies such as heavy taxation of tobacco were also discussed in detail as particularly strong levers for reducing cardiovascular disease and cancer incidence and mortality. However, no claim was made that a convergence around NCDs would be feasible in the 2035 timeframe.

A third proposition by GH2035 was that LICs and MICs could make marked progress towards the goal of universal health coverage (UHC) through public finance (understood to include social insurance), with an approach termed progressive universalism. The essence of progressive universalism is to publicly finance and ensure population-wide delivery of an initially limited set of high-quality, very cost-effective interventions that disproportionately benefit poor people. As resource availability improves, the number of interventions in the benefit package can increase. The CIH pointed to policies that could reasonably balance the sometimes competing goals of assuring adequate resources to fund the package of interventions for grand convergence, providing protection against the financial risks that households bear from medical treatment costs, and countering inherently strong pressures for expensive but unproductive expenditures on health.

Lastly, GH2035 conveyed the importance of countries to realise the exceptionally high economic value of successful investment in health relative to cost. The CIH showed that the returns to investing in health have been underestimated because economic studies often only capture the effects of health on economic productivity (the so-called instrumental value of health), measured by household or national income. Such studies do not capture the inherent benefits of better health (the so-called intrinsic value of health). GH2035 estimated that, with a full income approach that captures both the instrumental and intrinsic values of health, the economic benefits of achieving grand convergence between 2015 and 2035 would exceed costs by a factor of about nine to 20, making the investment highly desirable.

In light of these extraordinary opportunities, GH2035 made a case for reorienting official development assistance (ODA) for health to areas where national governments have natural incentives to underinvest: research and development, in particular product development for neglected diseases; pandemic preparedness; and control of cross-border transmission of drug resistance, pollution, and marketing of unhealthy substances. The Commissioners concluded that adequately financing these investments, which requires international collective action for health, should become the top priority for health ODA.

This follow-up to the GH2035 report was written by a team of 15 members of the original CIH,¹ together with eight new authors. Although the original messages of the

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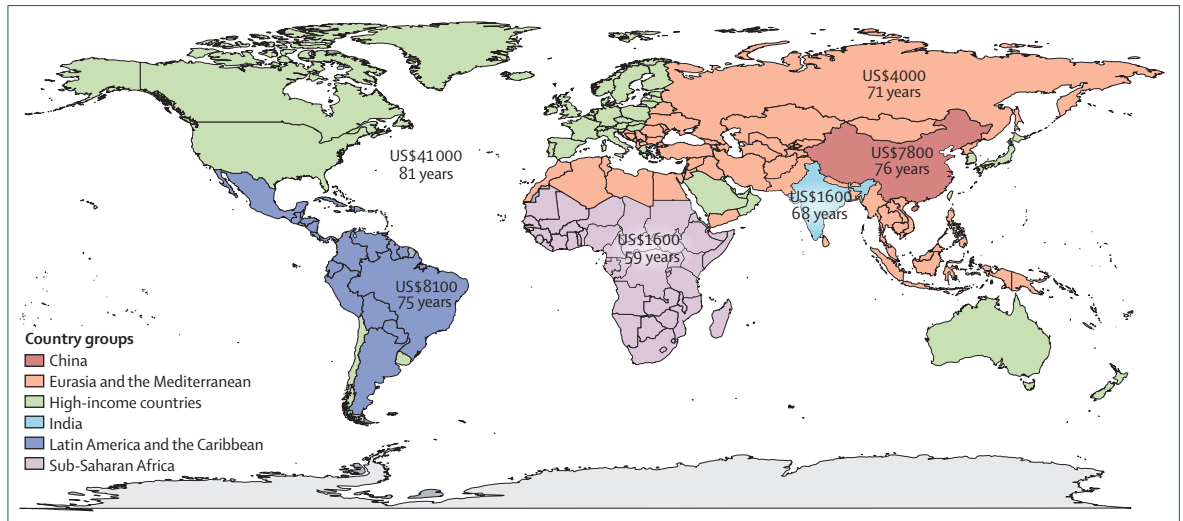


Figure 1: Country groups used in this report

Average gross national income per capita in 2016 US\$ and life expectancy at birth in 2015 is shown for each country group. Global average income per capita is US\$10 000 and global average life expectancy is 71 years. Data are from the 2017 World Population Prospects² and the 2017 World Development Indicators.³

CIH remain relevant, there are compelling reasons for us to revisit the analyses and recommendations of GH2035 5 years on.

In this report, we test our original message about grand convergence in mortality from infectious diseases and maternal and child health conditions. We estimate recent trends in mortality for different diseases and conditions, country groups, and age groups to establish whether, in 2018, the world is on track for convergence by 2035. Figure 1 shows the country groups that were used in this report. The classifications of countries within country groups and the rationale for our choice of country groups are in the appendix (pp 21–24).

We then focus on the future of UHC and primary health care (PHC), beginning with the health challenges that countries face beyond the convergence agenda, including NCDs and injuries. We describe essential PHC platforms to deliver UHC, and discuss intersectoral policies to accelerate progress and complement the health sector agenda. We update GH2035's projections of potential domestic resources for expanding UHC, and refine its messages on resource mobilisation, financial risk protection, and cost containment.

We go on to discuss the future of ODA for health, and for international collective action for health. As MICs transition out of health ODA, we propose a reallocation of such ODA over time, away from direct country support, towards international collective action for health. We summarise the best available information on current financing flows to international collective action for health and on the financing gap. We also identify a number of priority actions for international collective action for health.

We renew the call for national governments to invest in health. We continue to find that such investments boost

wellbeing and prosperity, and provide perhaps the greatest economic returns in the field of development. The vision for domestic and international health policy presented in this report is our effort to provide a concrete and realistic roadmap towards achievement of the aspirational goals of the Alma-Ata Declaration 2.0, the health-related Sustainable Development Goals (SDGs), and health for all within a generation.

The Alma-Ata Declaration 2.0

The upcoming 40th anniversary of the 1978 Declaration of Alma-Ata⁴ provided the first incentive to revisit the analyses and recommendations of GH2035. The anniversary will be marked at the WHO global conference on primary health care on Oct 25–26, 2018, in Astana, Kazakhstan, at which a new declaration, the Alma-Ata Declaration 2.0, will be written.^{5,6} We intend that our new report will inform the deliberations in Kazakhstan and contribute to valuable discussion and debate on the future of PHC. A key motivation for developing this new report was to explicitly define a vision for packages of essential interventions and PHC delivery platforms that could become part of national UHC systems.

Herein, we focus on only one dimension of the important goals proposed by Alma-Ata: reducing mortality, disability, and suffering due to injury and illness. We draw inspiration from Alma-Ata's concept of PHC, adopting a definition that centres on the platforms required to deliver UHC services close to the population: population-based (public health) interventions, community-based interventions, health centres, and first-level hospitals.⁷ Investments in PHC would need to efficiently address specific and common acute and chronic health conditions with interventions that are included in a UHC health benefits package. Alma-Ata's goal of "Health for All" carries over

See Online for appendix
For more on the WHO global conference on primary health care see <http://www.who.int/primary-health/conference-phc>

into the CIH's argument for public finance of progressive realisation of UHC, a concrete and achievable vision for the SDG era.

A changed global health landscape

A lot has changed in the global health landscape over the past 5 years, and we wanted to revisit GH2035 and explore how recent changes could affect the CIH's initial key propositions. We have grouped these shifts into seven categories (appendix p 20). Some trends are new since GH2035, and others were already underway but have accelerated or intensified in the past 5 years.

13 days after GH2035 was published, an 18-month-old boy in Meliandou, Guinea, developed fever, black stools, and vomiting, and died 2 days later.⁸ He was identified as the index case in west Africa's 2014 Ebola outbreak—one of several recent emerging infectious disease epidemics that have shown the weaknesses of our preparedness systems, including the inability of health systems to avert loss of life. Although GH2035 was written before the 2014 Ebola outbreak, it had already raised the alarm about the underfunding of global public goods and other forms of international collective action for health, including product development for neglected diseases, and pandemic preparedness. The two further Ebola outbreaks in the Democratic Republic of the Congo that happened in quick succession in 2018^{9,10} underscore the importance of international collective action for health. Looking to the future, the greatest known threat to global health aside from nuclear war is a severe influenza pandemic, for which we are clearly not prepared—because among other reasons, a universal influenza vaccine has not been developed yet.

Alongside emerging infectious diseases with epidemic and pandemic potential, the magnitude of the global threat from NCDs has substantially increased.¹¹ Progress in implementing the commitments initially made by countries during the UN High-Level Meeting on NCDs in 2011 has been slower than expected.¹² Among the key constraints that impede effective action are the so-called commercial determinants. These are market factors that drive consumption of products that increase the risk of cardiovascular disease and cancer. A series of investigative news reports in 2017 showed the remarkable effort multinational food and drink companies make to penetrate LIC and MIC markets with unhealthy products.^{13,14}

LICs and MICs continue to see rising rates of NCDs and injuries on top of their unfinished agenda of avertable deaths from infections and maternal and child health conditions. The need for medical care for complex and chronic conditions has continued to grow with the shifting epidemiology in these countries, especially in MICs, where the shift has been most pronounced.¹⁵ The rapid rise in obesity worldwide could undercut recent health gains, if aggressive measures are not taken to reduce its prevalence.¹⁶

This transition in disease incidence and prevalence is closely tied to a multifaceted demographic transformation. Generally, populations are ageing, putting enormous pressures on provision of health and social care. At the same time, in many LICs and MICs adolescents now make up a third of the population, and they must often confront a range of health threats unique to this age group, particularly road injuries, HIV/AIDS, suicide, and interpersonal violence.^{17,18} Further complicating these demographic transformations is the mass migration and movement of people in unprecedented numbers. Many countries are poorly equipped to make immigration a healthy and socially productive process.¹⁹

There are indications that some traditional donors, such as the USA, are retreating from their previous positions as champions of global health. In April, 2017, the current US administration withdrew funding to the UN Population Fund, and proposed a 23% cut in US global health funding from fiscal year 2018 to fiscal year 2019 (from \$10.8 billion to \$8.3 billion).²⁰ Just as these traditional donors are in retreat, new donors have emerged over the past few years, including China and the United Arab Emirates,²¹ in a geopolitical realignment that could have profound effects on global health.^{22,23} For example, a recent analysis²² of China's proposed global health investments under its Belt and Road Initiative suggests that these investments could substantially increase global access to low-cost Chinese pharmaceuticals and medical technologies, and provide new health infrastructure in several LICs and MICs.

GH2035 was published at the end of the era for the Millennium Development Goals (MDGs), which have been superseded by the ambitious SDGs. Although the process and deliberations of the CIH were intentionally kept independent of the SDG development process, there are multiple recommendations common to both (panel 1). Where does health sit within an expanded agenda of 17 SDGs and 169 targets?

On the one hand, experts have argued that health has become greatly diluted. Compared with the MDGs, which had three out of their eight goals dedicated entirely to health, only one of the 17 SDGs specifically focuses on health. This could indicate that health has slipped down the development agenda, with development experts arguing that other sectors such as agriculture should now take centre stage.³⁰

On the other hand, experts have pointed to how the SDGs have given a far more comprehensive picture of the challenges that must be addressed to achieve a successful transformation in population health. Unlike the MDGs, SDGs target NCDs, injuries, substance abuse, and environmental risks, focus on achievement of UHC, and lay out multiple means of implementation to reach their targets.³¹ Additionally, all SDGs are connected, and most can be linked back to health.³²

Although the global momentum towards achieving UHC has continued to grow since 2013, at a country

Panel 1: Common elements between Global health 2035, the Millennium Development Goals, Sustainable Development Goals, and universal health coverage

Global health 2035: an independent effort with strong links to the Sustainable Development Goals

Published in December, 2013, “Global health 2035: a world converging within a generation” (GH2035)¹ was well timed to feed into the Sustainable Development Goal (SDG) development process. It was published at a time when the Millennium Development Goals era was coming to an end and a new set of SDGs were being debated. To ensure strong links to the SDG process, the *Lancet* Commission on Investing in Health (CIH), which wrote GH2035, worked closely with the UN and had several Commissioners who were in the UN system. The convergence modelling in GH2035 was also done in close collaboration with the UN. At the same time, the CIH was deliberately convened as an independent group, with both the chairs and the secretariat based at universities. Although being outside the UN was an advantage to ensure independent analysis, the Commission maintained close ties with official agencies, including those in the UN system. For our Commission meetings, we brought together senior representatives from Roll Back Malaria, Stop TB, UNAIDS, and Gavi, the Vaccine Alliance.

The CIH collaborated with the authors of a Global Investment Framework for Women’s and Children’s Health²⁴ that modelled a scale-up of key reproductive, maternal, newborn, and child health interventions. The HIV interventions included in the GH2035 convergence modelling were based on those suggested by the Investment Framework Study Group.²⁵ The malaria control tools were those suggested by the Roll Back Malaria Taskforce’s Global Malaria Action Plan.²⁶ We published details of the modelling both with a 2030 endpoint to synchronise with the SDG target year of 2030, and with a 2035 endpoint.²⁷ The CIH shared its cost and outcome estimates at multiple timepoints during the SDG drafting process, so that they fed into the development of the SDG targets. For example, the CIH estimated that by 2030 an under-5 mortality rate of 27 deaths per 1000 livebirths could be achieved across low-income countries (LICs) and lower-middle-income countries (lower-MICs)—a rate similar to target 3.2 of the third SDG to reduce under-5 mortality to at

least 25 per 1000 livebirths in all countries. Our modelling of grand convergence captured multiple conditions in an integrated way.

Universal health coverage (UHC) and the primary health care agenda

The 2014 *Lancet* Editorial²⁸ “Grand convergence: a future sustainable development goal?” emphasised the unifying function of grand convergence. It argued that the global health community was driven by rivalries between different disease communities, and that grand convergence could help overcome these tensions by being an all-encompassing goal that the whole community can rally behind.

A major proposition by GH2035 was that LICs and MICs could make marked progress towards the goal of UHC through public finance (understood to include social insurance). The entire cost of an initially limited set of interventions for the whole population would be publicly funded. As such, Alma-Ata’s goal of “Health for All” would be carried over into the CIH’s progressive universalist approach.

Although GH2035 did not include quantitative modelling on non-communicable diseases and injuries, the CIH collaborated on a follow-on study²⁹ published in September, 2014, that estimated feasibility of mortality targets for all conditions by 2030. The study showed that all countries could reduce deaths in people under 70 years of age by 40% in their 2030 populations (at 2010 death rates), by achieving 2030 grand convergence targets and reducing premature deaths from non-communicable diseases and injuries by a third. The “40 by 30” target of reducing deaths in people under 70 years of age by 40% by 2030 and the grand convergence targets have taken on additional relevance over the past 5 years in framing discussions about what should be included in an essential package of UHC interventions. For example, based on disease burden, intervention outcomes, cost effectiveness, and feasibility of implementation, the third edition of Disease Control Priorities made the case that essential UHC should begin with interventions to achieve grand convergence.

level, UHC is hindered by weaknesses in health systems such as the health workforce crisis and poor access to medicines and technologies.

Additionally, some confusion remains about what is defined as UHC—the term can be a catch-all, with multiple proposed interpretations, frameworks, and monitoring approaches. Gaining consensus on what constitutes UHC will be important in monitoring whether UHC is achieved.³³ We believe that achieving universal coverage of quality PHC for priority health conditions is feasible.

Nevertheless, simply covering people with a package of defined interventions is not enough on its own. Around

8·6 million lives are lost in LICs and MICs as a result of conditions that are treatable in the health system. Of these deaths, as many as six out of ten could be due to poor quality of care.^{15,34}

With the stagnation of health ODA since 2010,³⁵ LICs and MICs must now find most of the annual funding to achieve the SDG health targets themselves. A 2017 study³⁶ estimated that achieving these targets will require an additional \$371 billion (in 2014 US\$) per year by 2030 across 67 LICs and MICs, representing 95% of the total population living in all LICs and MICs. Most of this additional funding will need to come from domestic resources in LICs and MICs.

Panel 2: Progress on neglected tropical diseases

Using mortality to discuss progress towards grand convergence targets for under-5 mortality, maternal mortality, HIV/AIDS, and tuberculosis is both feasible and reasonable since mortality burden correlates with morbidity burden. “Global health 2035: a world converging within a generation” (GH2035)¹ also included convergence of selected neglected tropical diseases, and those included in the analysis generated substantial morbidity burden and could be prevented by implementation of highly cost-effective mass drug administration programmes. GH2035 established no quantitative targets for addressing these conditions; mortality targets would in any case have been inappropriate since these conditions have a very high ratio of morbidity consequence to mortality consequence. Although our review of progress towards grand convergence is thus unable to relate goals to accomplishments for neglected tropical diseases, progress has been and continues to be substantial.

Worm infections in children provide an important example. In 2013, an estimated 400 million children under 15 years of age carried one or more worm infections and almost 900 million lived in regions of sufficiently high transmission to justify use of mass drug administration.⁵³ Between 2009 and 2013, global coverage of mass drug administration increased from 31% to 47%, and in Africa coverage increased from 32% to 51%.⁵³ Globally, this implies an 8.3% increase in coverage per year over this 5-year period. Similar improvements in coverage were observed for other neglected tropical diseases (such as lymphatic filariasis and trachoma) and in other age groups.^{53,54} Overall, it is plausible that the neglected tropical diseases that are preventable by mass drug administration will cease to be a problem by 2035.

Domestic funding for health in LICs and MICs increased more than five-fold between 2000 and 2015, exceeding \$1.5 trillion.³⁷ Nevertheless, the economic picture that was painted by GH2035, in which LICs and lower-MICs were estimated to be on course to add almost \$10 trillion annually to their gross domestic product (GDP) by 2035, is not as clear today as it was in 2013. The International Monetary Fund has downgraded its growth projections, so mobilising domestic resources for health will likely be more challenging.³⁸ Furthermore, increasing evidence points to health receiving lower budgetary priority in many countries.³⁷

The 2015 Rockefeller Foundation–*Lancet* Commission on planetary health³⁹ argued that unsustainable exploitation of the natural environment will lead to the deterioration of ecological resources that support human life and health. The Commission documented the health effects from a variety of environmental threats, including climate change, loss of biodiversity, land degradation, water scarcity, and overexploitation of fisheries. Examples of health effects included increased rates of water-borne infectious diseases, malaria, air pollution-related respiratory diseases, and injuries due to natural disasters.

New avenues of research and analysis

We also revisited and updated GH2035 to capture new research findings. In a recent review⁴⁰ of the lessons learnt from the CIH, we noted that GH2035 initiated several new directions for global health policy research. (appendix p 3). Since 2013, a range of new analyses have been made as an extension to the analyses by the CIH, and this report provides an opportunity to disseminate these results.

New research has focused on four main areas. The first area of research involves defining the crucial global functions of ODA for health—those that tackle challenges that all countries share—and estimating

levels of donor financing that flow to these functions.^{41,42} The second one estimates the funding needs and requirements of high priority global functions, in particular product development for neglected diseases, and epidemic and pandemic preparedness.^{43,44} The third one involves developing policy proposals to tackle the so-called middle-income dilemma—over 70% of the world’s poorest people now live in pockets of poverty and high mortality in MICs, yet many of these countries have reached a national average income level that disqualifies them from receiving health ODA.⁴⁵ This phenomenon is relatively new; just two decades ago, over 90% of the poorest people were in LICs.⁴⁶ The fourth area of research focuses on the global need for palliative care and pain relief and the magnitude of the gap in palliative care services, and on establishing the nature and cost of an essential package of services that fill this gap.⁴⁷

Several new streams of evidence have also informed our report, in particular the third edition of *Disease Control Priorities* (DCP3), new sources of global epidemiological and demographic data,^{48,49} the emerging work of the Task Force on Fiscal Policy for Health, chaired by Michael Bloomberg and Lawrence Summers, and several *Lancet* Series and Commissions on NCDs and economics, palliative care and pain relief, HIV/AIDS, sexual and reproductive health, and planetary health.^{31,39,47,50,51}

Is grand convergence by 2035 still feasible?

In GH2035 we modelled the effects of a package of essential interventions on population health, including an aggressive scale-up of today’s health technologies to a coverage of 90–95%, improved health delivery systems, and implementation of new technologies that will become available by 2035. Countries that adopt new health tools will have an additional 2% reduction

For more on the Task Force on Fiscal Policy for Health see <https://www.bloomberg.org/program/public-health/task-force-fiscal-policy-health>

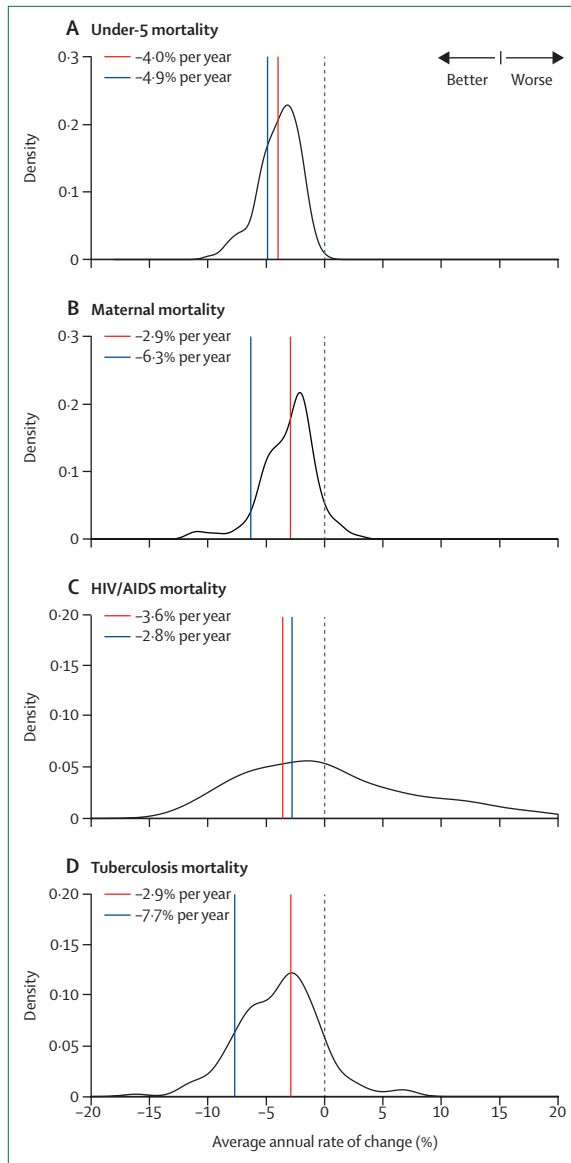


Figure 2: Global distribution of average annual rate of change in mortality rates for grand convergence conditions from 2000 to 2016

The density plots show the average annual rates of change in mortality rates for the four grand convergence conditions for each of the 165 countries included in this analysis (appendix pp 32–55). The red line shows the mean global average annual rate of change between 2000 and 2016, and the blue line shows the mean global average annual rate of change that would be required between 2016 and 2035 to achieve each grand convergence target. About 40% of HIV/AIDS deaths are from tuberculosis; the Global Health Estimates classify all deaths from tuberculosis in HIV-positive individuals as deaths from HIV/AIDS. About 80–90% of all individuals who die from tuberculosis are HIV-negative; tuberculosis mortality includes deaths from tuberculosis in HIV-negative individuals only. Data are from the 2016 Global Health Estimates.⁴⁹

in child mortality per year.⁵² We showed that with these interventions, by 2035 average maternal, child, HIV/AIDS, and tuberculosis death rates across LICs and lower-MICs could fall to rates seen in 2011 in the

best-performing MICs: Chile, China, Costa Rica, and Cuba (known as the 4C countries). Although GH2035 did not include incidence targets, the priority interventions included in the grand convergence agenda would reduce both incidence and mortality.

Based on the performance of the 4C countries (appendix p 25), the 2035 convergence goals were set to 16 per 1000 livebirths for child mortality, an annual HIV/AIDS death rate of eight per 100 000 population, and an annual tuberculosis death rate of four per 100 000 population (in short, “16–8–4”). Although no 2035 target was set for the maternal mortality in GH2035, for the purposes of this new analysis, we used 64 per 100 000 livebirths as the target, in line with the 2011 rates of maternal mortality in the 4C countries. As a result, the full set of convergence targets is now named “64–16–8–4”. The convergence goals were intended to be global targets, though we recognise that lower-MICs could generally achieve lower death rates than LICs by 2035.

For this report, we analysed these four indicators, looking at mortality rates from 2000 to 2010 and from 2010 to 2016 across age groups, causes of death, countries, and country groups. To assess progress towards the 64–16–8–4 targets, we calculated the average annual rate of change (AARC) in maternal, child, HIV/AIDS, and tuberculosis death rates from 2000 to 2010 and from 2010 to 2016, the AARC that would be required from 2016 to 2035 to meet the grand convergence target, the percentage of the 2035 target that had already been achieved by 2016, and the projected year that the target would be reached if the AARC calculated for 2010–16 remains unchanged. Details of the methods and data used for these estimates are in the appendix (pp 4–6).

In our analysis of progress towards convergence, we found that the world is on track to achieve convergence by 2035 for child mortality and HIV/AIDS death rates, but off track for maternal mortality and tuberculosis death rates. Recent progress in tackling neglected tropical diseases is summarised in panel 2. We also reflected on the level of ambition and feasibility of the GH2035 convergence targets.

Progress towards grand convergence

Child mortality

Impressive progress has been made to reduce child mortality since 2000, and the world is generally on track to achieve the convergence target for under-5 mortality. If the global rate of a 4.1% reduction in under-5 mortality per year achieved from 2010 to 2016 were to continue, then the convergence target would be reached by around 2038, with a delay of just 3.7 years from the 2035 target date. An acceleration in the AARC to –4.9% would mean that the goal could be reached by 2035. These encouraging data are reflected by the narrow gap between the blue and red lines in figure 2. Nevertheless, maintaining the current rate of decline might be

challenging, as averting residual mortality might require more advanced interventions and a higher quality of care than is available in all countries.

By contrast, new data from the UN Inter-agency Group for Child Mortality Estimation⁵⁵ suggest the need to move from under-5 mortality to more comprehensive indicators of progress on child health. We propose under-15 mortality as one such measure. This indicator captures antepartum stillbirths, perinatal deaths (including intrapartum stillbirths, occurring after labour begins), early neonatal deaths (after birth but before the seventh day of life), late neonatal deaths (from seventh to 27th day), post-neonatal deaths (from 28th day to 1 year), deaths in early childhood (1–4 years), and deaths in middle childhood (5–14 years). The under-15 mortality rate is highly associated with the under-5 mortality rate (appendix p 84).

By 2015, over 5 million fewer children under 15 years of age were dying each year, compared with under-15 mortality in 2000. The number of deaths fell in every country group, but there were wide variations in the AARC. China achieved the fastest AARC, followed by India, and Latin America and the Caribbean. The pattern was similar for deaths in infants aged 0–4 years, with the fastest rates of decline observed in China, India, Latin America, and the Caribbean. Compared with 2000, the number of stillbirths in sub-Saharan Africa increased by 2015 but fell in every other country group, with China having the fastest rate of reduction yet again (appendix p 26).

The highest number of deaths under age of 15 years both in 2000 and 2015 occurred in the perinatal period (figure 3). In contrast with the progress made reducing deaths in the postnatal period and early childhood, little progress has been made in reducing antenatal stillbirths and deaths in middle childhood.

Maternal mortality

In contrast with under-5 mortality, the world is not on track to reach the 2035 target for maternal mortality. Only 18% of the convergence target had been achieved by 2016.

The AARC for maternal mortality in 2010–16 was just at –2.4%, and at this rate the target would only be reached in 2067, representing a delay of 32 years. Achieving the target by 2035 would require the AARC to accelerate to –6.3%, a rate of change that was not achieved for maternal mortality anywhere in the world in 2010–16 (India came closest with –4.6%). The worrying situation of maternal mortality is shown by the wide gap between the blue and red lines in figure 2.

HIV/AIDS mortality

HIV/AIDS mortality has been reduced with remarkable success. The decline in death rates from HIV/AIDS has accelerated dramatically, from –1.3% per year in 2000–10 to –7.3% per year in 2010–16. If this accelerated

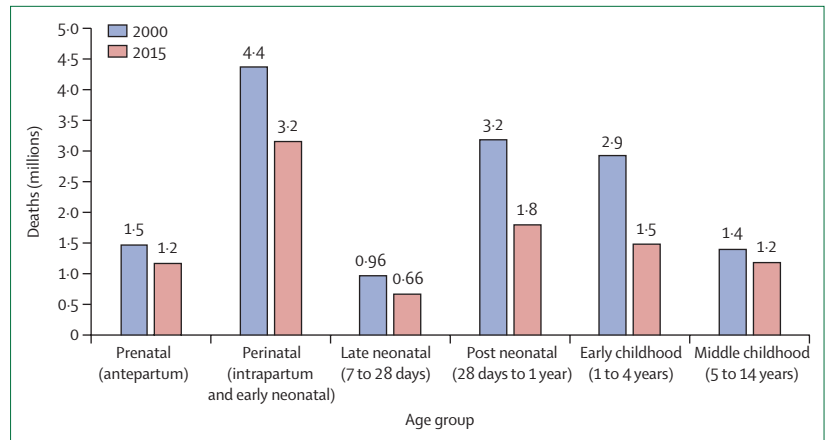


Figure 3: Distribution of under-15 mortality by age group in 2000 and 2015 for low-income and middle-income countries

Stillbirths were defined as the birth of a dead fetus weighing more than 1000 g within 13 weeks of the expected term of birth. Antepartum stillbirths occur before labour begins, intrapartum stillbirths occur after the beginning of labour. Early neonatal deaths occur after birth but before the seventh day of life. The prenatal age group includes antepartum stillbirths and the perinatal age group includes intrapartum stillbirths and early neonatal deaths. Total deaths under the age of 15 years were 14 million in 2000 and 9.4 million in 2015. Under-15 mortality data are from the 2017 World Population Prospects,² stillbirths data are from the 2016 Lancet Series on stillbirths.⁵⁶

AARC continues, the convergence target would be achieved by 2023, 12 years early.

The AARC for HIV/AIDS that has already been achieved is faster than what is required to reach the 2035 target (figure 2). China and India in particular have achieved astonishing rates of decline, with –13% and –12% per year from 2010 to 2016. In both countries, mortality rates were rising from 2000 to 2010. Progress in sub-Saharan Africa has also been remarkable, accelerating from –3.4% per year in 2000–10 to –9.8% per year in 2010–16. However, the data also show that HIV/AIDS mortality in Eurasia and the Mediterranean has increased since 2000. Although the rate of increase slowed after 2010, this country group should not be complacent.

Tuberculosis mortality

Compared with HIV/AIDS, the outlook for tuberculosis mortality is far bleaker. If 2010–16 trends continue, the convergence target for tuberculosis will not be achieved until 2074. By 2016, only 18% of the target for tuberculosis mortality had been achieved.

From 2010 to 2016, the global AARC for tuberculosis was only at –2.5% per year. In six of our eight country groups, the rate of decline in tuberculosis deaths was lower in 2010–16 than it had been in 2000–10, the reverse of what had been observed for HIV/AIDS (appendix pp 29–30). The slowest rates of progress in 2010–16 have been in fragile states, where the AARC for tuberculosis has only been –0.9% per year, and in sub-Saharan Africa, where the AARC for tuberculosis has only been –1.2% per year (appendix p 30). For a global reduction of tuberculosis death rates to four per 100 000 population, the AARC would have to accelerate to –7.7% per year. No

country group came close to achieving such an AARC over 2010–16, although some individual countries, such as Zimbabwe and Turkey, did achieve it (appendix pp 50–55).

The favourable rates of decline in HIV/AIDS mortality are probably capturing some progress in reducing tuberculosis-related mortality among people with HIV. HIV/AIDS is assigned as the underlying cause of death in people with HIV who also have tuberculosis,⁵⁷ and about 40% of deaths in individuals with HIV/AIDS result from tuberculosis.⁵⁸ Although tuberculosis treatment can reduce case fatality, antiretroviral drug therapy can reduce tuberculosis incidence as well as case fatality, and systems of care and follow-up are often better for people with HIV than for the general population, especially when delivered through targeted (vertical) programmes. Continuous global efforts to scale up HIV care will continue to reduce the burden of tuberculosis in this population. Our conclusions about the challenges in achieving convergence in tuberculosis death rates are therefore mostly related to reducing tuberculosis mortality among individuals who are HIV negative, who comprise around 80% of new cases of tuberculosis globally.⁵⁷

Regional and national variation

We looked at the feasibility of adopting the global convergence targets at regional and national levels. Our analysis of historical trends in 2000–16, and future progress that would be required for each region or country to meet the four global “64–16–8–4” grand convergence targets, is in the appendix (pp 27–55). Considerable improvements in the historical performance of AARC would be required to meet these global targets at regional and national levels. For example, sub-Saharan Africa and the fragile states would struggle to meet all four convergence targets, and Eurasia and the Mediterranean and India would struggle to meet the tuberculosis convergence target (appendix p 85).

Heterogeneous progress towards grand convergence

Modelling the scale-up of convergence interventions in GH2035 showed that by 2035 grand convergence would be feasible and affordable for most LICs and lower-MICs, but the poorest and most fragile nations would need more time. The modelling showed the progress that countries could potentially achieve if they chose to prioritise targeted investments that would tackle convergence conditions.

This report shows that if the trends from 2010 to 2016 are maintained, convergence by 2035 will still be feasible for child and HIV/AIDS mortality but not for tuberculosis or maternal mortality. The striking progress in tackling child and HIV/AIDS mortality might reflect the relatively high amounts of ODA that have been targeted to these two focus areas.⁵⁹ Declines in such ODA could affect progress, unless these

declines are compensated by increased domestic funding. About 70% of people with HIV live in sub-Saharan Africa, and most of the heavily affected countries in this region are LICs or lower-MICs. These countries will probably require health ODA for many years to prevent catastrophic resurgence. However, rather than doubling down on recent success, eight out of 14 bilateral donors cut their support to HIV/AIDS last year.⁶⁰

Many people in the HIV community have expressed concern that the recent gains in HIV/AIDS mortality are fragile and could quickly be undercut by a lack of progress to reduce new infections and by increases in drug resistance.⁵¹ One key message from the International AIDS Society–Lancet Commission on HIV/AIDS was that there is no end in sight to the HIV pandemic, and that a dangerous complacency has set in, which has weakened the global resolve to end HIV/AIDS.⁵¹

Given the slow progress to reduce tuberculosis mortality in recent years, four deaths per 100 000 population as a convergence target seems overly optimistic now. When we established this target in GH2035, it implied an ambitious AARC of –6.8% from 2011 to 2035. Hence, convergence on tuberculosis is unlikely, unless breakthrough tuberculosis technologies are developed that could shift the mortality curve. Our modelling in GH2035 assumed that new health technologies could reduce tuberculosis mortality by an additional 2% per year. However, mortality reductions need to progress at substantially faster rates in many countries to reach convergence. Doubling or tripling the national resources devoted to tuberculosis treatment could help to change the trajectory of tuberculosis mortality in countries where the disease has the greatest burden.

Accelerating progress on maternal mortality will not be quite as difficult as for tuberculosis, but it will still be challenging. New technologies will play a crucial part. Other strategies to catalyse progress include an aggressive scale-up of the package of maternal health interventions described in DCP3, which would require structural investments in the health system (including the PHC system); improvements in quality of care; reduction of inequities in coverage; and use of robust evidence in a timely way for policy decisions and accountability.^{61,62}

When it comes to achieving grand convergence, we cannot predict the effect of technological innovations that might become widespread by 2035. Countries are experimenting with a range of approaches that could help lower the price of health commodities (eg, using e-procurement), deliver medicines to remote places (eg, using drones), and improve overall management of health systems (eg, using blockchain technology). These technological innovations are also opportunities to reinvent PHC systems.

Other threats to grand convergence

Unaffordability of GH2035's package of health interventions for the poorest countries, and low prioritisation of health on the national agenda in several large countries such as India, threaten the achievement of grand convergence. The countries with the greatest needs—including fragile, post-conflict nations—are likely to require ongoing, direct financial and technical assistance leading up to 2035 to be on track for convergence. MICs with large populations of refugees, such as Lebanon and Jordan, will require international assistance to cope with increased pressure on their health systems. Nevertheless, analyses by GH2035, DCP3, and many other groups support our contention that increasing ODA for both global functions and for direct support to the countries with the greatest needs would have a very large health and economic payoff.⁶³

Other obstacles to reaching grand convergence are the very large inequities within MICs. In GH2035 we argued that achieving convergence would be impossible without tackling the large pockets of poverty and mortality in MICs. Many MICs will transition away from ODA for health in the coming years, if they reach an income level that disqualifies them from receiving concessional financing. One of the best ways that donors can continue to support communities living in pockets of poverty in MICs is through funding of global public goods and other global functions (eg, market shaping to reduce vaccine prices).

The national level indicators (eg, of child mortality) in MICs such as China, where national convergence targets have already been achieved, might mask vast differences between subnational units. Stark contrasts were shown in a recent subnational analysis of under-5 mortality in China.⁵⁹ In 2012, the rate of under-5 mortality ranged from 3·3 per 1000 livebirths in the Huangpu District in Shanghai (on par with Japan) to 100 per 1000 livebirths in Zamtang County in Sichuan (on par with South Sudan). A study of trends in state-level mortality in India found substantial differences between states in fertility and child and maternal mortality, and in the rates by which these outcomes changed over time.⁶⁴ Of course, MICs are not homogeneous and the size and nature of the regional health inequities are likely to vary. One reason why some MICs have pockets of high mortality is because poorer populations are not receiving life-saving drugs and vaccines, sometimes because of high prices. The international community plays a crucial part in reducing these pockets of high mortality, if they use mechanisms such as market shaping to reduce health commodity prices.

For grand convergence to be possible, interventions must be sufficiently effective and inexpensive, so that LICs can achieve rapid declines in mortality with the right policies. Croghan and colleagues⁶⁵ and DCP3 suggest focusing financial and technical attention on widespread implementation of a few highly effective

interventions. The experiences of China and India illustrate the importance of policy (panel 3). China's famine of 1959–61 has been widely interpreted as a failure of economic and social policy, resulting in 20–40 million excess deaths (appendix pp 57–58). In the decades that followed the famine, however, successful health policies in China led to sustained, rapid reductions in mortality long before China emerged from poverty (appendix p 59). Later, slower progress in India yielded substantial consequences for mortality: excess deaths in India between 1970 and 2010 were four times the number of excess deaths resulting from the Chinese famine (appendix pp 86–89). In recent years, India's life expectancy has begun to converge with China's, and India is now developing health policies that will accelerate the decline in mortality, if these health policies receive enough funding.⁶⁶

The future of domestic health policy, universal health coverage, and primary health care

Fully implementing GH2035's recommended package of interventions related to grand convergence would be an important milestone in domestic health policy, and would lead to substantial improvements in population health. However, since the publication of GH2035 new evidence has shown the continued rapid pace of demographic and epidemiological change, and, therefore, the value of focused investments in prevention and care of cardiovascular disease, cancer, mental health problems, and injuries.^{2,7,49} The 40th anniversary of the Alma-Ata Declaration provides an opportunity to reflect on the future of PHC as the principal delivery platform for the interventions included in UHC, and assess the need for PHC and UHC in LICs and MICs to tackle an expanding set of health topics.

We build on the grand convergence agenda by updating the messages of GH2035 on essential UHC, specifically reflecting on priority interventions for PHC in LICs and lower-MICs. We also discuss the current state of domestic health finance and specific ways in which ministries of health and finance should be preparing for the fiscal challenges that lie ahead.

Health challenges that lie beyond grand convergence

As progress on grand convergence is made, PHC systems will increasingly need to broaden their scope from simple, episodic, preventive, or curative models of care to include integrated, longitudinal models of care for many chronic health conditions. HIV/AIDS practitioners have been faced with this widening of scope for several years,⁶⁷ and the future of health care will require complex and sustained interventions in addition to the simple and powerful interventions that are currently more widely available. Emerging economies now face the challenge of retooling their health systems to successfully deliver future interventions for a broader set of health issues. We identified three health challenges that go beyond grand

Panel 3: Policy and mortality in China and India, 1950–2010

In 1950, China emerged from a civil war that followed a decade of war with other nations. India had very recently ended its colonial status. The world's two most populous countries thus started their modern development trajectories at about the same time. Their trajectories of income and demography suggest lessons about the importance of political factors, and of income and health sector policies, in determining mortality rates. Both countries, but particularly China, had success over the six decades after 1950 in increasing income per person and extending life expectancy. However, the patterns of change differed substantially between the two countries.

The Chinese famine of 1959–61 provides a dramatic example of the importance of political factors. The famine resulted in part from bad weather and ensuing bad harvests, but most observers have also concluded that the Great Leap Forward and other dimensions of public policy amplified the mortality consequences of the famine into one of the major global mortality shocks in the 20th century (appendix pp 57–58). The famine ensured that China's early mortality trajectory was markedly adverse. India, on the other hand, maintained steady reductions in mortality rates from 1950 to 2010.

In the two decades after the famine, China's policy focus on improving population health led to increases in life expectancy in excess of 1 year every year, resulting in an increase of about 23 years from 1965 to 1985. India, starting from a slightly lower life expectancy than China in 1950, managed to increase only half as much life expectancy than China in this period (appendix p 59). Per person, initial income levels were slightly higher in India than in China, but China's income growth rate was noticeably higher. From 1980 to 2010, China's income growth rate grew to about 9% per year, bringing China well into the ranks of upper-middle-income countries. However, during this period of rapidly growing income in China, India reduced the gap in life expectancy between the two countries by 5 years. China's substantial increase in life expectancy occurred while its income remained low, and India has maintained steady but unremarkable increases in life expectancy at relatively low income levels. Country policy can thus make great progress

toward grand convergence at low income levels—if the country chooses to do so.

How substantial are the consequences of falling behind on the path to grand convergence? The answer places the consequences of China's famine of 1959–61 into a broader perspective. We addressed this question in the context of India and China by calculating the number of deaths in India that would have occurred if India's age-specific mortality rates had declined (from their initially somewhat higher levels) at the same rates as China's age-specific mortality rates, using UN time-series data of the age distributions of the population and of the number of deaths. We then subtracted this number from the number of deaths that did in fact occur. The resulting difference provides an estimate of the number of excess deaths that occurred in India as a result of its health policies and other related policies that were lagging behind those of China. We also calculated the number of deaths in children under 5 years of age, deaths under the age of 70 years, and excess deaths occurring between ages 5 to 70 years (appendix pp 86–89). We assumed that the total excess deaths from the Chinese famine were 30 million, of which 28 million were in people under the age of 70 years.

In 1950–60, India had about 5 million fewer premature deaths than it would have had if its rate of mortality decline had tracked that of China's, reflecting the consequences of the famine. However, in each of the four decades from 1970 onwards, India's excess mortality exceeded a reasonable estimate of the total excess mortality resulting from the Chinese famine.

What can we conclude from this analysis? We can see a spectrum of health losses that result from policy failures. At the one end are major shocks, such as the great Chinese famine or the 1918 Spanish influenza pandemic, where the losses are concentrated in time and highly visible. At the other end are missed opportunities to improve health using existing technologies. India's poor gain in life expectancy relative to its level of development illustrates these missed opportunities. Because these losses are spread out over time, they are less visible, but they are just as important.

convergence: expanding grand convergence to a broader set of health conditions; aggressively dealing with high-burden NCDs and injuries in the face of strong demographic shifts; and putting functional PHC systems in place that integrate more effectively with social protection policies and are adaptive and resilient to environmental, demographic, epidemiological, and technical change. Initially, PHC systems could emphasise building capability to tackle common conditions that have cost-effective solutions, such as ischaemic heart disease, but reforms could be designed to be applicable to a range of health conditions.

An expanded set of conditions for grand convergence

The grand convergence package in GH2035 dealt with major adult infectious diseases (HIV/AIDS, tuberculosis, and malaria), neglected tropical diseases, family planning, maternal mortality, and infectious disease mortality in children under 5 years of age. If this package represents the most basic set of UHC interventions for LICs and MICs, then what is next?

Historical experience in HICs and the 4C countries suggests that convergence could also be possible for an additional set of infectious diseases and NCDs attributable to infections. These health conditions affect

older children and adults, and include sexually transmitted infections (syphilis, most importantly), diarrhoeal diseases, lower respiratory infections, cervical cancer, hepatitis B-related chronic liver diseases, and rheumatic heart disease. Age-specific mortality rates for these conditions can be drastically reduced by use of existing interventions, making them great candidates for setting convergence targets.

Excluding the 4C countries, this additional set of health conditions accounted for 1.8 million premature deaths in LICs and MICs in 2016 (table 1). If mortality rates for these conditions in LICs and MICs would have been the same as those observed in the 4C countries in 2016, 1.3 million premature deaths worldwide could have been prevented that year. Prevention of these deaths would represent a 72% reduction in premature deaths from this additional set of health conditions, and a 5.8% reduction in premature deaths from all causes. These rates are probably underestimates of avertable mortality, since age-specific mortality is likely to decline further in the 4C countries as the benefits of immunisation against human papillomavirus and hepatitis B virus begin to take effect. DCP3 and WHO’s analysis of the cost of reaching the SDG health targets recommend a number of specific cost-effective interventions for these additional health conditions.^{36,68} Such interventions could readily be integrated with the grand convergence interventions on existing PHC platforms.

Emerging infections with epidemic and pandemic potential pose an ongoing threat to achieving grand convergence. The greatest threat is a severe influenza pandemic, which could strike any time; 100 years after the great 1918 pandemic, the world remains grossly unprepared. The risk of severe influenza is global, but mortality in LICs and MICs caused by severe influenza would probably exceed mortality in HICs by a factor of 5–10.^{69,70}

We suggest that the major efforts to prepare for pandemics need to happen at the international level. LICs and lower-MICs in particular have little incentive to prepare for low-probability events in the face of so many pressing health needs. Thus, health ODA and international collective action for health should fund national preparedness and mitigate externalities of epidemics that often start out in LICs and MICs. Countries with sufficient domestic resources, including upper-MICs and HICs, should consider investing more in pandemic preparedness as part of the expanded grand convergence agenda.

Divergence of progress with non-communicable diseases and injuries

In 2016, two-thirds of deaths that occurred before the age of 70 years in LICs and MICs were due to cardiovascular disease, cancer, other NCDs, or injuries.⁴⁹ Figure 4 shows the AARC in age-adjusted mortality for NCDs and injuries from 2000 to 2016. Trends have been less

	4C countries (death rate per 100 000 population)	All other low-income and middle-income countries		
		Premature deaths (thousands)	Avertable deaths (thousands)	Percentage change in deaths
Sexually transmitted infections (excluding HIV)	0.033	22	21	-96%
Diarrhoeal diseases	0.17	490	480	-96%
Lower respiratory infections	2.9	620	490	-68%
Cervical cancer	1.8	180	85	-69%
Rheumatic heart disease	2.9	120	61	-90%
Chronic liver diseases related to hepatitis B	17	380	180	-64%
Total	..	1800	1300	-75%

Avertable deaths were calculated by applying death rates specific to age, sex, and cause observed in 4C countries to population estimates in low-income and middle-income countries. Only deaths occurring between the ages of 5 and 69 years were included. Diarrhoeal diseases and lower respiratory infections in children under 5 years of age are already covered in the global health 2035⁵ grand convergence package. 4C countries=Chile, China, Costa Rica, and Cuba. Data from the 2016 Global Health Estimates.⁴⁹

Table 1: Avertable deaths from an expanded set of health conditions for grand convergence, 2016

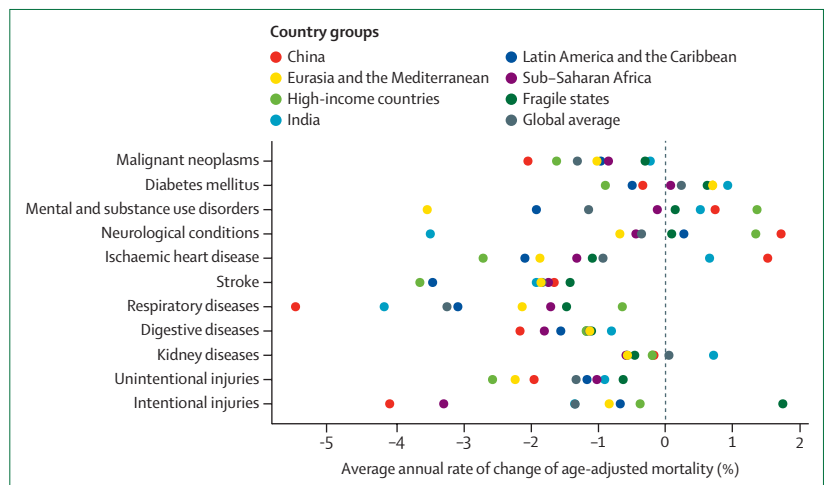


Figure 4: Average annual rate of change in premature (under-70) mortality for non-communicable diseases and injuries from 2000 to 2016 by country group
 The mortality rates were adjusted for the average population age distribution between 2000 and 2016 in each country group. See appendix pp 7–8 for more details. Data are from the 2016 Global Health Estimates.⁴⁹

favourable overall than for those conditions included in the grand convergence agenda, and there appears to be a divergence in mortality taking place, with some country groups experiencing large declines in mortality rates, and other country groups experiencing stable or increasing rates. Table 2 shows the demographic and epidemiological factors affecting premature mortality from ischaemic heart disease, as an example. The divergence in mortality rates for NCDs has been well documented in the Million Death Study in India and is a natural consequence of continued inequalities in case fatality across countries.^{71,72}

	Premature deaths in 2000 (thousands)	Premature deaths in 2016 (thousands)	AARC of premature deaths (%)	Population growth AARC (%)	Population ageing AARC (%)	Total demographic shifts (%)	Epidemiology AARC (%)
World	2600	3400	1.6	1.2	1.4	2.5	-0.90
China	260	550	4.7	0.43	2.7	3.1	1.6
Eurasia and the Mediterranean	1000	1100	0.44	1.2	1.1	2.3	-1.9
India	520	920	3.6	1.4	1.5	1.9	0.66
Latin America and the Caribbean	170	200	1.0	1.2	2.0	3.1	-2.1
Sub-Saharan Africa	190	240	1.5	2.7	0.06	2.8	-1.3
High-income countries	420	360	-0.95	0.47	1.3	1.8	-2.8
Fragile states	140	190	1.8	2.4	0.52	2.9	-1.1

Premature mortality refers to deaths occurring before the age of 70 years. Population growth AARC is the average annual rate of change in the number of deaths that are due to changes in population size. Population ageing AARC is the average annual rate of change in the number of deaths that are due to changes in population age structure. Total demographic shifts are combined effects of these two types of demographic effects. Epidemiology AARC is the average annual rate of change in the number of deaths that are due to reductions in age-specific death rates (ie, reductions in disease incidence and case fatality). The sum of the effects of demographic shifts and epidemiology AARC equals the AARC of premature deaths. Methods for the decomposition of crude death rates are in the appendix (pp 7–8). Fragile states are 33 states that were included in the World Bank list of fragile states for at least 3 out of 5 years between 2010 and 2015 (appendix p 24). The fragile states are not a separate country group but instead are included in the other country groups. AARC=average annual rate of change. Premature mortality data from the 2016 Global Health Estimates.⁴⁹

Table 2: Demographic and epidemiological factors underlying increases in premature deaths from ischaemic heart disease, 2000–16

	Total fertility rate			Total population (millions)			Median population age (years)			Median age at death (years)		
	2015	2035	AARC (%)	2015	2035	AARC (%)	2015	2035	AARC (%)	2015	2035	AARC (%)
World	2.7	2.3	-0.69	7400	8900	0.93	30	34	0.66	68	74	0.43
China	1.6	1.7	0.28	1400	1400	0.13	37	45	1.0	74	77	0.25
Eurasia and the Mediterranean	2.5	2.1	-0.74	1900	2300	0.93	28	33	0.81	67	72	0.37
India	2.4	2.0	-0.87	1300	1600	0.90	27	33	1.1	63	70	0.58
Latin America and the Caribbean	2.1	1.8	-0.70	600	710	0.80	29	36	1.1	68	75	0.51
Sub-Saharan Africa	4.9	3.7	-1.4	1000	1700	2.5	18	21	0.71	28	48	2.9
High-income countries	1.7	1.8	0.20	1200	1300	0.35	40	44	0.47	81	84	0.22
Fragile states	4.4	3.4	-1.3	500	780	2.2	19	23	0.80	34	56	2.5

Total fertility rate was reported as a demographic measure by UNDP. Fragile states are 33 states that were included in the World Bank list of fragile states for at least 3 out of 5 years between 2010 and 2015 (appendix p 24). The fragile states are not a separate country group, but instead are included in the other country groups. AARC=average annual rate of change. Data from the UN Population Division's medium variant projections according to the 2017 revision of the World Population Prospects.²

Table 3: Long-term projections of population growth and ageing in light of continued global demographic transition

Similar to grand convergence conditions, there has also been great heterogeneity in mortality rates for NCDs and injuries at the subnational level, especially in large MICs such as India, where these differences in mortality rates are common between urban and rural areas and across states.^{72,73} However, trends in risk factors for NCDs and injuries differ from risk factors for grand convergence conditions, in that, globally, most behavioural and environmental risk factors for NCDs are increasing rapidly (or are already at crisis levels), whereas risk factors for infectious diseases have been steadily declining since 1990 and now contribute substantially to disease burden only in the poorest countries and subnational units.⁷⁴ In fact, current trends in risk factors for NCDs might even begin to cut into, or even reverse, recent progress (appendix p 8).

Other demographic and epidemiological challenges

Hundreds of millions of individuals worldwide are currently living with chronic health conditions (such as diabetes and depression), even billions in the case of hypertension, and the prevalence of most of these conditions is increasing.⁷⁵ High rates of non-fatal disability from chronic conditions add stress to health systems and reduce economic productivity, adding urgency to the arguments to implement population-level prevention strategies and to prepare health systems for provision of high quality chronic disease care.³¹ Multimorbidity and population ageing are two issues that further complicate the problems brought about by the rise in NCDs, injuries, and their associated risk factors. The appendix (pp 9–10) explores these issues in more detail and outlines possible consequences for ministries of finance and health systems.

Multimorbidity—living with multiple chronic health conditions—is a well described phenomenon in HICs and an emerging issue in LICs and MICs.^{76,77} Studies in HICs have found that individuals with multimorbidity have health-care costs that are orders of magnitude higher than healthier individuals, and the quality of their care is usually worse.^{78,79} Most health systems, especially in LICs and lower-MICs, are not equipped for the complex care that multimorbidity requires.⁷⁸ Contributing to these clinical challenges are gaps in evidence. Most clinical trials and economic evaluations exclude the effects of comorbidity and patient complexity, calling into question the generalisability of research findings.^{80,81} Changing demographics will also continue to place increasing demands on health systems (table 3). Population growth and ageing will lead to larger numbers of middle-aged and older adults (often with multimorbidity) seeking ongoing care for management of NCDs. Furthermore, care for individuals with long-term disability, including older people with frailty, is already consuming a substantial portion of public budgets in HICs.⁸² For cardiovascular disease, diabetes, and cancer, we estimate that demographic shifts caused an increase in deaths due to population growth and ageing at a rate of about 2–3% per year across country groups (table 3, appendix pp 60–62). The implications of these shifts for health-care finance cannot be emphasised enough. Most LICs and MICs are facing historically unprecedented rates of population ageing, and have not had the resources to adapt in the way that HICs have. Increasingly, integration of health care and social care policies will be required to address the wide-ranging household and social consequences of long-term physical and mental disability (appendix pp 9–10).⁸³

It is clear that LICs and MICs cannot simply adopt the models of care practised by HICs, and cannot afford to only invest in the unfinished agenda of grand convergence. We propose that ministries of health and finance develop and adopt a PHC transformation agenda in parallel with this unfinished agenda, to help guide LICs and MICs through these changes in population growth and ageing.

Transforming UHC and PHC through essential packages

Here, we consider some of the first steps of health system transformation in light of the UHC and PHC agendas. The health policy roadmap we present here has the potential to achieve substantial progress towards the goals that were set in the original Declaration of Alma-Ata and in the SDGs.

A concrete notion of UHC to inform the PHC agenda

The starting point for health system transformation is a concrete notion of UHC that makes use of an explicitly defined, guaranteed, publicly financed set of essential health interventions (a health benefits package).⁸⁴ Our concept of UHC draws heavily on recommendations

and findings from DCP3, which viewed interventions as essential when they provided high value for money, were locally relevant, and feasible in resource-limited settings.⁷ Panel 4 provides some context for the evolution of the Disease Control Priorities effort and UHC-related innovations in DCP3. This UHC concept builds on the principle of progressive realisation of UHC put forward in GH2035. Although an explicitly defined health benefits package is of crucial importance to achieving health goals, this topic has been relatively understudied in academic and grey literature, compared with other topics like financing arrangements.⁶⁸

DCP3 provides a comprehensive and specific set of normative recommendations on the contents of UHC health benefits packages in LICs and lower-MICs.⁶⁸ The intention behind providing normative guidance is to establish a starting point for country-specific discussions rather than to prescribe specific actions. The model package was termed essential UHC, and consisted of 218 unique health interventions across five health sector delivery platforms (panel 4). For this report, we adopted the DCP3 framing of health care delivery platforms and use the term PHC to denote the four platforms that serve as the first point of contact for most health needs: community platforms, health centres, first-level hospitals, and population-based health interventions. All but 20 of DCP3's 218 essential UHC interventions are delivered on PHC platforms, illustrating the high degree of overlap between essential UHC and PHC.

A major objective of UHC is to provide protection against the financial risks of seeking care. UHC initiatives in HICs with robust PHC systems tend to allocate large amounts of resources to acute and specialised (often tertiary-level) services, which could be major sources of financial risk in the absence of prepayment. These types of financial risk do exist in LICs and MICs, but the need for financial protection must be balanced against the high-value investments in PHC that are crucial to preventing acute illness or injury, and help to reduce a substantial amount of financial hardship in the first place. Relative to HICs, efficient pathways to UHC in LICs and MICs will probably emphasise essential PHC interventions that include first-level hospital care, rather than specialised and referral care. Essential UHC is DCP3's solution to balancing health gains and financial protection. An extended cost-effectiveness analysis⁸⁷ of health interventions in Ethiopia illustrates one potential analytic approach to making these trade-offs explicit.

For many LICs, even DCP3's essential UHC package will be challenging to implement, because of reduced governance capability and human capacity and financial limitations. DCP3 introduced the concept of a highest priority package, tailored to the health needs and resource limitations of very poor countries.⁶⁸ Highest priority package interventions were extracted from the

Panel 4: Essential universal health coverage in the third edition of Disease Control Priorities (DCP3)

DCP3 was a 7-year international collaborative effort to synthesise evidence and provide recommendations for health priorities in low-income countries (LICs) and middle-income countries (MICs). The history of the Disease Control Priorities efforts is summarised in a *Lancet Review*⁷ published at the launch of the final volume of the series in London, UK, in December, 2017. DCP3 involved over 500 authors, 230 peer reviewers, and 33 editors who developed 172 chapters addressing specific health topics. These chapters were organised into nine volumes that were oriented towards specific professional communities (eg, surgery, cancer, and major infectious diseases).

One of the most important outputs from DCP3 was a set of 21 essential packages, presented throughout the nine volumes. The essential packages were also oriented towards professional communities and specific clusters of health topics (eg, reproductive health, palliative care and pain relief, and pandemic preparedness). Interventions were included in these 21 packages if they provided good value for money, were feasible to implement in LICs and MICs, and addressed a relevant burden of disease.

Volume nine of DCP3 contains two chapters that separate the content of the 21 essential packages into health sector interventions and intersectoral interventions.^{68,83} Duplicate interventions were removed and intervention phrasing was standardised. The final health sector package, termed essential universal health coverage (UHC), had 218 interventions.

The 218 health sector interventions were characterised by delivery platform: population-based health interventions (n=13), community-based health interventions (n=59), health centres (n=68), first-level hospitals (n=58), and referral and speciality hospitals (n=20). Although the specific ways in which platforms are defined will vary from country to country, DCP3 viewed platforms as a key part to the integration of health interventions. For example, in a community setting, the same school can deliver a range of interventions including deworming, vaccination against human papillomavirus, and health education and promotion. The same health centre can deliver antiretroviral therapy, cardiovascular disease screening, and treatment for depressive and anxiety disorders. The same first-level hospital can deliver surgical care for severe injuries, manage complicated cases of

tuberculosis, and provide some specialised care in the outpatient department for less frequent and more complex non-communicable diseases (NCDs), such as rheumatoid arthritis and congenital disorders. Notably, all but 20 of DCP3's 218 essential UHC interventions are delivered on primary health-care platforms. Integration of interventions within platforms can facilitate high-quality care and produce natural economies of scope. Over time, well designed platforms can incorporate additional health interventions more easily, if resources allow.

An additional suggestion by DCP3 to improve health system design and quality was the characterisation of interventions as urgent, chronic, or time-bound (non-urgent). Urgent and chronic interventions such as stabilisation of fractures or long-term management of diabetes must be easily accessible (ie, delivered close to where people live). Interventions that are not time-constrained can be delivered by accumulating cases over time and space to improve quality and reduce costs. Examples include immunisation and cataract repair.

DCP3's cost analyses found that about 50–60% of the incremental costs of essential UHC and highest priority package interventions would be for interventions based in health centres, with about 25% of the costs for first-level hospitals and 10–20% for community-based interventions. About 40–50% of incremental costs would be for chronic interventions, with about 25–33% for urgent interventions and the remaining 25% for interventions that were time-bound. Compared with current spending patterns (especially in LICs), these costs would represent a substantial shift towards facility-based services, especially for chronic diseases (including NCDs, HIV, and tuberculosis) and injuries.

Beyond essential UHC, new interventions would ideally be incorporated on the basis of explicit criteria, such as those used in DCP3, perhaps guided by a national health technology assessment programme. Expanding the UHC benefits package itself could also be accompanied by structural reforms and new models of care that better address issues like multimorbidity and the needs of ageing populations. A crucial final point is that the delivery of UHC needs to be accompanied by measures that improve quality of care as well as population uptake of these interventions.^{85,86} These measures are summarised briefly in DCP3's UHC chapter, and in detail throughout various chapters in the series.⁶⁸

essential UHC list according to criteria derived from the final 2014 report of the WHO Consultative Group on Equity and Universal Health Coverage:⁸⁸ very good value for money, priority to the most disadvantaged, and high likelihood of providing financial protection. The highest priority package had 108 of DCP3's 218 recommended interventions for essential UHC. Its core was an updated version of the GH2035 grand convergence package, but it went substantially beyond GH2035 to include more

interventions for adult infectious diseases, chronic NCDs, and injuries, as well as palliative care and pain relief. Although sparser in content, the highest priority package was designed to be catalytic and forward-thinking for the range of interventions that will be needed as LICs undergo epidemiological transition and their health systems become more advanced. Similar to essential UHC, most of the interventions in the highest priority package were based on PHC platforms.

To what extent could a concrete notion of UHC help countries reach the third SDG: “ensure healthy lives and promote well-being for all at all ages”? A modelling analysis of the essential UHC package and highest priority package in LICs and lower-MICs found that they both had potential for substantial progress towards achieving SDG 3. The analysis was framed within an overarching SDG 3 40×30 target of reducing premature mortality from all causes in people aged under 70 years by 40% by 2030.²⁹ Progress towards this target would depend on the extent of intervention coverage achievable by 2030 and ability to deliver high-quality care. If essential UHC could be extended to the whole population, and if interventions were delivered as well as what had been achieved in clinical trials, the 40×30 target could be reached (appendix p 92). A 95% coverage of the essential UHC package would allow LICs and lower-MICs to reduce premature deaths from grand convergence conditions by two-thirds (preventing around 5·5 million deaths by 2030). Realistically, in the absence of considerable new investment to expand intervention access and improve quality, reductions in mortality from tuberculosis and the major NCDs would not be sufficient to meet specific SDG 3 targets, or overall targets such as the 40×30 target.

One clear conclusion from DCP3’s analyses is that the technical effectiveness and efficiency of health interventions is only one factor involved in reaching SDG targets. Without simultaneously addressing systemic barriers, gaps, and bottlenecks, such a package of interventions would not translate into better health. A summary of common barriers to delivering essential UHC and PHC interventions is in the appendix (pp 10–11).

The importance of engaging other sectors in health policy

Another indispensable set of tools to achieve health for all are intersectoral policies. DCP3 provides a comprehensive set of recommendations for policies that are typically implemented by ministries other than ministries of health, and have the potential to provide substantial benefits to population health.⁸³ These policies might take the form of fiscal measures (eg, tobacco taxes), laws and regulations (eg, to increase air quality), changes to the built environment (eg, road safety measures), or information and education programmes (eg, about the nutrient content of food). The intersectoral policy agenda is especially relevant to SDGs that do not focus on health, as many of these specific policies also benefit targets in other sectors and SDGs. The appendix (pp 12–14) presents a detailed discussion of intersectoral policy priorities as summarised in DCP3.

We identified two major emerging themes within the intersectoral policy agenda: transformation of human diets and transformation of urban environments. These themes coincide with the ongoing need for greater progress on tobacco control in LICs and MICs.⁷⁴

Controversy remains about the effect of dietary sugar, refined carbohydrates, fats, and proteins on the risk of obesity, cardiovascular disease, and selected cancers. Efforts to improve the relevant science base hold clear priority, given the major implications for health outcomes and the financial consequences of dietary choices for households. That said, several clear messages have emerged around the desirability of fruits and vegetables and the undesirability of added sugar (appendix p 13). A multifaceted and comprehensive approach to dietary risk will be required that includes implementation of taxes (especially on sugar-sweetened beverages) and removal of ineffective subsidies (appendix pp 12–13). The capacity for implementing fiscal policies will differ by country, but in many countries taxation of sugar-sweetened beverages would be an early priority, followed eventually by taxes on sugar. Some countries could also consider removing ineffective subsidies on agricultural commodities (eg, corn). A comprehensive approach would also include a variety of regulations on harmful additives, and bolstering of consumer education.

Similarly, rapidly developing urban environments have created a number of interrelated challenges, including polluted air, unsafe roads, and insufficient infrastructure to support physical activity and exercise.⁴⁸ In view of the health consequences that might follow, and the long-term threat of climate change, an important initial step required for all countries is to put in place fiscal and regulatory measures to reduce harmful levels of air pollution. In 2015, global subsidies (broadly defined) for fossil fuels were about 6·5% of global GDP.⁸⁹ A range of urban infrastructure reforms will likely be appropriate for different types of cities; however, the key element in any setting will be to systematically incorporate health considerations into urban planning and development.

Of course, a number of other important issues remain on the intersectoral agenda, many of which intersect with the two major emerging themes and with SDGs not related to health. For example, in addition to raising the risk of obesity, current global food systems result in environmental degradation, reductions in water availability and quality, and depletion of fish stocks, to name a few.³⁹ Thus, ministries of health have an important part to play in advocating for “Health in All Policies” as part of sustainable development,⁷⁵ alongside achieving SDG 3 through PHC and essential UHC.

Implications of essential universal health care for domestic health finance

A shift in health priorities towards the types of interventions summarised in this report will require strengthening of financing systems, mobilisation of additional domestic resources (or at least channelling of more resources towards the prioritised PHC package), and proactive steps to contain unproductive cost escalation. In the following section, we briefly

review the state of domestic health financing worldwide and estimate the potential domestic resources for health during the grand convergence period. Then, we remark on some measures that can improve the fiscal sustainability of essential UHC and PHC. The appendix (pp 15–19) provides more detail on each of these issues.

Recent trends in domestic spending

In 2015, \$7·3 trillion was spent on health worldwide, accounting for 7% of global GDP. Since 2000, the health sector of the global economy has grown at a faster rate annually (4%) than the overall global economy (2·8%), and in LICs and lower-MICs health sector growth has been even faster (6%).³⁷ Growth in health spending has been primarily driven by increased domestic rather than external resources; external resources are only an important source of finance in LICs, where they represent 30% of current health expenditure.³⁷ Yet LICs have generally decreased the allocation of domestic resources to health and have become even more reliant on ODA for health since 2000.³⁷

In our re-analysis of WHO’s Global Health Expenditure Database, we break down trends in the growth of public expenditure on health (from domestic sources) and out-of-pocket spending by households (appendix pp 64–65). Although a major objective of UHC is to reduce out-of-pocket spending, trends have been mixed across country groups, with more progress in MICs (although less so in India). As countries move forward with UHC, we strongly believe that they should clarify that their primary objective is to minimise financial barriers created by out-of-pocket spending on the publicly subsidised UHC package. The UHC package should be guaranteed for everyone, and poor people should be exempted from copayments. It will also be important for countries to minimise the share of public spending on interventions outside of the UHC package. To disincentivise its use, out-of-pocket spending could be redirected towards low-value, non-essential health interventions, although this must be done carefully to avoid increasing medical

impoverishment from services for which the public perceives a need.

Another important recent trend is the lack of improvement in prioritisation of health sector spending in many countries. From 2000 to 2015, the percentage change in the ratio between public expenditure on health (from domestic sources) and general government expenditure—a measure of increasing prioritisation—was only weakly positive or even negative in most country groups, with China and sub-Saharan Africa reprioritising health to a greater extent than the other country groups (appendix p 64). Nevertheless, insufficient economic growth and high amounts of debt in some countries might hinder prioritisation of health in sub-Saharan Africa. We note that although growth in health sector prioritisation might have been modest, some governments are prioritising health by investing in services outside of the health sector, such as water, sanitation, and hygiene. Intersectoral spending on measures that improve health is generally not reflected in national health accounts.

Mobilising resources for essential UHC

Many LICs and lower-MICs are currently underinvesting in essential health interventions, and slow growth in future health spending will likely create barriers to achieving grand convergence and the SDG 3 targets. We do not advocate for increased public expenditure on health overall, but rather for increased spending, through national UHC systems, on specific interventions that provide good value for money and improve health equity. This distinction is crucial to reassuring ministries of finance that additional resources will be spent well and will lead to substantial economic returns. But what sorts of resources might be required to finance this disciplined approach to UHC?

We updated DCP3’s estimates of the cost of essential UHC and highest priority packages in LICs and lower-MICs, focusing on PHC-based interventions (appendix p 16).⁶⁸ Figure 5 shows incremental costs of priority health interventions by delivery platform and area of focus. The total annual cost (the sum of current spending and incremental costs) of essential PHC interventions across LICs and lower-MICs at 80% population coverage would be about \$350 billion, or about \$97 per capita on average (in 2016 US\$). About \$29 per capita in total would be spent annually on the grand convergence conditions and \$68 per capita on other conditions, including other infectious diseases, NCDs, and injuries, and cross-cutting services like rehabilitation, surgery, and palliative care. Overall, most investments would be in health centres and for chronic health conditions that affect adults.

Can countries mobilise enough domestic resources to finance essential UHC in the coming decades? We projected domestic resources in 2035 under two scenarios (appendix p 17). The baseline scenario assumes that only GDP growth would generate addi-

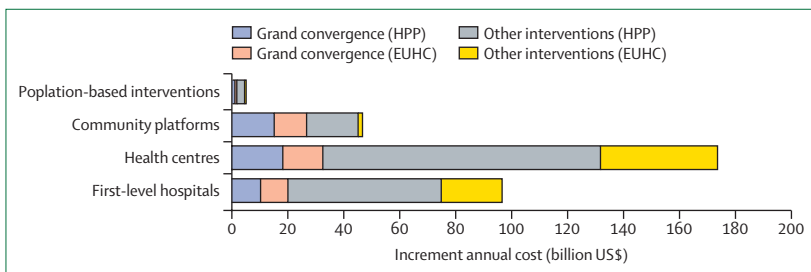


Figure 5: Incremental costs of priority health interventions on different primary health-care platforms in low-income and lower-middle-income countries
 Costs are higher than those presented in the 2013 report¹ by the Lancet Commission on Investing in Health because the third edition of *Disease Control Priorities* recommended a broader range of interventions for grand convergence, and because these estimates are in 2016 US\$. HPP=highest priority package. EUHC=essential universal health coverage. Data for country income groups are based on the 2014 World Development Indicators.⁹⁰

tional resources. Domestic resources for health in 2035 would be about \$20 per capita in fragile states, \$30–40 per capita in India and sub-Saharan Africa, and \$200–700 across China, Eurasia and the Mediterranean, and Latin America (appendix p 66). The more optimistic scenario assumes that public spending on health from domestic resources as a share of GDP would grow by an additional 1% per year. In addition to the resources generated by GDP growth alone, this reprioritisation would provide about \$5 more per capita in fragile states, \$10 more per capita in India and sub-Saharan Africa, and \$30–100 more per capita in China, Eurasia and the Mediterranean, and Latin America (appendix p 66).

Comparing these projections with essential UHC and highest priority package cost estimates suggests that essential UHC is currently affordable for most MICs, except for India. Most LICs, and sub-Saharan Africa as a region, are currently unable to afford the essential UHC package and even the more focused highest priority package (which could cost about \$49 per capita on average). India might be able to afford the highest priority package by 2035, but only through a combination of economic growth and increased prioritisation. Many countries in sub-Saharan Africa (a number of which are also classified as fragile states) will continue to have difficulties financing even the highest priority package from domestic sources, unless their institutional and macroeconomic conditions improve substantially.

Our analysis implies that raising more revenue is the principal means of generating resources for the prioritised PHC package. Other analyses have noted additional measures that could be considered,⁹¹ such as tackling inefficiencies in spending programmes that exist even in HICs. In some contexts, rationalisation of expenditures could release as many resources as those that would be gained from revenue increases in the coming years.⁹² Finally, although a variety of alternative and innovative financing sources have been explored in recent years,⁹³ evidence suggests that the approaches discussed here (macroeconomic growth, increased prioritisation, and increased efficiency) will provide the majority of new resources in most countries (appendix p 17).^{91,93}

Sustainable growth in health spending

This report has advocated for a UHC package comprised of interventions that provide good value for money, among other criteria. Yet even countries that use rational priority-setting processes struggle to contain growth in health spending. We briefly reflect on a few measures that can help ensure the sustainability of health financing and are likely to be important to LICs and MICs working towards UHC.

For many countries, collecting revenue is less challenging than pooling it effectively.⁹⁴ A key determinant of the success and sustainability of essential UHC will be the development and integration of risk pools—preferably, a single pool or a few large pools that allow

for cross-subsidisation between wealthy and poor patients and between high-risk and low-risk patients.⁹⁵ The demographic and epidemiological transitions that we reviewed in this report suggest that pre-emptive action should be taken in the design of risk pools, to mitigate risk selection and adverse selection problems that will naturally emerge as a result of a growing number of older, chronically ill individuals with multimorbidity (appendix p 18).

Aside from challenges in risk pooling, most countries moving towards UHC struggle to contain costs.⁹⁶ The biggest problem is not the amount of spending on health overall, but the widespread spending on low-value care. The appendix (pp 18–19) summarises a few lessons from the informative but sparse literature on cost containment. In light of the growing concern over cost escalation in LICs and MICs, particularly in those that are early adopters of UHC, a priority area for research—funded through international collective action for health—is the study of cost containment measures for health systems in diverse demographic and epidemiological environments.

The future of health ODA and international collective action for health

Trends in donor funding for health

A number of LICs and MICs are projected to experience substantial economic growth in the next two decades. These countries will increasingly be able to reduce their dependence on donor support and finance their health goals through domestic resources alone.

However, income projections also indicate that there will still be at least 25 LICs in 2026 that will need continued donor support. Additionally, emergency situations such as conflict and drought undermine progress in global health, with a disproportionate effect on the health of women and children. In 2017, 535 million children were living in countries affected by emergencies, conflict, and state fragility.⁹⁷

Despite the continued need for donor funding, health ODA (plus funding from the Bill & Melinda Gates Foundation, which counts as private flows) has stagnated in recent years (appendix p 93). In 2016, donor funding for health amounted to \$21.1 billion—the same as in 2013.³⁵ The sum does not include any private flows, except for the funding from the Gates Foundation. It therefore differs from the higher estimate of \$37.4 billion provided by the Institute for Health Metrics and Evaluation in 2017.⁹⁸ The institute's estimate contains additional funding beyond ODA, including private flows, other official flows, and debt repayments. This stagnation in health ODA potentially threatens a grand convergence in the poorest countries dependent on financial aid.

Funding for international collective action for health

The transition of MICs out of health ODA in the coming years should be accompanied by a reallocation of ODA to

Panel 5: Market shaping by Gavi, the Vaccine Alliance

Since Gavi, the Vaccine Alliance, was founded in 2000 it has worked with its partners, UNICEF and the Bill & Melinda Gates Foundation, to shape markets for new and underused vaccines. Before Gavi's founding, uncertain demand and funding provided weak incentives for manufacturers to expand capacity for existing vaccines and invest in new vaccines for low-income and middle-income countries. These barriers resulted in long delays between the introduction of new vaccines in industrialised countries and their introduction in the rest of the world. Market shaping by Gavi is intended to ensure an adequate and secure supply of high-quality vaccines, reduce vaccine prices to affordable and sustainable levels, and incentivise the development of suitable and high-quality vaccines and related products. Key elements of market shaping include the regular provision of demand forecasts as well as desired product characteristics (particularly to manufacturers in low-income and middle-income countries); the certainty of Gavi funding; pooled procurement by the UNICEF Supply Division for Gavi vaccines; and prequalification of specific products by WHO.

To date, one remarkable achievement has been made in the market for pentavalent DTP-HBV-Hib vaccines. Gavi has supported the introduction of pentavalent vaccines; Kenya was the first to introduce it in 2001, and South Sudan was the last of 73 countries to introduce the vaccine in 2014. As the demand and secured funding for pentavalent vaccines has grown, so have the number of manufacturers supplying this market. The price has fallen as well. The pentavalent vaccine had one supplier to the UNICEF Supply Division in 2001, offering the vaccine at US\$3.50 per dose for Gavi-eligible countries. By 2017, there were five manufacturers supplying the vaccine to the UNICEF Supply Division, with the lowest price offered at \$0.68 per dose—about 20% of the price offered in 2001. Furthermore, the benefits of this fall in price and excess production capacity now go beyond Gavi-eligible countries. The manufacturers will also supply the vaccine at these prices for any procurement through UNICEF Supply Division for the period 2017–19, regardless of whether the countries are supported by Gavi.

areas where governments have natural incentives to underinvest. In 2013, the CIH argued that donors had been underinvesting in international collective action for health (global functions of health ODA that are characterised by their aim to address transnational challenges).¹ Support for global functions is distinct from country-specific health ODA, which aims to tackle time-limited problems within individual countries that arise from constrained national capacity. A natural response of finance ministries to country-specific health ODA is to reduce domestic public finance—ie, money is often fungible.

The CIH has developed a taxonomy of international collective action for health with three categories: supplying global public goods (eg, generating and sharing knowledge); managing negative cross-border externalities (eg, preparing for pandemics); and fostering global health leadership and stewardship (eg, priority setting).⁴² New analyses made in a Health Policy paper⁴¹ as an extension to the analyses by the CIH found that about a fifth of all health ODA was directed to these three global functions in 2013 (appendix p 94).

Supplying global public goods

Product development

In GH2035, we emphasised the pronounced effect technological progress has on health, and the need to invest in product development for neglected diseases, including HIV/AIDS, malaria, tuberculosis, pneumonia, diarrhoeal diseases, and neglected tropical diseases. Annual global spending from public, private, and philanthropic sources on product development for such diseases is about \$3 billion.⁴³ A new study from 2016 suggests the

annual funding gap for advancing the current pipeline and developing crucial missing products is at least \$1.5–2.8 billion over the next five years.⁴³ This study also shows that the current pipeline of vaccine candidates is unlikely to lead to launches of highly efficacious vaccines for HIV, tuberculosis, malaria, and hepatitis C by 2030, although these tools could be game changers. For example, a 70% efficacious HIV vaccine could reduce new HIV infections by 44%.⁹⁹

As discussed previously, there is a particular need for additional investment in new tuberculosis products. Studies suggest that current funding might be sufficient for short-term success—for example, to develop a triage test and regimens for drug-resistant tuberculosis based on repurposed drugs.¹⁰⁰ However, the development of truly transformative treatments and prevention tools (eg, a test for incipient tuberculosis, or new vaccines) requires substantially more funding.¹⁰⁰ Without new technologies, which would need to go hand-in-hand with improved quality of care, global tuberculosis targets will not be met. Furthermore, unless new technologies are quickly implemented and tested, the incentives for product developers will be greatly reduced.

Market shaping

Developing new technologies is crucial, but making them accessible to countries is just as important. Market shaping involves LICs, MICs, donors, and procurers using their purchasing power, financing, influence, and access to technical expertise to address the root causes of market shortcomings and influence markets for improved health outcomes.

Gavi, the Vaccine Alliance, is the main global funder of vaccines for LICs and lower-MICs. Gavi has transformed the market for vaccines through market shaping, pooling demand from countries, and guaranteeing long-term funding through country cofinancing and donor financing mechanisms. By 2017, for example, the price of the pentavalent vaccine dropped to a fifth of the price that was offered in 2001 (panel 5). The percentage of LICs and MICs supported by Gavi that introduced rotavirus vaccines and pneumococcal conjugate vaccines is similar to the percentage of HICs that introduced these vaccines, and substantially higher than the percentage of MICs not supported by Gavi that introduced these vaccines.¹⁰¹

Market shaping is still in its infancy for improving access to NCD and palliative care products in LICs and MICs, although there have been some promising developments in recent years. One example is the Pan American Health Organization (PAHO) Strategic Fund, a pooled procurement mechanism that brings drug prices down by pooling demand and purchasing for several countries at the same time.¹⁰² Since 2013, countries in the Americas have been able to use the fund to purchase medicines for chronic cardiovascular and respiratory diseases, cancer, and diabetes.

Knowledge generation and sharing

Progress in global health is being hindered by a large delivery gap—the gap between our knowledge of evidence-based interventions and their actual delivery. The delivery gap is compounded by a technical gap in high burden countries, in which national planning and implementing bodies are often underfunded, resulting in reduced capacity to define health priorities, appraise and use scientific evidence, and plan and evaluate health programmes.¹⁰³

The CIH argued that one of the most important roles for international collective action for health is helping to close the delivery gap by supporting population, policy, and implementation research (PPIR).¹ PPIR captures both the emerging field of implementation science and its sister domain, health policy and systems research. The goal of PPIR is to identify best practices and to facilitate their diffusion across countries. PPIR is a priority area for international collective action for health, but individual governments have few incentives to invest in knowledge-generating activities that have positive externalities.

Investments in PPIR are needed across many health areas. However, given the ongoing shifts in the global burden of disease, PPIR will be particularly important for NCDs. PPIR is a major focus of the Global Alliance for Chronic Diseases and the US National Heart, Lung, and Blood Institute's Center for Translation Research and Implementation Science. Global health donors—particularly those who currently do not support the implementation of NCD programmes—could fund PPIR for NCDs to find out which areas require priority health investments. Financing PPIR related to health systems quality and resilience will also be crucial.

Managing negative cross-border externalities

Global health security

The 2014–16 Ebola outbreak in west Africa brought attention to the consequences of poor support for global functions, and how they relate to infectious disease control. There was no Ebola virus rapid diagnostic test, vaccine, or treatment, and regional surveillance capacity was weak. WHO was widely criticised for its lack of leadership, although it is important to consider that their budget is declining in real terms, and WHO leadership made the difficult decision to reallocate international resources to the larger problem of NCDs.⁴⁴ Such outbreaks are potential challenges to grand convergence, because they disproportionately affect the health of women and children, and they also disproportionately affect LICs, which are generally furthest from grand convergence.¹⁰⁴

The greatest known risk to global health, aside from nuclear war, is a severe influenza pandemic. In the past 100 years, there have been four influenza pandemics of varying severity: the 1918 Spanish influenza with 50 million deaths, the 1957 Asian influenza with 1·5 million deaths, the 1968 Hong Kong influenza with 750 000 deaths, and the 2009 swine influenza with 18 000 laboratory-confirmed deaths by WHO (although others have suggested mortality was actually much higher).¹⁰⁵ Global capacity to produce enough vaccines for a major influenza pandemic still falls short of the WHO goal of 10 billion doses per year, and maintaining such surge capacity is expensive.¹⁰⁶ A universal influenza vaccine that would provide long-term immunity against a range of influenza viruses is also required. Vaccine researchers believe that developing such a vaccine would take at least another decade. Estimates suggest that bringing a new influenza vaccine to launch costs at least \$1 billion per year, with only a 5% chance of success at the start.¹⁰⁷ However, these costs are small compared with the expected annual health losses from a severe influenza pandemic,⁶⁹ and there is an unmet need for greater investment in influenza pandemic preparedness (appendix p 7, 56).

Investments in disease surveillance systems are crucial for countries to avoid infectious disease outbreaks and ensure that these can be rapidly stopped if they do occur. The risk of outbreaks is increasing as a consequence of climate change, increased urbanisation, globalisation, and weak PHC systems, so investments to improve detection capability and emergency response capacity will be essential.

Managing cross-border externalities also involves tackling antimicrobial resistance, a large and growing threat.^{108,109} Common fatal infections are becoming resistant to treatment with first-line antibiotics. For example, drugs that had been used for decades to treat tuberculosis no longer work for 20% of patients in some countries. Likewise, in a number of settings where malaria is endemic, the parasite has become resistant to nearly all classes of drugs except for artemisinins. 2018 was also the first year an outbreak of extensively

For more on the 2018 WHO financing campaign see <http://www.who.int/about-us/planning-finance-and-accountability/financing-campaign>

drug resistant typhoid occurred in Pakistan.¹¹⁰ Today, 700 000 people die from drug-resistant infections every year—a number that could increase in the absence of improved policy. In addition to the development of new antibiotics, vaccines, and point-of-care diagnostics, inappropriate use of existing antibiotics must be restricted. Developing global rules to curb the overuse of existing antibiotics to protect their efficacy will therefore be crucial.^{111,112}

Spread of unhealthy products across borders

The spread of commercial determinants of health across borders—encouraging consumption of tobacco, alcohol, and ultraprocessed foods and beverages—is an important driver of the rising global burden of cardiovascular disease and cancer.¹¹³ The growth of markets for junk food in LICs and MICs is largely unchecked. Curbing this international flow of risk factors for NCDs requires international collective action for health.

Growing evidence has shown the multiple strategies by which the multinational tobacco, alcohol, and processed food and beverage industries have expanded globally to rapidly penetrate LIC and MIC markets, in response to saturation of markets in HICs.^{114,115} Public health experts argue that public regulation of transnational companies is the best way to reduce the spread of these risk factors across borders. Public regulation strategies include restrictions on product marketing, taxation of products, and regulation of nutrition labelling.¹¹⁶ The WHO Framework Convention on Tobacco Control has succeeded in shaping global and national health policies, although implementation of these policies has been patchy in many countries and regions (eg, sub-Saharan Africa and China). Effective policies dictated by this convention include taxation, plain packaging, warning labels, and marketing restrictions. Experts have argued that WHO should replicate the model of the 2003 Framework Convention on Tobacco Control and convene a similar convention on healthy diets.⁴²

International collective action for health is also necessary to ensure both effective access to essential medicines for palliative care (including opioids for pain relief) and to prevent diversion and non-medical use of medicines,⁴⁷ a consequence of inadequate safeguards to minimise such diversion in HICs.

Fostering global health leadership and stewardship

Exercising leadership and stewardship is crucial in facilitating negotiation and building consensus on health agendas and priorities. WHO has a unique leadership role within global health, through norm-setting and global consultative processes—a role built into its constitution (appendix p 67).¹¹⁷ WHO contributes to the development of health data and global knowledge sharing on health policies and practices. As part of its leadership and stewardship function, it also contributes

to monitoring and accountability for results and resources.

However, although WHO's income has more than doubled since 2000, this increase is almost entirely based on rising voluntary contributions, 95% of which were earmarked in 2017 for particular projects and programmes that had been chosen by the donor.¹¹⁸ In WHO's 2018–2019 programme budget, voluntary contributions account for almost 80% of WHO's funding.¹¹⁹ For example, polio eradication, humanitarian response plans and other appeals, tropical disease research, and human reproduction research are fully funded by voluntary contributions.¹²⁰ Overall, the earmarking also results in serious underfunding of many WHO programmes, including those for NCDs and pandemic preparedness.¹¹⁸ The agency is struggling to fund its core functions, undermining its capacity to supply global public goods and other global functions, including the management of negative externalities.¹²¹ A top priority for international collective action for health is to ensure that WHO and other UN agencies have access to funding that enables them to fully realise their unique role.

How investments in international collective action for health help to address the middle-income dilemma

Although most poor people now live in pockets of poverty in MICs and face high mortality rates, these countries are regarded as too rich to qualify for health ODA, an issue termed the middle-income dilemma. Investments in international collective action for health might help solve this dilemma. Poor individuals in MICs will benefit from donor support for international collective action for health, including research and development, knowledge sharing, market shaping, and management of cross-border externalities. Countries such as China and India would benefit substantially from increased international efforts to control multidrug-resistant tuberculosis, and from market shaping to reduce drug prices. Other policies that would improve accessibility of products through affordable prices are pooled procurement mechanisms, revolving funds, procurement guarantees, and prequalification of certain products. WHO is already piloting pre-qualification for biosimilars of cancer treatments and insulin.¹²²

Designing global procurement mechanisms in a way that allows MICs to benefit from them is crucial. MICs that are not eligible for support by Gavi often pay much higher prices for vaccines than countries supported by the partnership.¹⁰¹ However, because of a healthy vaccine marketplace, MICs can purchase pentavalent vaccines for the reduced price from 2017 to 2019, regardless of whether they are supported by Gavi.

Aid substitution

Donor funding can lead to aid substitution or displacement (also known as fungibility), if a government that

receives external support responds by reducing its own domestic financial contribution to the health sector. One study¹²³ found that for every dollar that LICs and MICs receive in development assistance for health, they remove \$0.44 of their own domestic health spending, although other studies have found lower amounts of aid displacement. One additional advantage of supporting international collective action for health is that it is likely to be less fungible than direct country support, and might therefore be a more efficient way for support to reach poor individuals.

Although fungibility is troubling to donors, who ultimately wish to see an increase in domestic health spending by LICs and MICs, the long-term effects of substitution will ultimately depend on what happens to the displaced funds. The outcome is detrimental to development if the displaced funds end up paying for weapons, which is what happened in Uganda,¹²⁴ but helpful if the funds are used to fund girls' education, for example. Very little research has been done to find out which of these outcomes happens most often, although a recent case study in Tanzania¹²⁵ found that "fungibility of external funds may not necessarily be detrimental to Tanzania's development (as evidence suggests the funds displaced may be reallocated to education)".

How much health official development assistance is required for international collective action for health?

GH2035 recommended a reorientation of health aid over time towards international collective action for health. Reallocation towards international collective action for health can be achieved by redirecting country-specific aid from countries experiencing substantial economic growth. Careful transition management will be required, especially given that every funder has policies on eligibility and transition. Country-specific aid will still be required for the countries in greatest need, many of which are in sub-Saharan Africa,

including fragile countries and those suffering from conflict and natural disasters. In view of the emerging challenges, opportunities, and evidence presented in this report, we identified a number of potential investment priorities for international collective action for health in the coming years (table 4).

Overall, we estimate that at least \$9.5 billion per year will be required for international collective action for health, roughly double the amount that is currently provided by donors for international collective action for health. An additional \$3 billion per year is needed for product development for neglected diseases, with a focus on new tuberculosis drugs and vaccines. Alongside basic research, health ODA should be used to fund game-changing technologies that promise higher returns, and health technologies that are critically needed but have lower success rates at each phase of the development pipeline. One example of a funder supporting this kind of research is the Wellcome Trust's Leap Fund, a £250 million investment into early stage and high risk endeavours. The Commission on a Global Health Risk Framework for the Future¹²⁶ calculated that LICs and MICs need \$3.4 billion per year to upgrade health systems to prevent infectious disease outbreaks. This could be a serious underestimate if pandemic preparedness were to require a substantial amount of new and dispersed investments in vaccine manufacturing capacity. Additionally, the activities of the Global Polio Eradication Initiative are estimated to cost about \$1 billion annually.¹²⁷

WHO needs at least an additional \$240 million annually; a financial estimate published by WHO in May, 2018, shows that the agency needs \$14.1 billion to finance its 13th general programme of work (2019–2023).^{128,129} This represents a \$1.2 billion increase in funding over 5 years. \$1.2 billion is needed for a pooled procurement mechanism for NCDs to expand the model tested by PAHO to other regions, like sub-Saharan Africa. Overall,

	Investments to achieve grand convergence	Investments to control non-communicable diseases	Highest priority investments ranked by the Lancet Commission on Investing in Health
Supplying global public goods	Product development for poverty-related neglected diseases, including tuberculosis; market shaping for convergence-related products; population, policy, and implementation research to improve health system quality and resilience	Population, policy, and implementation research for national non-communicable disease control programmes; market shaping for national non-communicable disease technologies; collective purchase of drugs and other key commodities	Development of much better drugs and vaccines against tuberculosis; preparation for severe influenza pandemic, including in commodity stockpiles, surge and manufacturing capacity, and development of universal influenza vaccine; control of non-communicable diseases through population, policy, and implementation research, market shaping for technologies, and collective purchase of commodities; population, policy, and implementation research to improve health system quality and resilience
Managing negative cross-border externalities	Implementation of international health regulations; global rules for antimicrobial resistance	Global framework to prevent the unregulated spread of unhealthy products across borders	Control of drug-resistant tuberculosis
Fostering leadership and stewardship	Strengthening of WHO core functions for convergence-related areas	Strengthening of WHO's national non-communicable disease department	Adequate funding for WHO and other technical UN agencies, including strengthening their financial and legal capacity to reduce cross-border transmission of drug-resistant tuberculosis and other pathogens, pollution, harmful substances, and counterfeit health products

Table 4: Selected priority investment areas for international collective action for health

Panel 6: The value of increased life expectancy in Nigeria

When assessing the value of public sector policies, the Organisation for Economic Co-operation and Development and the governments of many high-income countries apply standardised approaches to placing monetary value on small changes in mortality risk. These approaches were recently summarised by Robinson and colleagues,¹³¹ and “Global health 2035: a world converging within a generation” (GH2035) used variants of these to estimate the value of increased life expectancy in low-income countries (LICs) and middle-income countries (MICs). The value of increased life expectancy has often been substantial in terms of increases in national income; GH2035 estimated that from 1990 to 2011, the annual value of the mortality decline in LICs and MICs was typically on the order of 1.5% of national income.¹

Using Nigeria as an example, we illustrate the opportunity for countries to attain major increases in national welfare through increases in life expectancy. The appendix (p 83) shows estimates of life expectancy in Nigeria for the period 1990–2015 and compares Nigeria to Africa as a whole. Despite the interruption of the AIDS epidemic, estimated life expectancy in Africa increased from 51.7 to 62.4 years in this period, with an average annual rate of increase of 0.43 years per year between 1990 and 2015. Nigeria’s life expectancy started at 45.9 years in 1990 and increased by only 0.33 years annually, so that by 2015 the difference in life expectancy between Nigeria and Africa had grown to 8.3 years from 5.8 in 1990.

What is a reasonable estimate of the monetary value of Nigeria’s increase in life expectancy over this period? How much larger would that value have been if Nigeria had kept pace with the growth in life expectancy in Africa as a whole? GH2035 presented a method for calculating the answer to these questions that depends on the value of a small change

in mortality, and how that value varies with age of death and national income. Few empirical estimates have been made of the value of mortality reduction and the extent to which this value changes with age, and different analysts make different assumptions in their estimates. Chang and colleagues¹³² carefully assess the sensitivity of estimates made by GH2035 of the monetary value of mortality reduction. Robinson and colleagues¹³¹ provide major updates to the relevant literature from what was available to GH2035. In light of these updates, we believe that the value of a unit of mortality reduction is substantially smaller than what we estimated in 2013. Two-thirds of the value used in GH2035 would be a reasonable adjustment, but the exact value remains a subject for discussion and further research.

Nigeria’s gross national income per capita grew at an average annual rate of 2.5% per year from 1990 to 2015, although substantially slower at the start of this period. After multiplying the value of a 1-year increase in life expectancy in sub-Saharan Africa presented in GH2035 by two-thirds, we estimated the value to be about 8.4% of national income.¹ Given that life expectancy in Nigeria was increasing at about 0.33 years per year, the associated value of the increase in life expectancy has averaged about 2.8% of income per year.

By any reasonable historical standard, Nigeria’s life expectancy improved substantially between 1990 and 2015—hence, the high estimated value of mortality decline relative to growth in gross national income. The opportunities made available by modern medicine and public health were importantly realised, but at the same time, affordable policies could have led Nigeria to the better outcomes achieved elsewhere in Africa, so in that sense important opportunities were missed.

additional funding for market shaping and pooled procurement mechanisms, such as Gavi, will be crucial. An additional \$600 million is needed for PPIR and other knowledge generation and distribution activities.

Our estimate of \$9.5 billion per year for international collective action for health does not include the costs of malaria eradication, which will be estimated by the new *Lancet* Commission on Malaria Eradication.¹³⁰ Throughout this report, we have argued that resource constraints in the poorest countries threaten the achievement of a grand convergence. Thus, the future of ODA must include continued direct support to these countries. Implementing the grand convergence PHC interventions in DCP3’s highest priority package at 95% coverage in LICs and lower-MICs by 2035 would require total annual spending of \$27 per capita on average. Countries unable to mobilise and channel such resources will require direct support to reach grand convergence and related SDG 3 targets.

We acknowledge the highly tentative and approximate nature of the estimates we have made. We have chosen to be conservative in our estimates; there is little doubt that an investment in international collective action for health of \$9.5 billion a year would yield high health and economic returns.

Conclusions

In GH2035, we concluded that substantial health gains could be achieved by 2035, through grand convergence, a sharp reduction in the incidence and consequences of NCDs, and with the promise of UHC. We were optimistic about the prospects for a transformation in the global health landscape within a generation.

This report reiterates GH2035’s conclusion that the benefits of achieving better health can far outweigh the costs. Unfortunately, in this era of declining internationalism and reduced domestic prioritisation of health, some countries are not fully realising the benefits

of investing in health. Panel 6 gives as an example our estimate of the historical opportunities foregone in Nigeria.

5 years on from GH2035, we are almost a quarter of the way towards the 2035 grand convergence target date. New data from 2010–16 have been encouraging in terms of progress, especially for global trends in child and HIV/AIDS mortality, but there are also areas of slow progress that are of great concern, including maternal mortality and tuberculosis mortality rates, and there has been grand divergence of progress on NCDs. However, the reasons we were optimistic in 2013 remain the same today. Many LICs and MICs are achieving astonishing improvements in health, through pathways that are feasible to replicate elsewhere. Countries in all regions and at all income levels, such as China, Ethiopia, Bangladesh, Mexico, and Thailand, have consistently made smart health investments and have helped to set global standards for the level of health that can be achieved at relatively modest cost.¹³³ Scientific innovation will continue to provide new health tools and methods of delivery. And economic growth in LICs and MICs, although less impressive today than 5 years ago, can go a long way in financing PHC. Achieving essential UHC and making “Health for All” a reality are options that remain open to all countries.

Contributors

The first draft of the report was led by DAW and GY, with substantial input from MS and DTJ. Original analyses for the report were done by DAW, MS, OO, JQ, and HS. All authors contributed fully to the structure and concept of the overall report, the editing of drafts, revisions of key intellectual content, and the formulation of conclusions and key messages. The report was prepared under the general direction of DTJ and LH.S.

Declaration of interests

We declare no competing interests.

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