In collaboration with
L.E.K. Consulting

WORLD ECONOMIC FORUM

Global Health and Healthcare Strategic Outlook: Shaping the Future of Health and Healthcare

INSIGHT REPORT

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Foreword

Shyam Bishen
Head, Shaping the Future of Health and Healthcare, World Economic Forum

Pierre Jacquet
Vice-Chairman, Global Healthcare Practice, L.E.K. Consulting

The COVID-19 pandemic brought about health, economic, political and environmental challenges and exposed global disparities caused by income, age, race, sex and geography, but it also allowed for innovation in science and medicines development, distribution and delivery. We have now reached a time for reflection and have the opportunity to embed any positive changes from the pandemic response as part of our global health and healthcare systems moving forward.

Global health and healthcare will face important challenges in the future. In the near-term, worsening mental health, healthcare workforce shortages, supply chain issues, climate change related challenges and macroeconomic instability. In the longer-term, growing demand for services and an increasing funding gap, lack of incentives for innovation, widening disparities in overall health and wellness and variable access to advanced therapies.

This joint strategic outlook by the World Economic Forum and L.E.K. Consulting aims to unite stakeholders across different sectors, industries and geographies to a shared vision for health and healthcare by 2035. The vision is based on four strategic pillars of equitable access and outcomes, healthcare systems transformation, technology and innovation, and environmental sustainability, with equity as the foundational goal. For each of these strategic pillars, the outlook pre-empts potential barriers public and private stakeholders may face and demonstrates ways to mitigate these through case studies from across the world. The case studies highlight the importance of collaboration in fostering long-term change that is replicable and scalable.

This strategic outlook is important as it aligns stakeholders towards a shared vision, but also identifies near-term goals and actions to motivate systemic, long-term system change from now. Investment through this lens, can ensure equality, resilience, innovation and sustainability are embedded as key pillars of health and healthcare in the future.

Executive summary

In the face of a challenging past few years, the world went off track on health related Sustainable Development Goals. Unprecedented disruptions caused by the COVID-19 pandemic, followed by social, economic, geopolitical and environmental challenges, continue to place complex and interconnected threats on population health, especially impacting vulnerable populations, and increased strains on healthcare systems, particularly healthcare workers and supply of essential health products. It is important to ensure stakeholders, industries, countries, and sectors strive to achieve common health and healthcare goals and work collaboratively to do so.

This strategic outlook lays out a vision for health and healthcare in 2035, formed of four main strategic pillars with equity as the foundational goal.

- **Equitable access and outcomes**: Equilibrating access to determinants of health, ensuring health data is representative of the population and people with equal needs achieve equal health outcomes.
- **Healthcare system transformation**: Structuring resilient healthcare systems to provide high-quality care under both expected and unexpected circumstances.
- **Technology and innovation:** Cultivating an environment that supports funding, use and implementation of innovation in science and medicine.
- **Environmental sustainability:** Reducing the healthcare industry's environmental impact, preparing for and addressing climate change for better health and wellness.

For each of the strategic pillars, time horizons to demonstrate near-, medium- and long-term impact are identified.

While striving to achieve each of these strategic pillars, public and private stakeholders will encounter several barriers. To understand the impact of each of these barriers and the solutions deployed to solve them, eight case studies were examined globally. While each case study is nuanced in the barriers it faced, important themes emerged. Concerns around widening global health disparities are prominent. The rate of innovation deployed in the health and healthcare industry is limited by the slow pace of regulatory change. Although shifting, greater collaboration is needed to change the status quo from isolated to collaborative working based on common aims that deliver outcomes that are greater than the sum of its parts. None of this collaboration will yield long-term impact unless change is driven at the system level, for which there is currently limited support, incentive or monitoring.

The strategic outlook identified a range of levers available to public and private stakeholders to diminish the barriers at play across healthcare systems.

- Cross-industry collaboration
- Digitalization, artificial intelligence and big data
- Global collaboration
- Policy and advocacy
- Public-private partnerships
- Innovative funding models
- Patient empowerment
- Targeted/selective decentralization

The vision for health and healthcare in 2035 is ambitious yet achievable. To get there, stakeholders across sectors, industries and geographies need to build on the existing traction and collectively lead across their organizations to catalyse long-term change at the system level. Near-term barriers, such as worsening mental health, healthcare workforce shortages, supply chain issues, climate and macroeconomic instability, should be addressed in the context of the longer-term vision. Public and private stakeholders, alone and in partnership, each have their role to play in shaping health and healthcare systems in 2035 that are equitable, resilient, innovative and sustainable.

Introduction: What is the status quo in health and healthcare?

The pandemic, geopolitical conflicts, the climate and energy crisis have all detrimentally impacted health and healthcare globally.

In late 2019, the Wuhan Municipal Health Commission reported an increase in incidences of pneumonia-like cases with unknown cause. By the end of January 2020, the virus had spread to multiple countries around the world, totalling just under 10,000 cases. A year later, following the fastest vaccine development in history, the first vaccine against Coronavirus disease (COVID-19) received emergency authorization. While COVID-19 triggered growth and innovation in health and healthcare, it also brought about significant health, economic, political and environmental challenges.

Within this timeframe, the global healthcare sector experienced unprecedented growth; overall healthcare spend is expected to reach $12 trillion in 2022, up from $8.5 trillion in 2018.[1] Healthcare investments reached record highs in total funding in 2021 with a surge in venture investment and fundraising. A record $23.1 billion was raised by 128 therapeutic-focused biopharma companies that went public globally in the areas of innovative therapies namely gene, cell/immunotherapy and tissue engineering.[2,3] Following the launch of mRNA-based vaccines, applications in Zika, malaria and seasonal diseases such as influenza are growing, as well as beyond infectious diseases, with a number of cancer vaccines in clinical stages of development.[4] Precision medicine continues to grow with biomarker strategies for screening, diagnosis and treatment selection and response monitoring becoming increasingly critical components of drug launches. This is supported by advancements in liquid biopsies, with the first tests approved by the United States Food and Drug Administration (US FDA) in 2020 for early pan-cancer detection (Guardant360 CDx and FoundationOne Liquid CDx). Biomarkers are poised to expand into applications beyond oncology, particularly neurologic, immunologic and cardiovascular diseases.

Digital investments nearly doubled to $57 billion in 2021, particularly in telehealth and mental health.[5] The number of digital health start-ups is increasing, with expansion from tech companies into healthcare (e.g. Amazon), putting pressure on the market.[6] With a significant pace of change and digital leaders outperforming laggards in revenue, continued digital innovation is expected. Data aggregation technologies in clinical and commercial settings are maturing with a growing collection of companies providing solutions and enabling pharma to gain better insights.

> **People want on-demand healthcare. We want greater accessibility to real-time answers. COVID has been the tipping point for the demand for telehealth. We are receiving feedback from physicians that they are building better relationships with patients through telehealth and we are seeing greater uptick in usage by older adults.**
>
> Jisella Veath Dolan, Chief Global Advocacy Officer, Honor + Home Instead

There is increasing recognition that treating patients in lower-acuity settings, such as the home, is less costly. Total home health expenditure growth is expected to outpace total healthcare expenditure growth in nearly all other healthcare segments, with increasing focus on home diagnostics, home-administered drug delivery systems and patient monitoring devices.[7] Increasing decentralization of healthcare is also aligned with increasing patient centricity, as patients demand greater convenience and medical privacy, as well as value-based care.

Artificial intelligence (AI) applications are now targeting many aspects of healthcare, including diagnosis, clinical decision support, disease prevention, monitoring and treatment, patient adherence and self-management and workflow solutions. There is increasing focus on developing regulatory frameworks and guidelines for the clinical application of AI and its usability.[8] The first FDA approval for AI-assisted medical imaging was in 2017, but several other approaches in different areas have been approved since. In AI-assisted drug development and design, all of the largest ten pharmaceutical companies (by revenue) have either partnered with or acquired AI companies to make use of this capability or are listing a significant number of AI jobs to build this capability internally.[9,10]

Nearly 90% of countries surveyed reported some form of disruption to health services and the greatest disruptions were being reported in low- and middle-income countries.

In addition, advances in AI, augmented reality, virtual reality and improved connectivity allow the emergence of the metaverse. The metaverse can be a platform for several potential applications in healthcare, such as the delivery of telemedicine in a more immersive and interactive environment that can track the patient's response to treatment or the formation of digital twins that can create a simulation using real-world data that can virtually model how the patient responds to a given procedure.[11] There are already metaverses that exist, such as the virtual real estate platform Decentraland and digital gaming platforms like The Sandbox. Companies are investing more in this space; Microsoft is developing Mesh. A survey of 391 healthcare executives showed that around half believe the metaverse will have a breakthrough or transformational impact in the future, while the rest believe it will be minimal or incremental.[12]

While there were developments in technology and innovation, the resilience of healthcare systems was tested during the pandemic affecting access to healthcare.

The COVID-19 pandemic exposed disparities in global essential healthcare coverage, impacting women, children and adolescents the hardest with a 25% drop in coverage of essential health interventions.[13] A pulse survey by the World Health Organization (WHO) in August 2020 showed that nearly 90% of countries surveyed reported some form of disruption to health services and the greatest disruptions were being reported in low- and middle-income countries (LMICs).[14] Supply chain delays and high customer demand during the pandemic resulted in significant disruptions. The impact of this went beyond the healthcare industry and was exacerbated by the global semiconductor chip shortage and blockage of the Suez Canal by a cargo ship in March 2021 for six days resulting in shipment delays of around $60 billion worth of products.

Misinformation, mistrust and political divide continued to be present, with the US Capitol riots in early 2021, the release of the Facebook Files and "partygate" in the United Kingdom. Misinformation and mistrust impaired vaccine efforts and resulted in multiple protests against vaccines, restrictions and lockdowns.

Mental health issues were prevalent throughout the pandemic due to isolation, redundancies, job losses and uncertainty across the population. Pressures on healthcare systems affected the mental health of healthcare workers across the globe, leading to significant burnout.

FIGURE 1 | **Recent trends in global health and healthcare – while COVID-19 triggered growth, it also brought about health, economic, political and environmental challenges**

Source: L.E.K. Consulting; World Economic Forum

Beyond the pandemic, major conflicts, such as the Taliban takeover of Afghanistan and Russia's invasion of Ukraine, resulted in significant loss of life, impact on health and well-being, human rights violations and broader economic and supply disruptions across the world. The risk of geopolitical divide (e.g. between the US/West and China) may restrict access to medicines, disrupt supply chains and limit the ability of national health systems to respond to global health problems requiring cooperation and collaboration, for example, anti-microbial resistance (AMR) and the threat of future pandemics.

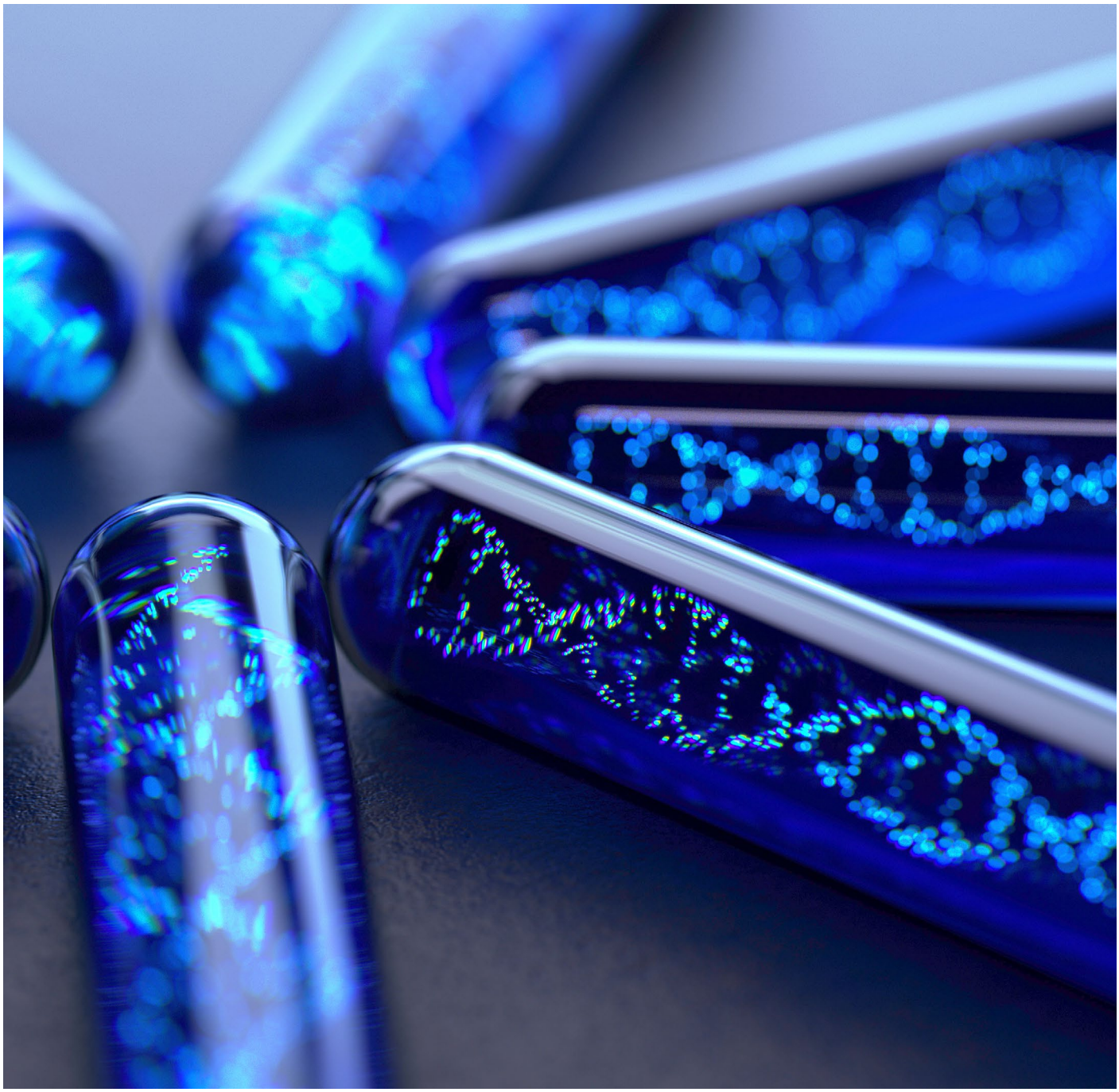
Macroeconomic issues, such as the energy crisis and rising inflation, continue to affect individuals' standard of living, thereby impacting their physical and mental health. In addition, government regulations to reduce inflation are expected to affect the pharmaceutical industry. For example, the Inflation Reduction Act, which empowers the federal government to negotiate prices for some drugs purchased by the Center of Medicare and Medicaid Services, can impact how pharmaceuticals are researched, developed and commercialized.[15]

The climate crisis has continued to have an increasing global impact. In July 2021, the Dixie fire became California's largest single wildfire in recorded history and was only extinguished in October of the same year. The effects of the climate crisis continued in 2022 with heatwaves across the globe including the US, Europe, China and India, wildfires, and floods in South Africa and Asia, particularly in Pakistan where over a third of the country was submerged.

These events highlight the global inequities that exist in health and healthcare and the fragility of healthcare systems under the pressure of pandemics, conflicts, economic uncertainty and the climate crisis. In order to benefit equitably from technology and innovation in the healthcare industry, these issues need to be proactively addressed.

1 What is the vision for health and healthcare in 2035?

To achieve equity, transform healthcare systems, encourage innovation and secure global environmental sustainability, with equity as the foundation.



The strategic outlook sets out a vision for health and healthcare in 2035. A 2035 outlook allows for sufficient time to respond in the context of other key global targets, such as the 2030 Agenda for Sustainable Development[16] and 2030 nationally determined contributions (NDCs) as part of the Paris Agreement and provides opportunity to implement change to health and healthcare at the system level.

FIGURE 2 **The vision for health and healthcare in 2035 is formed of four main strategic pillars, with equity as the foundational goal**

Source: L.E.K. Consulting; World Economic Forum

Equitable access and outcomes in health and healthcare

Health is a product of social determinants, including where one lives and works, and health and healthcare inequity continues to be a pressing issue.[17] While decentralization is relieving pressure off hospitals and allowing increased access to care, there are still geographic and demographic disparities in access to not only healthcare but high-quality healthcare. The WHO has reported that over half of the world's population lacks access to the basic health services they need.[18] Customer empowerment and ownership of health through digitalization and healthcare at home are not yet universally accessible and may exacerbate existing disparities.

The pandemic had disproportionate impact on certain populations, highlighting inequities. For example, the reduction of essential maternal and child health interventions may have caused more than a million additional child deaths.[19] One in seven people in LMICs is fully vaccinated for COVID-19. By comparison nearly three in four people in high-income countries (HICs) have been vaccinated for around a year.[20] Beyond the pandemic, only 4% of research and development (R&D) budgets are focused on women's health and there are limitations in the availability of clinical data on women, as those of reproductive age were historically excluded from clinical trials. In addition, multiple studies found that in many areas of healthcare, women experience poorer outcomes than men, such as in dementia care and management of acute pain.[21]

The goal is to have equitable access to determinants of health, ensuring health data is representative of the population and ensuring people with equal needs achieve equal health outcomes.

Among European Union (EU) countries, deaths and losses due to ill health account for 20% of the total costs of healthcare and 15% of total costs of social security benefits. Losses due to reduced labour productivity costs are around 1.4% of annual gross domestic product (GDP).[22] Eliminating health inequity is estimated to equal a projected $350 billion return to society.[23]

Businesses have a powerful voice and can advocate for policies that can meaningfully improve the health of communities, employees and families.

Addressing health inequity is not just a societal goal but there is business incentive for employers to play a more proactive role in investing in their employees' health. Employers share the burden of chronic diseases and health inequities that drive many chronic conditions, such as obesity and diabetes. This generates costs for employers such as greater healthcare expenses, absences, medical appointments and reduction in productivity. Companies that provide wellness programmes and benefits packages have been shown to help narrow the health disparities gap, particularly those focused on vulnerable populations. Contributing to creating a more equitable society is beneficial for company exposure and culture. Businesses have a powerful voice and can advocate for policies that can meaningfully improve the health of communities, employees and families.

The long-term goal is to provide access to universal health coverage (UHC) globally. WHO defines UHC as all people receiving the health services they need, including health initiatives designed to promote better health, prevent illness and provide treatment, rehabilitation and palliative care of sufficient quality to be effective while at the same time ensuring that the use of these services does not expose the user to financial hardship.[24] Research indicates that while private financing can play a role in UHC, the onus is on public funding and allocation of general government revenues to ensure coverage of the population not in salaried employment and drive improvements in health system performance.[25,26] Value-based agreements can be incorporated into this model to share accountability across more stakeholders and incentivize providers, insurers, pharmaceutical companies and physicians to focus on outcomes.

BOX 1

Time horizons to demonstrate impact in the 2035 outlook:

Near-term: Continue investment in decentralization and alternative care models (e.g. home care) to help improve access to essential health and healthcare systems globally.

Medium-term: Incorporate more equal representation in clinical trials to improve the evidence base for decision-making and unlock understanding of different diseases and appropriate treatment across different regions.

Longer-term: Make disproportionate investment in health and healthcare services in LMICs to narrow the global health disparity gap.

Healthcare systems transformation

The COVID-19 pandemic demonstrated the importance of resilient healthcare systems. Disruption of global supply chains affected the provision of medicines, diagnostics and protective equipment. An analysis of 81 studies across 20 countries showed a median reduction of 37% overall in health services, with the greatest reduction in visits of 42%.[27] Disruption to services was greatest in LMICs; in the WHO pulse survey to assess the continuity of essential health services during the COVID-19 pandemic, HICs reported disruption to 34% of services, whereas LMICs reported 50%.[28] LMICs also reported greater bottlenecks in accessing COVID-19 tools (e.g. diagnostics, therapeutics, personal protective equipment, vaccines).[29] A study of out-of-hospital cardiac arrests in France showed the incidence doubled, coupled with a reduction in survival at hospital admission between March and April 2020.[30] In Australia, a one-year disruption to healthcare services is expected to lead to 1,719 additional deaths between 2020-44 among colorectal cancer patients.[31] Conversely, the pandemic may have provided the opportunity to alleviate some pressure on healthcare systems by catalysing the uptake of decentralized trials and remote care models[32] and highlighted the role of diagnostics as a foundational component to ensure equitable access to therapeutics and standard of care.

> **In terms of the research system, although there were dips in enrolment and availability, I actually think the pandemic helped improve healthcare and access to clinical trials. It advanced our ability to provide remote care, which improves convenience, adherence and availability of information.**
>
> Jeff Allen, Chief Executive Officer, Friends of Cancer Research

NCDs account for 71% of global deaths annually

While COVID-19 put significant pressure on healthcare systems and demonstrated the importance of resilience, this was not an isolated incident and will not be the only health crisis likely to be faced. During the 2014 Ebola outbreak in West Africa, disruptions to malaria, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS) and tuberculosis treatment had a detrimental indirect impact on mortality rates. In Guinea, more additional deaths occurred from disrupted malaria treatments than from Ebola itself.[33] An estimated 20 to 40 countries experience significant new disease outbreaks each year,[34] and the WHO names AMR as one of the top ten public health threats globally.[35] Unexpected pressures on healthcare systems are not restricted to pandemics but also economic crises or effects of climate change.

Beyond pandemic situations, ageing populations and the high prevalence of chronic conditions and non-communicable diseases (NCDs) require forward planning. Deaths from NCDs, such as cardiovascular, cancer and respiratory diseases, and diabetes, now exceed all communicable disease deaths combined. They account for 41 million global deaths every year, which is 71% of global deaths overall. Of the 41 million deaths, 29 million occur in LMICs.[36] However, health system services for prevention, education, screening and treatment of NCDs remain inaccessible to billions of people living in rural regions in LMICs. On average, in the EU, public and private expenditure on preventive care accounted for 2.8% of total health expenditure in 2018, with the highest shares recorded in Italy (4.4%) and Finland (4.0%) and lowest in Slovakia (0.8%).[37] In addition to increasing investment in prevention, there is a need to focus on the preservation of health once individuals are diagnosed with a condition to reduce the impact on health systems.

The goal, therefore, is healthcare systems transformation to provide high-quality care under both expected and unexpected circumstances, such as pandemics, geopolitical crises, supply chain bottlenecks and inflation, and to minimize the negative consequences of these disruptions.

Investment in healthcare system transformation can protect economies from destabilising shocks, such as economic disruption, unemployment and redundancies, and protect people from premature death.

BOX 2

Time horizons to demonstrate impact in the 2035 outlook:

Near-term: Ensure all healthcare systems globally return to pre-pandemic stability.

Medium-term*:* Invest in and diversify supply chains to ensure healthcare systems are resilient and reliable for all countries globally.

Longer-term: Refocus healthcare systems on the value of the services delivered, as opposed to the volume, incorporating better prevention and preservation of care and consistent reporting of outcome metrics.

Technology and innovation

Health technology and innovation have significant future growth potential in new treatments and modalities improving patient outcomes, better and earlier diagnostics for prevention as well as earlier treatment, and technology that improves the quality and efficiency of healthcare provision.

Healthcare spending continues to outpace GDP growth on a global scale – a development that is not sustainable. Consequently, drug prices and reimbursements are put under pressure to contain costs.

The goal is to cultivate an environment that supports funding, use and implementation of innovative approaches in science and medicine, including wellness, therapeutics and healthcare delivery.

Innovation has the potential to reduce overall healthcare spending by improving efficiency and outcomes. For example, National Health Service (NHS) England says one in four general practitioner appointments are potentially avoidable, and telemedicine is important for relieving the burden on the health system.[38] A study in Houston showed that 5,570 patients treated with telehealth-enabled care over 12 months showed a 6.7% absolute reduction in potentially medically unnecessary emergency department visits, $928,000 annual cost savings ($2,468 saved per visit averted).[39] In the US, chronic diseases affect 50% of the population and contribute to more than 85% of healthcare costs.[40,41] Therefore, better prevention, monitoring and personalized recommendations leveraging digital and AI-powered techniques can have significant impact on overall spend. While there are some examples, more robust evidence linking investment in health technologies to contained costs and improved outcomes will facilitate recognition and uptake of innovation by public bodies.

Beyond healthcare savings, healthcare innovation supports overall economic output. A model built to project ageing populations demonstrates future reductions in output of 17% by 2056 and 39% by 2096 relative to an economy with constant population distribution. The model demonstrates that curing diseases like Alzheimer's and dementia can lead to a compounded output increase of 5.4%.[42]

However, incorporation and use of technology takes time due to the receptiveness of the end-user, availability of the required infrastructure – particularly in LMICs – and cost to the healthcare system. Therefore, innovators need to focus not only on their projected revenues but the extent to which their products and services will ultimately lead to cost-savings, improved efficiencies and true value-add to existing treatment paradigms.

> In the US, chronic diseases affect 50% of the population and contribute more than 85% of healthcare costs.

BOX 3

Time horizons to demonstrate impact in the 2035 outlook:

Near-term: Incentivize investment to drive innovation in medicine development and commercialization, supply chain optimization and healthcare delivery.

Medium-term: Harmonize data use and its applications across the healthcare industry and across geographies.

Longer-term: Work with policy-makers to create a regulatory environment that cultivates and drives innovation across all geographies and all parts of the healthcare system.

Environmental sustainability

$300 million in medicines go unused each year in England

The healthcare industry has a large climate footprint, accounting for an estimated 4.4% of global net carbon dioxide emissions.[43] In England, the NHS accounts for around 4% of greenhouse gas emissions.[44] Of this, 62% of emissions are from medicines, equipment and other supply chain sources (e.g. freight).[45] Pharmaceuticals contribute around 20% of the emissions, compounded by over £300 million in medicines going unused each year in England resulting in sub-optimal usage of therapeutics and over-prescribing and waste, causing soil and water contamination.[46]

Along with the impact of the healthcare industry on the environment, there is the impact of the climate crisis on health and healthcare. This can be through extreme weather events, heat stress, poor air quality, water quality and quantity, food security and vector distribution.[47] As a result, mortality, heat-related illness, respiratory illness, water and vector-borne diseases, malnutrition and mental health of individuals are likely to suffer through the climate crisis.

The goal is to reduce the impact of the healthcare industry on the environment and prepare for and address climate change for better health and wellness of the global population.

Net-zero commitments include more than 70 countries, including China, the US and the EU, who are collectively responsible for 76% of global emissions, and 1,200 companies.[48] The pharmaceutical and medical technology sector as a whole achieved a major breakthrough in Race to Zero, whereby 20% of the major companies (by revenue) have committed to halving emissions by 2030 at the latest.[49] Healthcare policy-makers are adopting environmental objectives – for instance, the NHS is aiming to reduce its carbon footprint by 80% by 2040,[50] there is growing interest in incorporating environmental sustainability into health technology assessments[51,52,53,54] and increasing focus on how prevention and better management of chronic conditions can improve carbon emissions.[55] While the increasing list of countries and companies with net-zero targets is encouraging, the commitments made to date fall short of what is required to meet the Paris Agreement of limiting global warming to 1.5 degrees Celsius compared to pre-industrial levels.[56] Across countries, particularly the largest emitters, stronger 2030 targets in NDC and bold, immediate steps to reducing emissions are now needed.

Extreme weather events (e.g. floods, heatwaves, wildfires and storms) are increasing in frequency and severity. This exacerbates inequities as it affects social determinants of health such as housing and food. It tests the resilience of healthcare systems affecting access to healthcare, disproportionately impacting more vulnerable and disadvantaged communities.[57,58] The WHO estimates that health shocks and stresses push around 100 million people into poverty every year and that climate impact can worsen this trend. The richest 1% of the world's population is estimated to produce double the emissions of the poorest 50% of the world's population, while 94% of pollution-related deaths occurred in LMICs in 2016.[59,60] In addition, between 2030 and 2050 around 250,000 additional deaths associated with climate change are expected due to malnutrition, malaria, diarrhoea and heat stress. The cost of direct damage to health is estimated to be around $2-4 billion per year by 2030.[61]

BOX 4

Time horizons to demonstrate impact in the 2035 outlook:

Near-term: Work to embed environmental, social and governance pillars into the health and healthcare industry by defining and tracking a set of metrics centrally.

Medium-term: Make disproportionate investment in LMICs to reduce the impact of climate change on health – for example, reduce the number of people pushed into poverty each year due to climate shocks and stresses.

Longer-term: Reduce the climate footprint of health and healthcare as an industry, focusing mainly on addressing key segments responsible for the majority of emissions (e.g. supply chains, pharmaceuticals development and wastage) while maintaining patient centricity and equity.

2 What are the key issues and barriers to face?

To achieve the vision, several issues and barriers need to be addressed, many of which require public-private collaboration.

There are several issues and barriers to face in achieving this vision, some of which will become increasingly challenging to address over time.

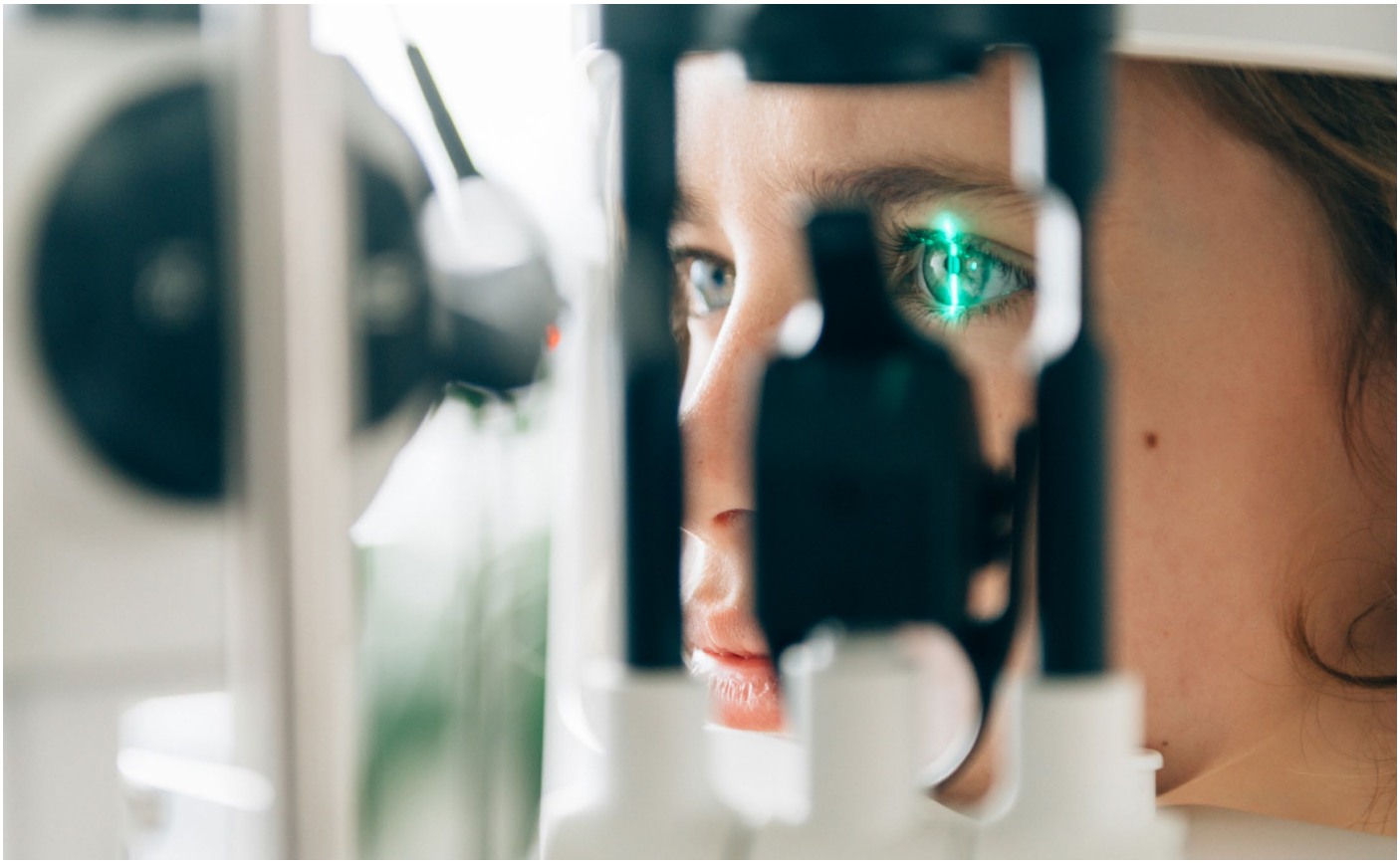
Therefore, proactive action by public and private stakeholders is needed to address these barriers and issues with equity as the foundational goal.

FIGURE 3 **There are several issues and barriers where public and private stakeholders play a role, and each given barrier impacts the ability to achieve goals in multiple pillars**

	Issues and barriers to address for achieving goals in each pillar	Equitable access and outcome	Healthcare systems transformation	Technology and innovation	Environmental sustainability
Significant public and private role	Challenges with funding and reimbursement	●	●	●	●
	Baseline health and wellness and global discrepancies	●	●		●
	Healthcare literacy and trust in industry	●	●	●	
	Skilled labour shortage and hospital capacity constraints	●	●		
	Deteriorating mental health and well-being	●	●		
	Data interoperability and confidentiality	●	●	●	
	Connectivity to internet and lack of digital infrastructure	●		●	
	Maintenance and scalability of required pandemic capacity		●		
	Ensuring patient centricity and high quality care in decarbonization				●
Significant private role	Supply chain issues	●	●	●	●
	Restrictions/lack of incentives for innovation	●		●	
	Limited diversity in health data and gaps in data/evidence generation	●		●	●
Significant public role	Pace of regulatory change	●	●	●	●
	Limited standardization in measuring outcomes over time	●	●	●	
	Disproportionate impact of climate issues on health of LMICs		●		●

Source: L.E.K. Consulting; World Economic Forum

Challenges in funding due to continued increases in healthcare spending above GDP growth (which is unsustainable and puts return on investment for innovative medicines at risk) are placing significant pressure on healthcare systems. It will be increasingly important to ensure that funding is allocated on the basis of patient outcomes according to defined criteria over a set time period and that equity is defined as equal outcomes rather than equal access. For example, the *NHS Outcomes Framework* is a set of indicators developed by the Department of Health and Social Care to monitor the health outcomes of adults and children in England; example indicators include one-year survival from all cancers and emergency re-admissions within 30 days of discharge.[62] In 2021, the US FDA issued a draft guidance document, *Core Patient-Reported Outcomes in Cancer Clinical Trials*, which provides recommendations to sponsors on which patient-reported outcomes (PRO) concepts to measure in cancer clinical trials and at what frequency.[63]



Baseline health and wellness have been deteriorating as a result of ageing populations and unhealthy habits, increasing NCDs. Disparities in baseline health between different demographic and geographic populations affect the ability to achieve resilient healthcare systems and equitable access to health. Therefore, prevention, earlier diagnosis and preservation of health and earlier engagement of younger populations in health and wellness before sickness are increasingly important. Isolated use of speciality services limits the ability of healthcare systems to improve the prevention, treatment and preservation of patients' overall wellness. For example, vision care and dental services are connected to a wider range of systemic disorders (e.g. high blood pressure, diabetes, heart disease, rheumatoid arthritis, etc.) and can act as predictors of such disorders in a less invasive and cost-effective way.[64,65] Challenges around baseline health and wellness were highlighted as one of the most important focus areas in health and healthcare, along with proactive investment in prevention.

> **In addition to prevention, there needs to be greater focus on preserving health. We need to provide an intensive support package to preserve the health of individuals once they have been diagnosed.**
>
> Sally Lewis, Director, Welsh Value in Health Centre

> **Even things that are not related to healthcare access directly (e.g. good nutrition, good preventative care, the internet) will continue to be important. For example, there is lots of focus on broadband access in rural areas, which is a significant barrier, but this is also a problem in urban areas where some patients have WiFi access but do not have the space or privacy to conduct their telehealth consultation. The integration of wellness and healthcare is not done well yet.**
>
> Jeff Allen, Chief Executive Officer, Friends of Cancer Research

> **Something as simple and non-invasive as an annual vision care exam is about so much more than seeing clearly. Through it, eye doctors can also detect signs of over 270 serious conditions, including diabetes and heart disease – sometimes even before symptoms appear. And when we can help catch these conditions early, we can empower patients and healthcare systems to reduce costs and improve overall health outcomes.**
>
> Michael Guyette, President and Chief Executive Officer, VSP Vision

Shortage of
10 million
healthcare workers worldwide by 2030

The COVID-19 pandemic has exacerbated public scepticism towards technology and innovation in healthcare. Following the large volumes of misinformation about the pandemic and vaccinations, there is a need to improve healthcare literacy and rebuild and reinforce trust in the healthcare industry. Levels of **healthcare literacy** vary across the population and geographies, and access to and acceptance of reliable, evidence-based information sources is important to allow people agency and decision-making ability in health.

There is a need for a large and well-trained workforce to undertake the expected and unexpected challenges that will be faced. However, **skilled-labour shortage and hospital capacity constraints** are growing issues in healthcare provision – there will be an estimated shortage of 10 million healthcare workers worldwide by 2030,[66] primarily in LMICs. The unequitable distribution is exacerbated as physicians are increasingly migrating to HICs in search of better working conditions and career opportunities, which has economic and health consequences in LMICs of origin[67] and the broader global community (e.g. incorrect use of antibiotics due to limited speciality or experience in LMICs further exacerbates global AMR problems). Private equity investment in healthcare has grown dramatically over the last decade; estimated annual deal values have gone from $41.5 billion in 2010 to $119.9 billion in 2019,[68] and in 2018, the number of doctors who were employed by a company surpassed the number who owed their own practices for the first time.[69] Outpatient services (e.g. ophthalmology) accounted for three-quarters of all private equity buyouts in healthcare in 2020.[70] This consolidation has potential ramifications on doctor supply, as many do not adjust to the culture of reporting structure and policies, and provider dynamics, as they are able to negotiate higher payments from insurance companies that in turn leads to higher premiums for patients.

The pandemic exacerbated the challenges faced by healthcare workers including **burnout, illness and mental health and well-being issues** (e.g. workplace violence and harassment). Even before the pandemic, the healthcare sector was one of the most hazardous sectors to work in; healthcare workers are four times more likely to be assaulted than other professionals in the general workplace, with those most at risk including junior doctors and nurses, those working in government hospitals, emergency departments, intensive care units or isolated areas.[71] While some efforts are being made to improve healthcare sector working conditions (e.g. the recent WHO and International Labour Organization (ILO) guide on developing and implementing stronger occupational health and safety programmes for health workers[72]), healthcare workers are still at risk, with high potential for burnout and jeopardy towards their health and well-being leading to many professionals leaving the sector and reduced recruitment into the sector. There is a serious need to take pressure off acute care and medical staff; efforts must be reprioritized to build a resilient healthcare system. Mental health and well-being issues are not limited to healthcare workers; there are significant efforts to address these issues across the broader population through novel therapies (including psychedelics), telehealth and community-based mental healthcare, and digital tools and online education programmes to train providers. This need is even greater in LMICs; while 70% of people with psychosis are reported to be treated in HICs, only 12% of people with psychosis receive mental healthcare in LMICs.[73] Private organizations could play an important role in taking responsibility for the mental well-being of their employees and

> **While there are several laws protecting our safety and well-being as physicians in India, the threats of violence and burnout are real, and one of the contributors as to why doctors are considering other professions or are looking to pursue medical specialities in other countries.**
>
> Kashish Malhotra, Physician, Department of Internal Medicine, Dayanand Medical College and Hospital

Given the expected heavy reliance on digital and cloud-based solutions in the future due to workforce availability, **data interoperability and confidentiality** issues are important barriers to fully using digital solutions and gaining sufficient trust for widespread use for both back-end and customer-facing technology. While data aggregation can allow data sharing and identification of trends and insights, local data can reveal valuable information but is challenging to share and can result in significant trust issues if not communicated transparently. To be aggregated, however, data needs to be harmonized across organizations and countries to be of value. Data ownership policies need to be clearly defined and data security reinforced to cultivate an environment that allows for the safe collection and sharing of valuable insights that improve healthcare delivery. Customers also need to understand the context for data sharing. Localized relationships with trusted community leaders as advocates can help, but this introduces challenges around the scalability of solutions. Consistency and quality of data collection are important for recording outcomes, which is necessary to facilitate the financing of digital solutions.

With new technology, customers expect a seamless experience they can trust that meets the specific needs of the users in the digital interface and the hardware. It is important to ensure that the quality of care is maintained when decentralizing part of the healthcare system through digitalization. It is also vital that decentralization is appropriately selective of patient populations where in-hospital care is not required to avoid poorer outcomes. Additionally, three billion people are currently **not connected to the internet**;[74] of those who are, there are still issues with cloud storage and bandwidth, mainly in LMICs. This makes the implementation of digital solutions more challenging and exacerbates inequities further by preventing access to these innovations. There is a need to ensure that solutions are compatible with communities without internet access and countries with limited digital infrastructure.

> **In Alzheimer's we have the approach of 'nothing for us, without us.' It is important to include the needs of the target population for tech developments. For example, if you are working with an over 80s population it is not just about making the interface easy to use but ensuring that the hardware has the right speaker quality, font size, touch screen for the needs of these people.**
>
> Jisella Veath Dolan, Chief Global Advocacy Officer, Honor + Home Instead

During the pandemic, there was significant increase in scale and repurposing of capacity in drug manufacturing and diagnostics. As part of pandemic preparedness and globalization, there is an additional increase in capacity committed in countries around the world to future vaccine efforts. However, issues remain around **maintaining this capacity in non-pandemic situations and showing agility** in repurposing and scaling this capacity on short notice should other pandemic situations arise.

While the aim is to ensure that the right capacity and sufficient supply chain infrastructure is in place, the impact of this and the broader healthcare system on the environment needs to be taken into account. One of the main issues with decarbonizing healthcare systems is ensuring that changes are made in **a patient-centric way, and that quality of care is maintained** in this transition. Decisions made should not result in higher cost of care to patients, nor restrict access to necessary medications with a large carbon footprint, therefore limiting impact on patient outcomes.

> **Decarbonizing cannot be at the expense of quality, reach or continuity of patient care. Patient care experience must remain our north star so we achieve better outcomes for people, society and the planet.**
>
> Elly Darkin, Senior Manager, Global Corporate Affairs, AstraZeneca

Supply chain issues were prevalent during the pandemic and impacted a range of industries, however, in the healthcare industry, the lack of availability of medicines or equipment means that the lives of healthcare workers and patients are at risk. During the pandemic, those countries without local manufacturing capabilities were some of the last to receive essential medicines and equipment despite their need being the greatest. The localized and concentrated nature of manufacturing and supply chain resources and knowledge limits the ability of LMICs to secure long-term and reliable access to medicines and equipment. Therefore, it is important that supply chain infrastructure is resilient, distributed, diversified and tracked closely to predict and mitigate against disruptions for all stakeholders equally. Supply chain security requires vetting and verification of suppliers to avoid introducing counterfeit products into the supply chain to protect patients and healthcare workers. The application of digital solutions can have a significant beneficial impact on monitoring and tracking product supply. The healthcare supply chain has a large carbon footprint, mainly from production, packaging, transport and disposal of pharmaceuticals, medical devices and hospital equipment and instruments.[75] Therefore, decisions regarding the fortification and geographic diversification of supply chains should take into account environmental impact.

Supply chain issues have brought forward the importance of global connectivity while highlighting equity issues across geographies. Global access and reliable supply chains have been hampered by strict national export bans and a lack of patient regionally diversified sourcing and production due to restrictions and a **lack of incentives** for tech transfers. Beyond tech transfers, companies are not incentivized to adopt broader innovation around product development, process design, service or business models, which further limits opportunities to improve overall population health.

Discrepancies in health equity are entrenched in healthcare data, given the **limited diversity** in clinical trial demographics. As big data and AI are increasingly deployed, these issues can be further exacerbated due to **existing biases in the data**. There needs to be proactive focus on diversity and clear guidelines for increasing inclusion.

There are significant **gaps in data and evidence generation** despite the increase in data, which restricts the ability to identify priority areas for funding, deliver outcomes-based care and raise awareness of issues, such as inequities in the impact of climate change on health, that need to be addressed.

> **We should acknowledge existing data gaps and use AI to close these rather than integrating biases and worsening them.**
>
> Ivor Horn, Director, Health Equity and Product Inclusion, Google

Unfortunately, the pace of innovation is currently faster than the **pace of regulatory change**. Regulatory change needs to be linked to outcomes, as what is efficient is not always the most effective. This, and a lack of harmonization of regulation across jurisdictions, impact digital innovation and the funding and reimbursement of innovative therapy modalities.

The lack of **standardized outcomes measurements** by disease is a barrier to being able to offer outcomes-based care and making informed reimbursement and investment decisions. The challenge is made even harder by the misplaced need for short-term results in a system where the true value of investment is more easily revealed over the years. Furthermore, with increasing decentralization, it is more challenging to ensure that the quality of care is standardized and consistent.

The impact of **climate issues disproportionately affects LMICs**, which contribute less to emissions but are particularly vulnerable to climate change and have less resilient healthcare infrastructures.[76] Policy changes to encourage lowering emissions are at odds with encouraging urbanization and economic growth in LMICs, which in effect can exacerbate climate impact on healthcare.

> **Standardized outcomes measurements by disease are important for a sustainable healthcare system that helps patients so we do not waste money on things that do not help people.**
>
> Stefan Larsson, Distinguished Fellow, World Economic Forum

3 What are the solutions to address these issues?

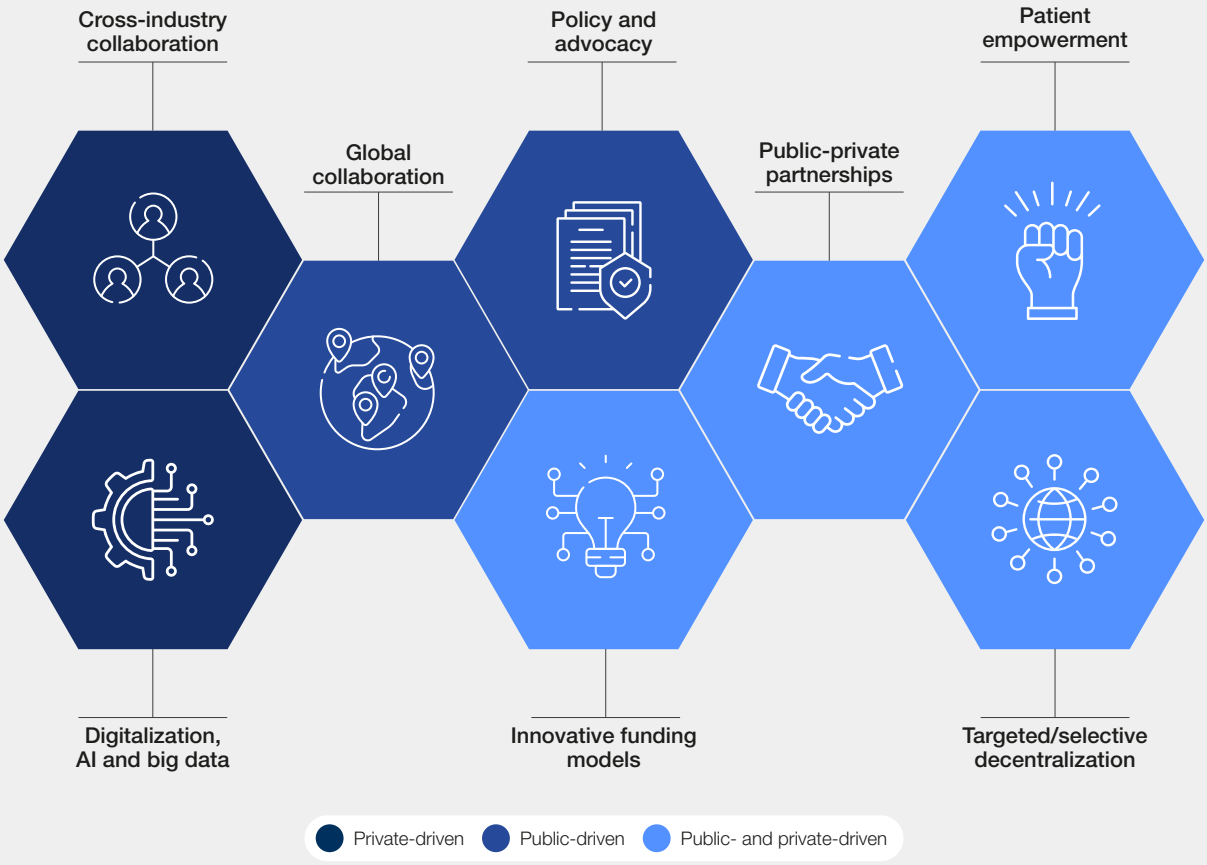
Public and private stakeholders can use a range of levers to resolve issues in health and healthcare globally.

While these barriers prohibit the achievement of equity, resilience, innovation and environmental sustainability in health and healthcare, addressing these barriers provide opportunities to create value for businesses, governments and society.

There are several levers to resolve these issues driven by public, private or both stakeholders, and solutions can make use of multiple levers as subsequently demonstrated by the selection of case studies.

FIGURE 4

Levers that private and public stakeholders are employing to address issues and barriers in health and healthcare



Source: L.E.K. Consulting; World Economic Forum

Cross-industry collaborations can occur between healthcare providers and a range of other industries such as consumer/retail or digital solutions companies to address a number of barriers. In one such example, a technology platform, Honor Technology, and an at-home health service company, Home Instead, have combined their capabilities to offer Home Instead's high-touch care model supported by Honor's technological and digital solutions. This collaboration allows Honor to scale its technology geographically and better empower Home Instead's workforce. In such cross-industry collaborations, the key to success is mission alignment across the two organizations joining forces. In the case of digital solutions, it is particularly important to ensure that the technology is designed in collaboration with the customer to account for their specific needs and tech readiness, while engagement is guided by on-the-ground support through a trusted member of the community or carer. In addition, alignment on data collection and ensuring data integration from the beginning across the organizations is key to continuing to improve services and demonstrate value proposition, along with transparency in data collection to the consumer. As a result, agencies using the Honor care platform have a workforce turnover rate that is half the industry average, and 94% of them feel they have the tools and resources they need to be empowered in their jobs. In addition, 94% of the older adults they care for have a positive experience with their professional caregivers.

> **The Honor care platform helps caregivers feel respected and provides them the schedules they desire, which is key to enable Home Instead agencies to recruit and retain the workforce needed to meet growing demand for home care services.**
>
> Home Instead and Honor Technology

Patient empowerment is a key lever to encourage patients to have ownership of their health and wellness. To support this, South Africa-based health insurance company, Discovery Vitality, developed a behavioural change platform that incentivizes customers to adopt a range of health behaviours including increased physical activity, healthy eating and regular screening. The key to success in supporting behaviour change is incentives. Simply providing guidance on good health choices is insufficient in changing behaviour, but personalized interventions and incentives lead to better engagement, trust and outcomes. The private sector is particularly well-positioned to offer these types of incentive structures. Data gathered over decades show that increasing engagement with the platform reduces mortality risk and life expectancy. For those with the highest engagement, life expectancy reaches 83-89 years compared to South Africa's average life expectancy of 64 years.

> **Vitality makes living a healthy lifestyle fun for me. By gamifying the act of healthy living, it motivates me to reach my weekly goals by offering valuable and practical rewards. As a person living with a disability, it is even more important to try to live an active life.**
>
> Brandon Beack, Participant, Discovery Vitality programme

Policy and advocacy are important levers to drive systematic change across a broader population. For example, the Ayushman Bharat Digital Mission (ABDM) is an initiative launched by the Ministry of Family and Health Welfare, Government of India, under the aegis of the National Health Authority, to build, launch and scale foundational infrastructure, and enable the world's largest digital health landscape. It aims to develop the backbone necessary to support India's integrated digital health infrastructure and bridge the gap among healthcare stakeholders through digital highways. This includes generating a unique patient identifier, health professionals and facility registry, a mobile app for personal health records, a health information exchange consent manager for patient control over data collection, claims processing and a unified digital health interface for appointment booking, teleconsultation, service discovery and other services. The key to success in these types of solutions is the security and privacy of data, as well as data interoperability at the centre of the design and build of the model. In addition, adoption is a major element of the journey and sustained engagement with all partners, particularly small-scale healthcare service providers, is essential to drive adoption and shift from traditional healthcare delivery methods to digital. As of the end of September 2022, nearly 250 million ABHA unique identifiers have been created, and 160,000 health facilities and 91,000 healthcare professionals have been registered with the platform.

Digitalization, AI and big data to better connect healthcare stakeholders and provide access to a wider set of healthcare information to improve decision-making is an important underlying theme in several case studies (e.g. ABDM, Home Instead and Honor). In Bayer Consumer Health's work in Guatemala, digitalization via QR codes on individual product sachets aims to improve affordable access to over-the-counter (OTC) medicine by reducing packaging costs, improving healthcare literacy and empowering patients while reducing carbon footprint. The role of OTC products in middle-income countries of Latin America (like Guatemala) helps individuals save on average four productive days, worth $123 revenue per person per year – a significant income for low-income consumers who can earn between $2 and $15 per day. While digitalization's role in addressing health and healthcare issues will likely increase in the future, challenges around accessibility (e.g. ensuring access to mobile telephones with camera functionality) and regulatory approval must be considered. As demonstrated by the case study in Guatemala, when discussing data interoperability in the context of health and healthcare, the digital solutions being deployed do not need to be advanced or overly ambitious. The emphasis should be on building the right data infrastructure for the future while understanding how best to apply the minimum data set now to inform decision-making and improve outcomes for patients.

> **On data, we know where we are trying to get to with this and need to accept it's a multi-year endeavour… the focus should be on building the infrastructure and getting that right and doing what we can with the minimum data set we have at that point in time. It's important we don't try to boil the ocean.**
>
> Sally Lewis, Director, Welsh Value in Health Centre

Decentralization is a lever to alleviate pressure on hospital capacity. However, it needs to be done in a selective and targeted way to decentralize healthcare segments with large populations that can benefit from the privacy and convenience of decentralized care with no negative impact on outcomes. Many examples of decentralization use digital solutions, however, internet access is not universal. Singapore-based health social enterprise, reach52, aims to tackle remote access issues in areas with limited data coverage through an offline first health technology platform that enables a full range of health services. This solution supports implementing community-based and tech-powered healthcare delivery models for NCDs, including a 3-in-1 offering of coaching, testing and medications at a subsidized cost. The platform works on basic mobile phones with significant offline functionality. Data is synced at specific locations or when a mobile signal becomes available. The key to success with this type of platform is not relying entirely on the digital solution but having a human component to encourage use and empower members to manage their health conditions. reach52 collaborated with municipal health providers in Pototan, Philippines and MedTech social enterprise, Medtronic LABS, to upskill existing community health workers to promote sustainability and scalability. They also incorporated local residents as peers in programme facilitation to build participants' trust and sense of belonging. As a result, 76% of members had their systolic and diastolic blood pressure under control by the end of month six, compared with 64% (systolic) and 73% (diastolic) in month one.

> **I've had diabetes for 30 years now. It has been a challenging journey, especially with the burden of medicine costs and there are a lot of foods that I must avoid. My family always worry about my condition and I always have to disturb them whenever I need to do my check-ups. I'm really happy that Padayon arrived in our barangay and gave us easier access to blood pressure and sugar checks, affordable medicines and diabetes education.**
>
> Participant, 64 years old

The cost of a one-time infusion could reach

$2.8 million

Global problems require global solutions. The negative health, economic and environmental effects of one country or organization are far-reaching and extend beyond borders. **Global collaboration**, particularly between stakeholders generating disproportionate impact (e.g. HICs, blue chip or multinational corporations), is important to be effective and sustainable in the solutions delivered. The healthcare sector contributes over 4% of global greenhouse gas emissions.[77] Launched at COP26, the Sustainable Markets Initiative (SMI) Health Systems Task Force is a global private-public partnership effort to accelerate the delivery of net zero, patient-centric health systems through scalable action, recognizing the deep interconnection of public and planetary health. Members include chief executive officers or equivalents from global life sciences firms (e.g. AstraZeneca), healthcare systems (e.g. NHS England), institutions (e.g. WHO) and academia (e.g. the Karolinska Institute). The Task Force is committing to global action as a collective focusing on decarbonization across three core areas: supply chains, patient care pathways and digital health solutions. The Task Force initiatives include aligning a set of common supplier standards to incentivize decarbonization efforts, jointly pursuing renewable power purchase agreements and identifying green transport corridors in supply chains, tracking and publishing emissions across patient care pathways, and deploying digital health solutions to decarbonize clinical trials. Beyond climate, many other global health and healthcare problems require global collaboration. For example, AMR presents a significant global mortality burden with unequal distribution in LMICs due to the greater prevalence of critical infections, lack of laboratory testing capabilities and limited access to second- and third-line agents. Several global initiatives were launched to combat this, including international guidelines, strategies and action plans, antimicrobial stewardship programmes, global awareness campaigns and surveillance programmes (e.g. the Global Antimicrobial Resistance and Use Surveillance System).

More co-ordinated investment in global health and neglected disease areas, such as malaria and schistosomiasis, is also needed on an international scale to reduce the negative health, social and economic impact on the most vulnerable populations.

Innovative funding models, where the innovation is derived either from the source of funding or the degree of innovation (e.g. completely new or building on existing models), will be needed to meet the growing demand for services and increasing funding gap. Funding solutions need to be context-dependent to maximize impact and sustainability, as well as be implemented into systems that are reorientated to focus on the outcomes achieved versus the volume of services delivered. For example, NHS Wales is deploying mixed funding models to bring about behavioural change in their healthcare landscape and is reviewing the allocation of resources at a macro, meso and micro level as part of their initiative to promote value-based healthcare for the population. NHS Wales has established a commitment to a financial strategy that will embed the financing of value through linking resource allocation, resource use and outcomes achieved across communities. Multiple approaches to financing for value are being harnessed, including national formulae, value-based procurement, value-based contracting, data use and remote care. Key success factors for NHS Wales' approach include that the policy and infrastructure were in place to support such change, a system-level approach was adopted to ensure consistency and continuity across services, and different funding models were flexed to meet the needs of the local areas, conditions or populations they were serving. The work in NHS Wales led to the allocation of £20 million towards wider implementation of value-based healthcare and triggered the development of standardized PRO measures, which aligned data standards, processes and information exchanges to allow for the aggregation of national data to report system-level progress. Alongside innovative funding models, transparent reporting of the cost of medicines and greater investment into real-world evidence are needed. For example, in the context of cell and gene therapies where the cost of a one-time infusion could reach $2.8 million in the US, instalment-based funding models could be applicable given the small patient numbers and ability to collect real-world data over a long-term horizon. In LMICs, where the barriers to such therapies are even higher (e.g. lack of infrastructure, limited trained workforce, insufficient policy in place), financing solutions need to be more innovative to ensure equal access and outcomes. Potential models could include multistakeholder approaches to voluntary licensing, donation programmes, value-based tiered pricing or subscription-based payments.[78] For example, in Thailand, patients undergoing haematopoietic stem cell transplants receive $21,000 from the government before treatment and up to one year after transplantation for ongoing treatment and monitoring of beta thalassaemia or acute lymphoid leukaemia.[79] In Argentina, the government formed a price agreement with Biogen to ensure access to treatment of the rare disease spinal muscular atrophy for 260 patients.[80] In Taiwan, the National Health Insurance (NHI) has a separate fund that uses 24.2% of tobacco tax to pay medical expenses for rare diseases.[81]

> **Funding is extremely context-dependent and if we try to impose a uniform financial model it will fail; having access to a range of funding models and being able to apply those flexibly depending on the scenario, country or healthcare system is key to success.**
>
> Sally Lewis, Director, Welsh Value in Health Centre

As the health and healthcare challenges rise in complexity, the need for innovative solutions that span across geographies, industries and sectors is increasing. **Public-private partnerships** (PPP), where partners share risks, resources, accountability and decision-making authority, are a key lever that makes use of the collaboration of different stakeholder groups.[82] The Global Antibiotic Research and Development Partnership (GARDP) is a not-for-profit organization, founded in 2016 by WHO and the Drugs for Neglected Diseases initiative (DNDi), focused on providing countermeasures to manage the emergence of AMR. AMR is a public health priority with 1.3 million deaths directly attributed to antibiotic resistance in 2019 alone.[83] In order to reduce this growing AMR-attributed mortality, barriers need to be addressed, such as a dry antibiotic pipeline due to the lack of market incentives for R&D, inequalities in new antibiotic access, especially in LMICs despite disproportionate burden and recurrent shortages of off-patent antibiotics due to a fragile supply chain. To address these barriers, GARDP is developing a public health portfolio to manage the emergence of AMR, taking into account local public health and clinical needs on a not-for-profit basis. GARDP is collaborating with over 70 partners in more than 16 countries to support late-stage clinical development and access to antibiotics. For example, GARDP signed a first-of-its-kind licence and technology transfer and collaboration agreement with a pharmaceutical company and the Clinton Health Access Initiative to expand access to a novel antibiotic in 135 LMICs. The success of GARDP is driven by their ability to work closely with partners to understand their specific needs and flexibly across projects to address the gaps identified (e.g. innovative financing models, market shaping and procurement activities, awareness raising).

> **Public-private partnerships are fruitful in that they bring about collaborations that might not otherwise occur, involving stakeholders that are tackling the same problem but from different lenses. They are particularly useful in addressing product-agnostic questions, where the value is in improving efficiencies or scientific understanding. Too often we see many companies trying to find the path through the forest themselves, and each of them getting lost and not learning from one another. Public-private partnerships help bridge this divide to find solutions to common problems in a shorter time.**
>
> Jeff Allen, Chief Executive Officer, Friends of Cancer Research

FIGURE 5 | **Case studies illustrate opportunities to use levers to a range of barriers across geographies**

Case studies	Cross-industry collaboration	Public-private partnership	Patient empowerment	Targeted/ selective decentralization	Digitalization, AI and big data	Global collaboration	Innovative funding models	Policy and advocacy
Home Instead and Honor Technology: Decentralization and technology	●		○	○	○			
Discovery: Vitality programme for patient empowerment	○		●		○			
National Health Authority: Building a digital health landscape	○		○		●			●
Bayer: Digitalization to provide equity and sustainability		○	○		●			○
reach52 and Medtronic: Digitalization and equity			○	●	○			
AstraZeneca: Implementing net zero	○	●	○			●		○
NHS Wales: Innovative funding models and value-based care							●	○
Global Antibiotic Research and Development Partnership (GARDP): Partnerships to manage AMR		●				○	○	○

Source: L.E.K. Consulting; World Economic Forum

● Main focus ○ Other relevant levers

These case studies demonstrate how a range of solutions can be applied to address important barriers in health and healthcare today. Although the challenges faced vary by country or region, the most common barriers included healthcare literacy and trust in industry, baseline health and wellness, global discrepancies, skilled labour shortage, and hospital capacity constraints. The most used levers include digitalization, AI and big data, patient empowerment and cross-industry collaboration. Solutions were most effective when levers were used in combination with one another. For example, Discovery used cross-industry collaboration, patient empowerment and digitalization in combination to increase average life expectancy by 25 years for its members in South Africa, leading to significant individual and system-level impact. The impact can be greatest when multiple stakeholders work to solve a common problem using different levers in parallel.

Over-investment in short-term solutions will not facilitate change at the system level nor be replicable or scalable across markets. Efforts should focus on compounding the strengths of public and private stakeholders, incentivizing innovation through policy and collaborating globally across industries to achieve far-reaching and long-term impact on the health and healthcare of the population.

Conclusion

In the last three years, the world experienced a major pandemic, multiple geopolitical conflicts, and climate and energy crisis effects, which all have a detrimental impact on health and healthcare globally, with the most vulnerable populations being the most impacted. While triggering growth and innovation in the form of a surge in healthcare spend and investments, scientific advancements, improved digital innovation and connectivity and alternative care models, the pandemic also exposed global health disparities, had a detrimental impact on mental health and well-being, and exacerbated macro-economic issues and the climate crisis.

In a time where barriers are complex, involving multiple stakeholders with competing priorities, it is increasingly important to work together and define clearly what the vision for health and healthcare looks like in 2035. Equitable access and outcomes for all is a key pillar and will require significant and disproportionate investment in the countries or regions lagging behind. Healthcare systems need to be reorientated to think about success in the context of broader outcomes across health and wellness for individuals, communities, populations and systems over multiple years in the face of expected and unexpected circumstances. An environment that supports funding, use and implementation of innovative approaches in science and medicine needs to be cultivated, in particular in countries or regions where infrastructure and opportunities may not be as advanced. For environmental sustainability, reducing the healthcare industry's impact on the environment is key (e.g. supply chain and decentralized care) while also preparing for and addressing climate change for better health and wellness across all countries, including those that suffer a disproportionate impact. Each strategic pillar is important, but collectively striving for them all will help ensure that sustainability, equality, resilience and innovation are embedded into future health and healthcare systems.

The vision for health and healthcare in 2035 is ambitious yet achievable. To get there, stakeholders across sectors, industries and geographies need to build on the existing traction and collectively lead across their organizations to catalyse long-term change at the system level. The biggest barriers in health and healthcare in 2023 are predicted to include worsening mental health, healthcare workforce shortages, supply chain issues and climate and macroeconomic instability (e.g. energy supply and inflation). While it is important to keep these barriers in mind, they should be addressed in the context of the outlook for 2035 to ensure activities are complementary to striving towards systemic, long-term change.

Action is needed now; nearer-term initiatives and targets that balance the needs of different stakeholders should be enacted to build upon successes to date. In 2023, private stakeholders should:

1. Implement the WHO guidelines on mental health at work[84] and other evidence-based research to preserve, monitor and remediate employee welfare, as well as define and track metrics over time to demonstrate impact and advance understanding of key determinants of well-being in health and healthcare workplaces.

2. Incentivize private industry investment to drive innovation in medicine development and commercialization, supply chain optimization and healthcare delivery. Outline how innovative products and services can lead to contained costs, improved efficiencies and better outcomes at the individual and system level, which could be scaled globally considering the different tech capabilities across markets. Also, work with policy-makers to outline ways to cultivate regulatory environments that support rather than restrict the adoption of technology and innovation.

3. Mandate that environmental, social and governance pillars are embedded equally into the health and healthcare industry by defining and tracking a clear set of metrics centrally to encourage widespread adoption and standardize expectations across the industry in collaboration with public bodies.

Public stakeholders should:

1. Internationally cooperate (e.g. via the World Trade Organization and other trade and investment fora) to create an environment that facilitates and promotes distributed supply chains via a global network with a focus on building capacities and investing in underrepresented geographies with vulnerable populations.

2. Redesign systems to focus on the value of outcomes achieved over the volume of services delivered and embed the financing of value through linking resource allocation, resource use and outcomes achieved across communities. Implement policies that ensure the changes are at the system level but allow for local autonomy and flexibility in funding models. Define a clear set of short-, medium- and long-term impact measures to allow for national data aggregation and evidencing of system-level impact. Educate all stakeholders, including patients, physicians, payers and policy-makers to ensure alignment and embed value as the norm.

3. Mitigate national divergences in data regulations by converging an international body that sets out rules and guidelines to harmonize data use and its applications within health and healthcare. Alongside this, track, monitor and publish data-related trends to update policy-makers on key changes required to support the widespread use and adoption of data applications in the industry while balancing the needs of privacy, personal data protection and security.

Appendix

A1 Cross-industry partnership case study: Home Instead and Honor Technology

Overview:

Between 2015 and 2050, the proportion of the world's population over 60 years will nearly double from 12% to 22%.[85] All countries face major challenges in maintaining the baseline health and wellness of their ageing populations, especially in the context of increasing pressure on healthcare services' capacity and funding. Catalysed by the pandemic, options to deliver high-quality care while maintaining value are increasingly attractive. Home Instead is the world's largest private home care provider for older adults operating through more than 1,200 locations in Europe, North America, Asia, Australia and New Zealand. Home Instead is built on the concept of "high-touch" care, engaging the patient and their families through a franchise model that allows building localized relationships and delivering care that meets the personalized needs of older adults and their families.

Barriers faced:

- Declining baseline health and wellness with an ageing population, creating an increased demand for services and a need to scale more quickly
- Skilled labour shortage across healthcare and home care
- Deteriorating mental health and well-being of the healthcare workforce as well as the broader population, including family caregivers
- Need for technology to allow scalability of local agency presence and the ability to serve more people

Levers used:

- Cross-industry collaboration
- Patient empowerment
- Targeted/selective decentralization
- Digitalization, artificial intelligence (AI) and big data

Solution:

Home Instead was acquired by Honor Technology, a leading technology and operations platform, with the aim to combine high-touch care with best-in-class technology and digital solutions. The tech and digital elements empower patients, families and the workforce, while the platform is integrated within local Home Instead agencies to unlock scale. This increases the capacity of the in-person geographic presence and local footprint to serve more people better and to better empower workforce.

Key learnings:

- In a cross-industry collaboration, the perspective and experience of the two companies can differ; in this case the tech perspective and the personal care service perspective. Therefore, mission alignment across the two companies is important. Mission alignment guides the decision-making process for achieving partnership goals.
- Mission alignment is important to engage the workforce in a decentralized model, and making use of tech allows for building a sense of community for the workforce.
- Technology is used to connect the entire care landscape and empower patients, their carers and the workforce, but humans and local presence are still necessary to deliver the experience.
- Any customer-facing tech should be designed in collaboration with the customer to make it fit for purpose. Additionally, to ensure the tech use by older adults, a human coach trusted by the customer (home care professional, community leader or family member) should support the customer with tech readiness.
- Data collection is very important to ensure proper outcomes are measured and that there is a clear understanding of the efficacy of interventions. There needs to be alignment at the beginning of cross-sector partnerships regarding how the data will be collected and integrated to ensure care is consistent and continuously improving to address patients' and carers' needs.

– For sharing non-aggregate data, patients should have visibility on which data is shared and the rationale based on discussions with a trusted member of their local community, a family member or a carer.

– Funding routes need to be established, and as a result, it is important to understand what information and data will be required to express the value proposition of the service appropriately.

Impact:

– In this first year following the acquisition, the initial integration of the Honor care platform and the Home Instead franchise network has empowered Honor Technology to expand its footprint in the US with the long-term goal of supporting Home Instead agencies in every state and other countries.

– The Honor care platform helps the caregiving workforce feel respected, provides them with schedules and hours they desire, and treats them as professionals.

– Consequently, care professionals who use the Honor care platform express that they have the tools and resources they need to be empowered in their jobs (94%) and will be working for the same agency a year from now (93%).

– Agencies using the Honor care platform have a workforce turnover rate that is half the industry average.

– By supporting the workforce in this way, Home Instead agencies can continue to be employers of choice and recruit and retain the workforce needed to meet the growing demand for home care services.

– Older adults and their families have a positive experience through care delivered by the Honor care platform and local agency.

– Older adults express positive feedback about their professional caregivers who use the Honor care platform (94%).

– A Home Instead client shared the following about his experience with his Care Pro: “The love and care has just been fabulous. It’s kept me from feeling lonely. It’s kept me happy and wanting to continue to live”.

Remaining challenges and role of key stakeholders:

Public stakeholders:

– Public decision-making needs to be faster to keep up with the speed of innovation and involve input from private stakeholders to gain expert insights.

– Social care and healthcare are intertwined and should be merged into the landscape. Some countries are further ahead than others in doing this.

Private stakeholders:

– Engaging with people earlier in age to manage wellness rather than sickness can improve baseline health issues.

– There are disparities in access to the internet within and across geographies; tech solutions should take this into account to avoid increasing global disparities.

A2 Patient empowerment case study: Discovery's Vitality programme

Overview:

Despite the well-evidenced relationship between lifestyle factors (e.g. diet, smoking, sleep) and health, many adults fail to meet recommended guidelines related to these behaviours. For example, in Australia in 2020-2021, only 45% of adults aged 18 years and over were sufficiently active, while only 4% of men and 13% of women were consuming the recommended number of daily servings of vegetables, and 41% of men and 48% of women were meeting recommendations for fruit intake.[86] A higher proportion of males than females were more likely to drink at levels exceeding lifetime risk guidelines and 1 in 10 people (10.7%) aged 18 years or over were current daily smokers.[87] In South Africa, 57.4% of individuals 15 years or over were physically inactive.[88] Discovery is a shared value insurance company with a pioneering business model that incentivizes healthy behaviour leading to better health outcomes, lower claims and lower lapses.

Barriers faced:

- Baseline health and wellness and global discrepancies
- Healthcare literacy
- Deteriorating mental health and well-being

Solution:

Discovery Vitality is a scientifically-proven behavioural change platform that incentives customers to adopt a range of healthy behaviours including increased physical activity, healthy eating, mental wellness and regular health screening. Customers earn points through physical activity, healthy eating, regular screening and more. Points earned are then converted into a range of rewards including discounted gym membership, discounts across a range of retail partners and discounted fitness devices. The Vitality behavioural change platform has been scaled globally through partnerships with leading insurers and is available in 40 markets and covers more than 20 million members.

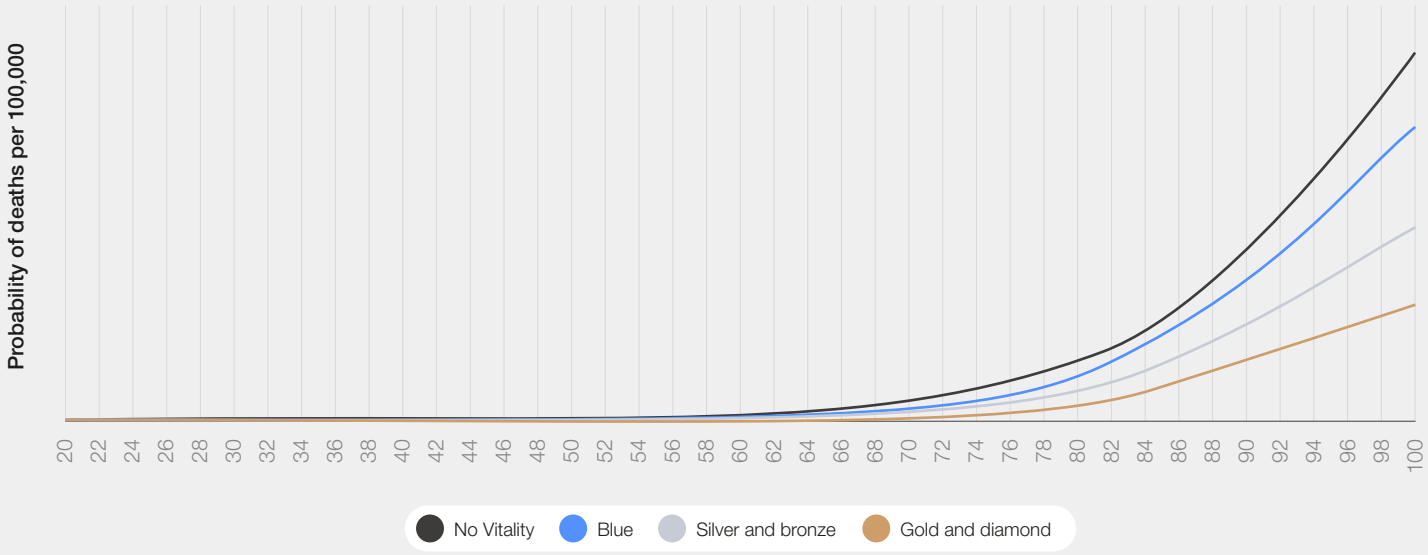
Levers used:

- Patient empowerment
- Cross-industry collaboration
- Digitalization, AI and big data

Key learnings:

- It is not enough to provide people with guidance on good health choices – incentives are a uniquely powerful tool in driving better behaviour, and insurers are well-placed to provide these incentives, given they are one of the few actors that can monetize better health.
- The repeatability of the model has been a vital factor in its ability to scale – because the shared-value insurance model is underpinned by principles that work across industries and markets, it has been able to grow rapidly to over 40 countries covering more than 20 million lives.
- Personalization is key – using data strategically to offer people timely and relevant interventions and rewards drives engagement and trust, as well as better outcomes. People will trust organizations with their data if they know it will only ever be used to their benefit.
- Compounding good behaviours across lifestyle categories can have a significant impact on both the business and the client – Discovery is creating an interconnected environment where clients with multiple products, who are engaging in better health, driving and financial behaviour, get incredibly rich rewards, keeping them healthier for longer, while Discovery benefits from clients who are lower risk overall and remain engaged in the various programmes.
- The depth of the offering can seem over-complicated to consumers, so work needs to be done with advisers, brokers and brand communicators to simplify the offering and its various components.

FIGURE 6 | **Mortality risk by age and Vitality status**



Source: Discovery Health

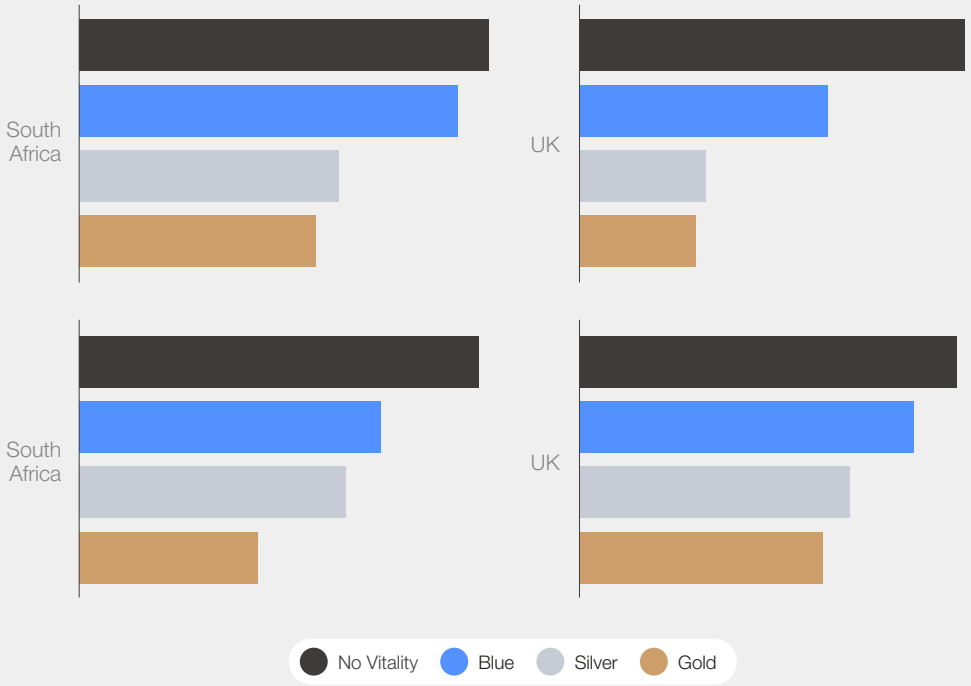
Customer impact:

- Discovery's Vitality programme was launched in 1997, leading to decades of data collection on the impact of behaviour change on health and ageing.
- Data show that at each age, gold and diamond Vitality members have significantly lower mortality risk and higher longevity compared to other Vitality status members and those without Vitality.
- Members achieve a specific status based on their level of engagement, with diamond being the highest and blue the lowest.
- While the average life expectancy in South Africa is 64 years, Vitality gold and diamond members have a life expectancy of 83 and 89 years, respectively; the former is in line with Italy and Australia while the latter is higher than the average life expectancy in Japan.

FIGURE 7 | **The impact of Vitality member status on claims and lapse rate**

15%
Lower claims

40-60%
Lower lapses



Source: Discovery Health

Business impact:

The shared value health insurance model results in a virtuous cycle whereby customers, incentivized to adopt healthy behaviours, increase their levels of physical and mental fitness, which then leads to lower reserves for health insurance. These savings are then reinvested into lower premiums and/or additional rewards and incentives for further customer behaviour change.

Discovery's Vitality programme has led to a 15% reduction in health insurance claims and 40-60% lower lapses, with a positive correlation between the level of engagement, and claims and lapses.

Personal impact:

> **I have asthma but have managed to get it under control with exercise. I know I have to exercise to keep healthy. But without a 'carrot', I find it hard to make my goals … I found the rewards tangible from the get-go.**
>
> Ros Karamba, Participant, Discovery Vitality programme

> **I was overweight and unhealthy, my face was puffy, I was eating badly and not exercising – all of which I had allowed to happen in my 50s. I realised that I had to change my lifestyle and look after myself before turning 60 ... There was a massive change in my medical results. Everything dropped into a good range: from cholesterol to blood pressure and blood glucose levels, and I was in line with my Vitality age-weight range for the first time in years. Everything was just working properly.**
>
> Jackie-Anne Collette, Participant, Discovery Vitality programme

A3 Policy and advocacy case study: National Health Authority India – Ayushman Bharat Digital Mission

Overview:

India's 1.4 billion people seek healthcare through a maze of public and private providers – the majority of these interactions are captured on hand-written paper records or not at all. Ayushman Bharat Digital Mission (ABDM) is an initiative launched by the Ministry of Family and Health Welfare, Government of India, under the aegis of National Health Authority, to build, launch and scale foundational infrastructure, and enable the world's largest digital health landscape. It aims to develop the backbone necessary to support the integrated digital health infrastructure of India and bridge the existing gap among different stakeholders of healthcare landscape through digital highways. ABDM will create a seamless online platform through the provision of a wide range of data, information and infrastructure services, duly using open, interoperable, standards-based digital systems while ensuring the security, confidentiality and privacy of health-related personal information. ABDM takes a "citizen-centric" approach in healthcare to strengthen the accessibility and equity of health services, including a continuum of care with citizens as the owners of data.

Barriers faced:

- Healthcare literacy and trust in the industry
- Skilled labour shortage and hospital capacity constraints
- Data interoperability and confidentiality
- Connectivity to the internet and lack of digital infrastructure

Levers used:

- Policy and advocacy
- Patient empowerment
- Digitalization, AI and big data
- Cross-industry collaboration

Solution:

ABDM has built and rolled out various building blocks (through modules, gateways and protocols) to address the existing challenges the healthcare sector currently faces, which are built on the principle of open application programming interfaces (APIs) that the healthcare landscape can consume:

Ayushman Bharat Health Account (ABHA) number: A 14-digit random unique number designed as a patient identifier, created with minimum demographic details.

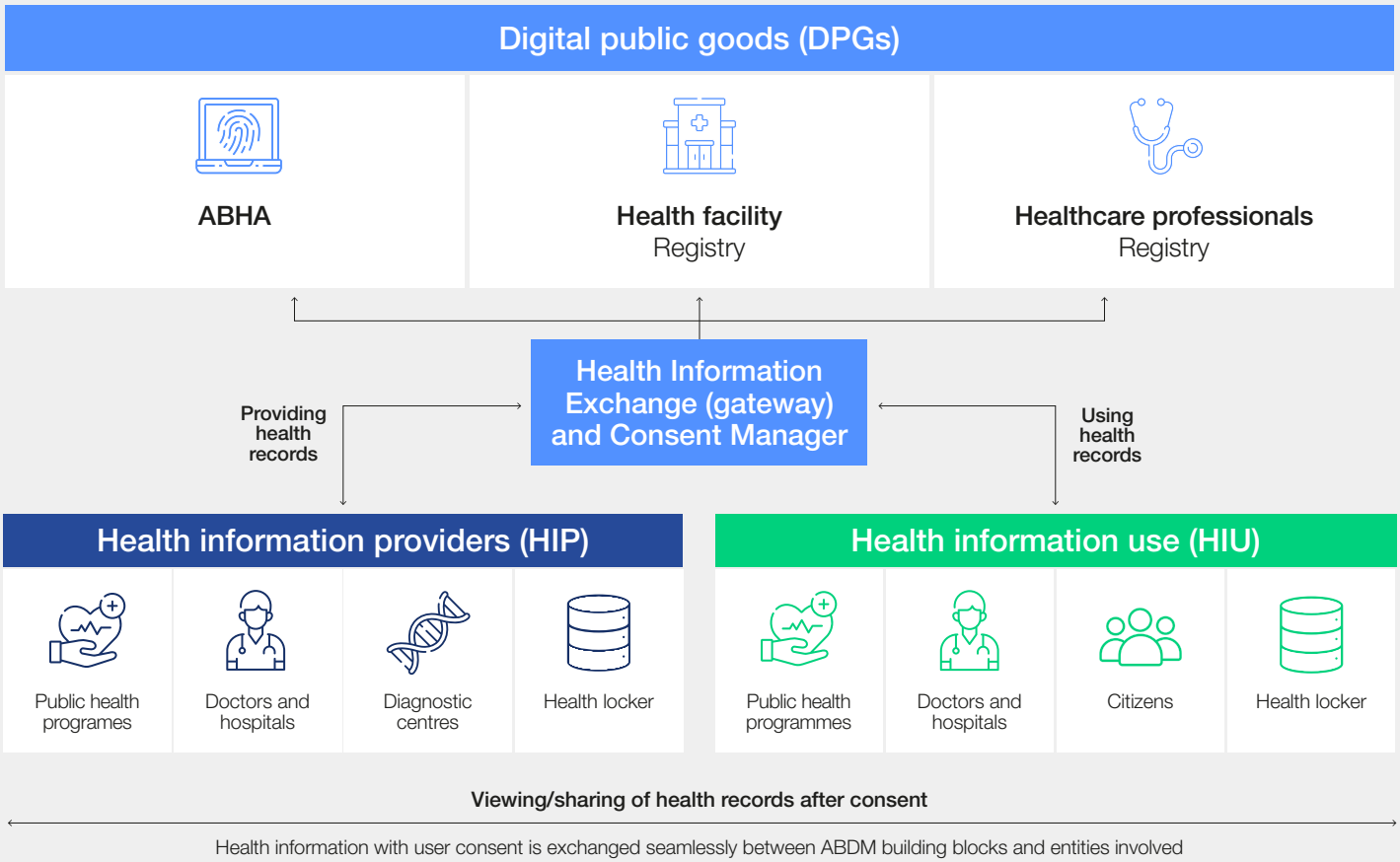
Healthcare Professionals Registry (HPR): A comprehensive repository of all healthcare professionals involved in the delivery of healthcare services across both modern and traditional systems of medicine.

Health Facility Registry (HFR): A comprehensive repository of health facilities of the nation across different systems of medicine. It includes both public and private health facilities including hospitals, clinics, diagnostic laboratories and imaging centres, pharmacies, etc.

ABHA mobile app: Enables an individual to manage information about their personal health records (PHR) on a platform through nationally recognized interoperability standards that can be drawn from multiple sources. This includes viewing of a longitudinal record consisting of all health data, lab reports, treatment details and discharge summaries across one or multiple health facilities on one platform.

Health Information Exchange Consent Manager (HIE CM): A gateway that interacts with an individual and obtains consent for any intended access to personal or health data to ensure that an individual is in complete control of what data is collected, how/with whom it is shared and for what purpose, and how it is processed.

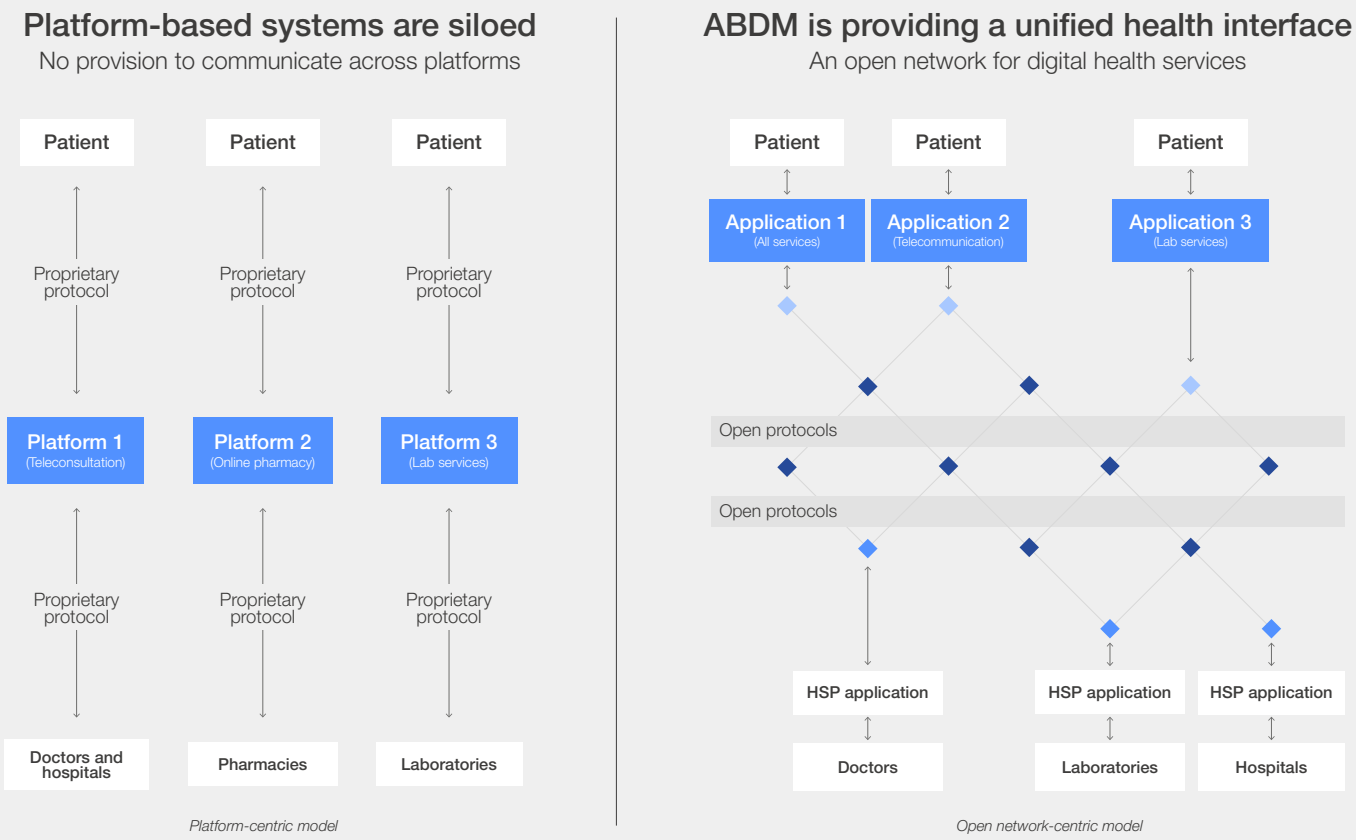
FIGURE 8 **ABDM enables interoperability while maintaining privacy**



Source: National Health Authority India

Unified health interface (UHI): Envisioned as an open protocol for various digital health services. The UHI network will be an open network of end-user applications (EUAs) and participating health service provider (HSP) applications. The UHI will enable a wide variety of digital health services between patients and HSPs, including appointment booking, teleconsultation, service discovery and others.

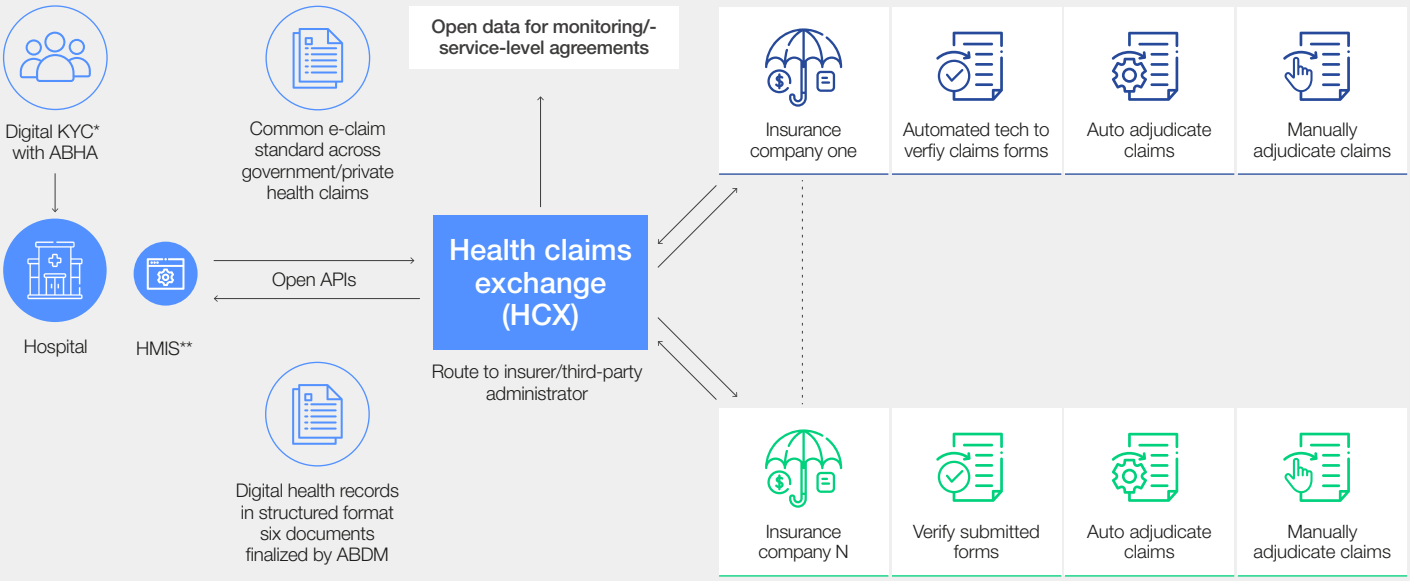
FIGURE 9 | **UHI – From platform-centric model to network-based model**



Source: National Health Authority India

Health claims exchange (HCX): A digital "provider-payer" partnership for seamless e-claim processing. It seeks to help claims processing information move across providers and payers. The implementation of HCX is expected to reduce the cost per claim and provide better data on service-level agreements (SLAs) for various processes, like time to pre-authorization/discharge.

FIGURE 10 | **HCX: A digital "provider-payer" partnership for seamless e-claim processing**



Source: National Health Authority India

*Know-your-customer
**Health management information system

Key learnings:

- Offering solutions with open APIs and standards as digital public goods drives scalability and long-term interoperability.
- Partnership with all partners drives accelerated adoption of solutions.
- Adoption is a key element of the journey, especially for small-scale healthcare service providers.
- Offering required support to integrators is important for special cases of limited connectivity, digital illiteracy and limited human resources.
- Keep citizens at the heart of the mission – building a citizen-centric healthcare model.
- Keep security and privacy of data at the heart of the design of the architecture built.
- Information, education and communication (IEC) activities are important to drive awareness among stakeholders.
- Interoperability of healthcare data to drive improved health and wellness outcomes.
- Keeping stakeholders involved and engaged throughout is important.
- Integrating a fragmented sector/players requires sustained engagement with industry partners
- Capacity building of stakeholders drives the switch from traditional methods of healthcare delivery to digital healthcare delivery.

Impact:

ABDM is enabling the delivery of quality healthcare that is integrated, affordable, accessible, inclusive and sustainable (the numbers below are as of 27th September 2022).

- 244,065,706 ABHA numbers created
- 159,616 health facilities registered on HFR
- 90,541 healthcare professionals registered on HPR
- 13,831,843 health records linked with ABHA/ ABHA address
- 980 active integrators on ABDM sandbox to become ABDM compliant, with 60+ private and public players already live
- Launch of HCX and UHI soon

Remaining challenges and role of key stakeholders:

Given ABDM is envisioned to digitize the entire healthcare environment in the country, its success relies on its adoption by all players. Thus far, the adoption of ABDM has been a key challenge, which has been limited and staggered mainly due to data interoperability, confidentiality and connectivity to the internet and lack of digital infrastructure:

- Heavy partner dependency: Dependency on partners for creating and using ABDM-compliant solutions and using the ABDM building blocks, gateways etc. within healthcare (e.g. 200,000+ health facilities in India use software from more than 2,000+ vendors, all of which must become ABDM compliant), fragmentation of players etc.
- Technological and infrastructural challenges: Lack of digitization in the health sector, existing healthcare solutions available are too costly or not user friendly, unstructured data, absence of unique identifiers of patients across providers, duplication of data, multiple formats and standards for data storage and sharing.
- Landscape inertia: Limited interest by healthcare providers to switch to digital format due to high costs, limited technology understanding and required infrastructure and resources, concerns of accountability and financial monitoring, inertia to adopt digital healthcare by citizens and demand/ receive healthcare through digitization, fear of data privacy and security.

Public stakeholders:

- Drive adoption of ABDM across stakeholders through technological, financial, regulatory and behavioural levers to transform digital healthcare.
- Adoption of ABDM across public healthcare in states.
- Offer adequate support and incentives to stakeholders to uptake and sustain ABDM implementation.
- Engage healthcare players in the building of an open digital healthcare landscape.
- Continued progress on enhancing the technological infrastructure.
- Enhanced decision-making at a policy and administrative level through aggregated and anonymized data.

Private stakeholders:

- Integrate with the ABDM environment, both healthcare service providers and end consumers.
- Drive innovation within the sector.
- The use of ABDM-compliant software.
- Offer provision of digital healthcare services to end citizens, in compliance with ABDM.
- Uptake of ABDM modules/gateways (UHI/ HCX/ HPR/ HFR etc.)
- Work in collaboration with the National Healthcareer Association to drive further the adoption of ABDM and enable an open healthcare digital environment.

A4 Digitalization, AI and big data case study: Bayer low-dose aspirin sachets in Guatemala

Overview:

Bayer empowers consumers to manage their health needs in key self-care areas. Through its sustainability strategy, Bayer committed to enabling access to everyday health for 100 million people in underserved communities annually by 2030, focusing on unmet needs in high-impact markets. Self-care is the only treatment available in most of Central America (see Global Self-Care Federation (GSCF) Value of Self-Care study) due to physical and financial barriers to access healthcare, and cardiovascular diseases cause 30% of all deaths in Guatemala.

Barriers faced:

- Baseline health and wellness and global discrepancies
- Healthcare literacy and trust in the industry
- The pace of regulatory change
- The disproportionate impact of climate issues on LMICs

Levers used:

- Digitalization, AI and big data
- Patient empowerment
- Public-private collaboration
- Policy and advocacy

Solution:

Sachets for individual low-dose aspirin tablets help provide access to drugs at an appropriate out-of-pocket cost for low-income consumers. QR codes on each sachet enable consumers to gain access to all required health information to ensure safe usage of the product (also for blind people, who can hear the instructions via the QR codes) while avoiding larger (and more expensive) packs with leaflets.

Key learnings:

- **Effective and safe self-care solutions** can help improve health outcomes, particularly in communities where physical and financial access to health services is challenging. According to the GSCF Value of Self-Care study, three times as many packs of OTC products are sold in middle-income countries of Latin America (like Guatemala) as the **only form of treatment** compared to OTC as the first treatment of choice due to those barriers.
- To enable effective and safe low-dose aspirin sachets, the **Bayer team in Guatemala worked with regulatory authorities to enable the usage of QR codes on the sachets** to access required regulatory and safety information. This was critical to be able to deliver an affordable, practical, convenient and safe cardiovascular solution in the form of a single sachet for low-income consumers in this and other countries in Central America (such as El Salvador, Nicaragua and Honduras), especially considering the high percentage of these consumers who own a smartphone in Latin America.

– Effective delivery of this project required **investing in new capabilities in Guatemala to produce, pack and distribute the new sachets**. A new sachet machine was installed at the production site. Bayer invested in a new distribution system with a network of intermediaries who can service more remote independent businesses and pharmacies where low-income consumers shop.

Impact:

– Of all the product's sales in Central America, sachet form represents 8% of sales.

– The role of OTC products in middle-income countries of Latin America (like Guatemala) helps individuals save on average **four productive days, worth $123 in revenue per person per year** – a significant income for low-income consumers who can earn between $2 and $15/day. With low out-of-pocket OTC cardio solutions, individuals in Guatemala can benefit from self-care for their quality of life.

– **Self-care policies** can dramatically improve health outcomes and productivity: in the future, OTC could help save an individual **6.6 productive days, worth $163 in revenue**.

Remaining challenges and role of key stakeholders:

Public stakeholders:

– Role of self-care policies to raise the bar for science-based OTC solutions while lowering the bar to increase physical and financial access to OTC solutions.

– Acceptability of the QR code from a regulatory perspective played a key part in the success of this initiative to advance affordable and safe OTC solutions. Regulatory considerations may limit the widespread and scalable adoption of such solutions in other countries.

Private stakeholders:

– Collaboration across industries is needed to increase physical access to self-care solutions in more remote communities for whom self-care is the first and last line of care.

– Equal access to affordable technology (e.g. mobile telephones with camera functionality to scan QR codes).

A5 Targeted decentralization case study: reach52 and Medtronic offline-first application for non-communicable disease healthcare delivery

Overview:

The burden of non-communicable diseases (NCDs) is rapidly increasing due to ageing populations, lifestyle and dietary changes, rapid urbanization and improved control of communicable diseases. Of the 17 million annual premature deaths attributable to NCDs, 86% occur in LMICs where the availability and use of appropriate NCD services are insufficient, especially in poorer and rural areas.[89] reach52 aims to tackle remote access issues in areas with limited data coverage, currently covering parts of India, Kenya, Indonesia, Philippines, South Africa and Cambodia, through an offline-first health tech platform that enables a full range of health services. This solution supports implementation of community-based and tech-powered healthcare delivery models for across a range of health areas, including NCDs (e.g. those with or at risk of type 2 diabetes, hypertension or co-morbid conditions). The platform works on basic mobile phones with significant off-line functionality; data can then be synced at specific locations or when a mobile signal becomes available.

Barriers faced:

– Declining baseline health and wellness and global discrepancies

– Lack of internet connectivity

– Healthcare literacy and trust in industry

– Skilled labour shortage and hospital capacity constraints

Levers used:

– Targeted/selective decentralization

– Digitalization, AI and big data

– Patient empowerment

Solutions:

- The aim was to build a model that is able to reach an area with limited data coverage, address a primary health issue in this region through decentralized care (i.e. NCDs) and offer this solution at an affordable price.
- The design, build and implementation of Padayon, a new digital health model, was through a public-private sector partnership involving social enterprises Medtronic LABS and reach52 with municipal health providers of Pototan, Philippines.
- The fully integrated health solution provides in-person and virtual coaching, screening and remote monitoring and affordable medicines in a single subscription service for low-income patients, who paid $20 to enrol for a three-month intensive service and continued monthly subscriptions at $8 per month.

Key learnings:

- Integrated 3-in-1 offering (coaching, testing, medications) created a perception of value, but demand generation is still vital in the case of NCDs, where many patients are asymptomatic and/or undiagnosed.
- Offline-first platforms and mobile health apps can support overcoming access barriers for NCDs in low- and middle-income countries as quality health data can be collected through community teams to enable remote patient monitoring and analysis for population-level precision healthcare.
- Having a human component introduces challenges around the scalability of digital solutions, but it is important to encourage use and build trust in a digital solution and to empower members to manage their conditions.
- Task-shifting through the upskilling of existing community health workers promotes sustainability and scalability, allowing more efficient use of available human resources for health, and equips these individuals residing in partner communities to provide education, testing and medicine delivery services.
- Incorporating local residents to serve as peers in programme facilitation helps build trust and a sense of belonging among participants; training is still required and is best conducted primarily face-to-face or through "train the trainer" approaches, with remote learning serving a complementary role.
- Including greater involvement of caregivers to join some sessions and provide e-guidebooks and checklists so they can assist with planned online activities and broader support and monitoring of patients, would be an improvement.
- There should always be a ratio of one coordinator to one barangay/village to improve monitoring of their progress, particularly for tracking daily medication intake and monitoring adverse effects.
- Emotional versus rational engagement is more motivating for individuals to encourage screening and enrolment (i.e. love for family, control of life over technical information).
- Virtual coaching resources (including a low-specification version of Facebook) were available to patients, but use was lower than expected as less than 2% of enrolees had mobile access to even basic versions of applications.

Impact:

- 76% of members had their systolic and diastolic blood pressure (BP) under control by the end of month six, compared with 64% (systolic) and 73% (diastolic) in month one.
- 69% of members had their random blood sugar (RBS) levels under control by the end of month six, compared with 60% in month one.
- 76% of participants reported being "very satisfied" with the programme.

> **The municipal doctor was able to check my health condition. She prescribed maintenance meds for my diabetes and it truly managed my blood sugar. I'm thankful that my blood sugar gradually went down from 206 mg/dl to 112 mg/dl. Thanks to Padayon!**
>
> Participant, 63 years old

Remaining challenges and role of key stakeholders:

Public stakeholders:

- Navigating different regulations across countries for data protection is challenging and harmonizing frameworks would be helpful.
- Continuity of services is important for long-term impact and working with governments would help affect change at a national level.

Private stakeholders:

- Private companies have relationships with public stakeholders that can support smaller digital solutions providers.

A6 Global collaboration case study: AstraZeneca as champion of the Sustainable Markets Initiative (SMI) Health Systems Task Force

Overview:

- The healthcare sector contributes over 4% of global greenhouse gas emissions.[90] Recognizing that the sector must do more to drive the sustainable transition, members of the SMI Health Systems Task Force are committed to developing a collective roadmap to accelerate the delivery of a net zero, sustainable health system.
- Launched at COP26, the SMI Health Systems Task Force is a private-public partnership to accelerate the delivery of net zero, patient-centric health systems through scalable action, recognizing the deep interconnection of public and planetary health. Members include chief executive officers or equivalents from global life sciences firms, healthcare systems, institutions and academia, including AstraZeneca, GSK, Merck, Roche, Samsung Biologics, Sanofi, Novo Nordisk, the World Health Organization (WHO), UNICEF, NHS England, the Sustainable Healthcare Coalition, the Karolinska Institute and the University of Pavia.

Barriers faced:

- Gaps in data/evidence generation
- Ensuring patient centricity and high-quality care is central to health system decarbonization strategies
- Supply chain issues
- Pace of regulatory change
- Limited standardization

Levers used:

- Public-private partnership
- Global and cross-industry collaboration
- Policy and advocacy
- Education and awareness raising
- Metrics and measurement

Solution:

- The SMI Health Systems Task Force is committing to act as a collective – the first time the health sector has come together in this way. Areas of focus are supply chains, patient care pathways, decarbonization and digital health solutions.
  - Supply chains: Given that supply chain emissions drive approximately 50% of overall healthcare emissions, SMI task force members have committed to aligning on a set of common supplier standards to incentivize decarbonization efforts and jointly pursue renewable power purchase agreements and green transport corridors.
  - Patient care pathways: Task force members will build an end-to-end care pathway emissions calculation standard and tool that allows stakeholders to measure and track emissions across the care pathway and will publish product-level life cycle assessments (LCA) data to increase transparency on treatment emissions.
  - Digital healthcare: The task force has committed to using digital health solutions to decarbonize clinical trials and develop and use a common framework to measure emissions, identify hot spots and areas for improvement, and track the impact of decarbonization initiatives.

Key learnings:

- Public-private collaboration, delivering scalable action, and inspiring the broader value chain to act are essential for the decarbonization of health systems.
- For example, the SMI Health Systems Task Force is officially partnering with the WHO-led Alliance on Transformative Action on Climate and Health (ATACH): a new multilateral platform to deliver on health resilience commitments made by 60 countries at COP26 last year. By partnering with ATACH, the task force has unlocked the potential of aligning private-sector leaders with national governments to drive sustainable, net-zero healthcare.
- There is a lack of awareness of the climate impact on health and vice-versa. By coming together, the sector can raise awareness, offer solutions and help drive action.

Impact:

The SMI Health Systems Task Force is driving impact at scale:

1. Recognize that supply chain emissions drive approximately 50% of overall healthcare emissions, in COP27, the task force members also announced that they will:
   - Align on a set of common supplier standards
   - Switch to 80-100% renewable power by 2030
   - Jointly pursue renewable power purchase agreements in China and India in 2023
   - Jointly explore green heat solutions by 2025 to accelerate the adoption of scalable technologies
   - Transition car fleets to zero-emission vehicles by 2030 and jointly explore green transport corridors by 2025.
2. There is a significant opportunity to reduce the emissions of patient care, which contribute to 1 gigatonne of emissions globally while improving health outcomes. The SMI Health Systems Task Force will:
   - Collaborate with health policy-makers, regulators, payers, providers and hospitals to raise awareness of the need and the opportunity to decarbonize care pathways
   - Build an end-to-end care pathway emissions calculation standard and tool for specific diseases that allows stakeholders to measure and track emissions across the care pathway and assess decarbonization strategies.
   - Align on a common framework to perform life cycle assessments (LCA), with private sector members also committed to publishing product-level LCA data across their product portfolio to increase transparency on treatment emissions.
3. The SMI Health Systems Task Force is committing to using digital health solutions to decarbonize clinical trials and will:
   - Develop and use a common framework to measure emissions, identify hotspots and areas for improvement, and track the impact of decarbonization initiatives
   - Set trial emissions reduction targets for 2030 at the latest, aligned with each member's decarbonisation pathway
   - Incentivize clinical research organizations and clinical trial-related suppliers to measure and reduce emissions, including using digital solutions.
   - Review how digital solutions can reduce emissions for at least 90% of trials starting in 2025 or later.

Remaining challenges and role of key stakeholders:

- Regulators: Engagement from regulatory authorities is required to remove barriers to low-carbon treatments and care delivery.
- Governments/policy-makers: Must support policies that promote healthier environments, incentivize the energy transition and encourage the use of digital solutions.
- Suppliers: Given the concentration of healthcare emissions in the supply chain (estimated to be more than 50%), the engagement of suppliers in decarbonization is critical.
- Healthcare professionals/providers: Can develop green plans, support education programmes on healthcare sustainability and prevent disease onset.
- General public/patients: Can engage with preventative measures and management activities as citizens of the future low-carbon society.

A7 Innovative funding models case study: NHS Wales: allocation, distribution and use of resources for value-based healthcare

Overview:

- Wales is a country of 3.2 million people with wide geographical diversity, a mix of rural and urban areas and a wide variation in population health needs and determinants. Fourteen NHS Wales organizations provide the infrastructure and delivery of health services across Wales with seven integrated health boards responsible for the planning and delivery of services for its resident population.

Barriers faced:

- The system has a growing demand for services and an increasing funding gap, with a primary focus on the volume of services delivered versus the outcomes achieved. In line with the Organisation for Economic Co-operation and Development (OECD) report, the UK performs well in overall care processes but is low performing in health outcomes.
- The impact of the pandemic on health services, including activity backlogs, potential surges in demand, workforce and financial implications, has enhanced the need for a change in service delivery and system approach to achieve a sustainable healthcare service that maximizes the use of limited resources to achieve health equity.
- The challenge of short-term financial challenges versus medium-term sustainability.

Levers used:

- Innovative funding models: financing for value
- Policy and advocacy
- Digitalization, AI and big data
- Education and engagement
- Patient empowerment
- Public-private partnerships
- Global and cross-industry collaboration

Solutions:

- The policy position in NHS Wales (including prudent healthcare, A Healthier Wales and the Well-being of Future Generations Act) provides the context and opportunity, alongside the integrated structure of healthcare services in Wales, to implement and deliver value-based healthcare for the population.
- NHS Wales is a capitation-based system, with allocations to health boards based on a needs-based population formula, updated in recent years, to support a focus on population health. NHS Wales has established a commitment to a financial strategy that will embed the financing of value through linking resource allocation, resource use and outcomes achieved across communities.

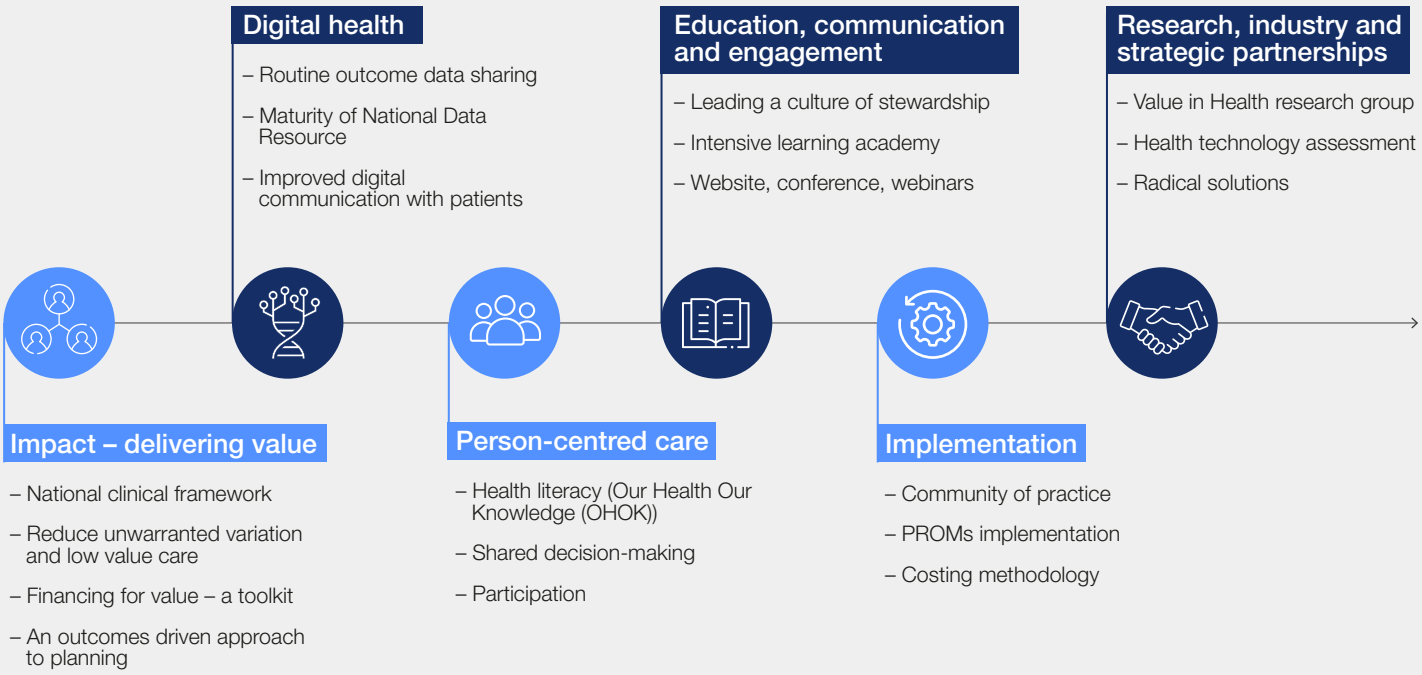
- The aim is to allocate resources to drive improvement in outcomes and deliver allocative value while maximizing the use of limited resources to achieve health equity and deliver services focused on delivering outcomes that matter to patients.

- NHS Wales is taking a broad system-level approach through to the pathway/condition level to support the transition that balances volume and the delivery of outcomes that matter to patients.

- Due to the unique system-level approach, NHS Wales has progressed its implementation of a value-based healthcare approach to healthcare delivery through multiple levers and enablers.

- NHS Wales established the Welsh Value in Health Centre in 2021, providing a core infrastructure, knowledge, capacity and expertise to support and drive the system and the delivery of value-based healthcare in NHS Wales. The Welsh Value in Health Centre's *Our Strategy to 2024* has six clear goals to facilitate the delivery of value-based care across the whole pathway of care, for the whole population of Wales, equitably.

FIGURE 11 **The Welsh Value in Health Centre's *Our Strategy to 2024* has six clear goals to facilitate the delivery of value-based care**



Source: NHS Wales

Key learnings:

- There is no one silver bullet of financing for value, multiple approaches across the system are required.

- Balancing national direction with local autonomy and capacity.

- Alongside nationally agreed condition-specific patient-reported outcomes measurement (PROMs), nationally agreed standardized and consistent approaches to collecting PROMs through multiple platforms is key to supporting national data aggregation and use.

- Working with patients has identified that outcome measurement must be embedded in direct care.

- Implementing value-based healthcare involves a cultural shift from longstanding traditional approaches for all stakeholders.

- The education of patients and all professions within healthcare providers is a key enabler to embedding value.

- Underpinning data for decision-making is of critical importance.

- Implementing value is a multi-disciplinary challenge.

Impact:

- Welsh Value in Health Centre's *Our Strategy to 2024* sets out the six strategic goals to facilitate the delivery of value-based care creating an environment in NHS Wales focused on outcomes that matter to patients and a changing infrastructure to create a more data-driven system.
- The release of the *NHS Wales Planning Framework 2022-2025* outlines that "Prudent healthcare and value-based healthcare will be the basis on which services are planned and delivered".
- The 2022-23 NHS Wales allocation included a £20 million direct allocation to support progress and wider implementation of value-based healthcare.
- The national data resource programme, a strategic imperative for health and care in Wales, is in development. It will support timely and seamless data flows across the system to support data-driven and informed decision-making, including patient-reported outcomes.
- A PROMs standard operating model is being implemented across NHS Wales to ensure data standards, processes and information exchanges are aligned, allowing aggregation of a national PROMs data set to be collected, reported and analysed at both a system basis, across conditions and with patients.
- Multiple approaches to financing for value are being harnessed: national allocation formula, direct allocations and allocative value. Redistribution of resources, value-based procurement, value-based contracting and the use of data and remote care.
- A developing evidence base of high-value interventions to support implementation in clinical areas to maximize value.
- Establishment of a local value team within each health board.
- The use of resources through analysing variation, adverse outcomes and high-value interventions has been a core development between clinicians and finance across multiple speciality and condition areas including diabetes, heart failure and lymphoedema.
- The development of an intensive learning academy to support the education of value-based healthcare across the system and multiple professions within health.

Remaining challenges and role of key stakeholders:

- Ensuring a value-based approach to COVID-19 response and recovery
- Spread and scale of data-driven and evidenced-based high-value interventions
- Widespread triangulation of clinical, outcome and financial data
- Achieving allocative value through the redistribution of resources from linking, allocation, use and outcomes
- Continued balance of national direction and local autonomy
- Patient literacy
- Multi-professional education
- Widespread use of PROMs in direct patient care

A8 Public-private partnership case study: GARDP: accelerating development and access to antibiotic treatments for drug-resistant infections in LMICs

Overview:

- Antimicrobial resistance (AMR) presents a significant global mortality burden; Around 1.27 million deaths were attributed to AMR in 2019, making it the third leading cause of death worldwide, following only strokes and ischemic heart disease. The highest mortality rates are found in LMICs.
- The Global Antibiotic Research and Development Partnership (GARDP) is a not-for-profit organization founded in 2016 by WHO and the Drugs for Neglected Diseases initiative (DNDi) focused on providing countermeasures to manage the emergence of AMR.
- GARDP's mandate is to accelerate the development and access to antibiotic treatments for drug-resistant infections.

Barriers faced:

- Even though AMR is a public health priority, many barriers exist:
  - A dry antibiotic pipeline, due to the lack of market incentives for R&D.
  - Dramatic inequalities in new antibiotic access with little access in LMICs despite the disproportionate burden.
  - Recurrent shortages of off-patent antibiotics due to a fragile environment and supply chain (e.g. low margins, constrained budget for API manufacture).

Solutions:

- GARDP is developing a public health portfolio to manage the emergence of AMR, taking into account local public health and clinical needs on a not-for-profit basis. This portfolio is developed around antibiotics to treat sepsis in children and newborns, serious bacterial infections in adults and sexually transmitted infections.
- GARDP is currently focused on providing access to this portfolio in countries in need, particularly LMICs.
- GARDP focus on late-stage clinical development and access in LMICs. In this way, GARDP complements rather than replicates the work of major players, helping products move "over the finish line" and providing a global infrastructure to accelerate clinical development and facilitate access.

Relevant levers used:

- GARDP works with a network of over 70 partners in more than 16 countries, making use of public-private partnerships, global collaboration, innovative funding and R&D models, and advocacy to support late-stage clinical development and access to antibiotics.

Key learnings:

- Work closely with the developers of new antibiotics to understand their financial constraints, ensure timely project success and guarantee that the partnership will allow GARDP missions to be achieved.
- Define access barriers at the global and local levels to develop appropriate measures with the support of local, national and regional partners.
- Aligning to guidance from normative bodies (e.g. WHO) helps to set priorities.
- Develop a flexible approach to addressing gaps (GARDP's role varies according to the project development, access needs and strengths of their partners) and creating new models/activities aligned with existing barriers (innovative financing models, market shaping and procurement activities, and awareness raising).

Impact:

- Published positive results in a phase three trial of a combination antibiotic developed in collaboration with a pharmaceutical company. A new drug application is slated for 2023. If approved, this will be the first antibiotic treatment to be launched in collaboration with GARDP. The partnership includes a license agreement supporting access in 67 LMICs, as well as in the public markets in India and South Africa.

– Signed a first-of-its-kind license and technology transfer agreement with a pharmaceutical company and a collaboration agreement with the same pharmaceutical company and Clinton Health Access Initiative (CHAI) to expand access to a new antibiotic in 135 LMICs.

– Conducting a global phase three trial of a new, first-in-class antibiotic to treat gonorrhea.

– Completed one of the largest studies on babies with sepsis – 3,200 newborns in 11 countries worldwide. Working in parallel, three promising existing antibiotics were identified, which will be evaluated for use in combination.

Remaining challenges:

Public stakeholders:

– Prioritize the implementation of AMR national action plans

– Engage in innovative procurement, licensing and payment models to help accelerate and secure access to new antibiotics.

Private stakeholders:

– Explore public-health orientated licensing arrangements with not-for-profit organizations

– Ensure long-term collaborations and commitment of private players to manage AMR.

Contributors

World Economic Forum

Susanne Andreae
Head, Health and Healthcare Industry

Kelly McCain
Head, Health and Healthcare Initiatives

Nivedita Sen
Community Lead, Global Health and Healthcare Industries

L.E.K. Consulting

Lain Anderson
Partner

Melisa Guven
Engagement Manager

Tara Lumley
Consultant; Project Fellow, Shaping the Future of Health and Healthcare, World Economic Forum

Adrienne Rivlin
Partner

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Jean Accius
Senior Vice-President, Global Thought Leadership, American Association of Retired Persons (AARP)

Murray Aitken
Executive Director, IQVIA Institute for Human Data Science, IQVIA

Claire Biot
Vice-President, Life Sciences and Healthcare Industry, Dassault Systèmes

James Blazar
Chief Strategy Officer, Hackensack Meridian Health

Melissa Brotz
Chief Marketing and Communications Officer, Abbott Laboratories

Michelangelo Canzoneri
Global Head, Group Smart Manufacturing, Merck

Carlos Castillejos
Vice-President, Strategy and External Affairs, Johnson & Johnson

Arvan Chan
Senior Vice-President and Chief Operating Officer, International Centene Corporation

Aneesh Chopra
President, CareJourney

Fayad Dandashi
Chief Executive Officer, Tamer Healthcare

Jisella Dolan
Chief Strategy Officer, Home Instead

Leslie Donato
Executive Vice-President and Chief Strategy Officer, AmeriSourceBergen

Amr Fahmy
Corporate Director, New Ventures, Pharco Pharmaceuticals

Kirti Ganorkar
Chief Executive Officer, India Business, Sun Pharmaceutical Industries

Tushar Gupta
Vice-President, Corporate Strategy, Jubilant Pharmova

Sjoerd Hubben
Senior Vice-President, Global Corporate Affairs, AstraZeneca

Oliver Kohlhaas
Head, Strategy and Business Consulting, Bayer

Christine Lemke
Head, Global Corporate Development, Ferring Pharmaceuticals

Niels Lund
Vice-President, Global Prevention and Health Promotion, Novo Nordisk

Salah Mawajdeh
Vice-President, Central Product Development, Hikma Pharmaceuticals

Matthew McKnight
General Manager, Biosecurity, Ginkgo Bioworks

Gerard Meuchner
Vice-President and Chief Global Communications Officer, Henry Schein

Abhinav Mishra
Chief of Staff, Chairman's Office, Dr Reddy's Laboratories

Paul G. Parker
Senior Vice-President, Strategy and Corporate Development, Thermo Fisher Scientific

Pankaj Paul
Director, Strategy and Innovation, Burjeel Holdings

Rabbur Reza
Chief Operating Officer, Beximco Pharmaceuticals

Geralyn S. Ritter
Head, External Affairs and Environmental, Social and Governance, Organon

Koki Sato
Corporate Strategy Officer and Chief of Staff, Takeda Pharmaceutical

Vinita Sethi
Senior Vice-President and Chief Public Affairs Officer, Apollo Hospitals Enterprise

Jonathan Sheldon
Senior Vice-President, Business Area Bioinformatics, QIAGEN

Laura Sol
Chief of Staff to the Chief Executive Officer, American Heart Association

Melissa Sorenson
Chief Strategy Officer, VSP Vision

Marco Stuelpner
Head, Strategy and Mergers and Acquisitions, Siemens Healthineers

Vivian Tan
Vice-President, Strategic Information Management and Global Relationships, Kaiser Permanente

Marit Tanke
Head, Corporate Strategy Office, Coöperatie VGZ

Jens Viebke
President, Acute-Care Therapies, Getinge

Ankur Vora
Chief Strategy Officer, Bill & Melinda Gates Foundation

Angela Wang Nan
Chief Investment Officer, Senior Vice-President and Secretary of the Board of Directors, Neusoft Corporation

Ronald Michael Whelan
Chief Commercial Officer, Discovery Health

Darren Whiten
Vice-President, Strategy and Operations, Global Business and Innovation, Alcon Management

Edward Whiting
Director, Strategy, Wellcome Trust

Hans Juergen Woerle
Chief Scientific and Medical Officer, Nestlé Health Science

Christina Zorn
Chief Administrative Officer, Mayo Clinic

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Hannah Aldean
Head, Value-Based Care Strategy, Discovery Health

Jeff Allen
Chief Executive Officer, Friends of Cancer Research

Logan Ansell
Vice-President, Partnerships, reach52

Thomas Barzan
Executive Committee Member, Senior Vice-President, Strategy and Transformation, Bayer

Sandrine Bouttier-Stref
Vice-President, Global Head of Corporate Sustainable Responsibility, Sanofi

Jennifer Cohn
Director, Global Access, Global Antibiotic Research and Development Partnership (GARDP)

Elly Darkin
Global Corporate Affairs, AstraZeneca

Daniella Foster
Executive Board Member, Senior Vice-President and Global Head, Public Affairs, Science and Sustainability, Consumer Health, Bayer

Claire Green
Deputy Director, Finance Delivery Unit, NHS Wales

Sally Lewis
National Clinical Lead for Value-Based and Prudent Healthcare, NHS Wales

Kashish Malhotra
Dayanand Medical College and Hospital

Neel Ratan
Distinguished Fellow, World Economic Forum, Centre for the Fourth Industrial Revolution India

Jon Schuller
Communications, Office of the Chief Executive Officer, VSP Vision

Stefan Seliger
Senior Vice-President and Head, Global Access and Policy, Roche Diagnostics Solutions, Roche

Shreepee Singh
Ministry of Health and Family Welfare, Government of India

Veronica Vago
Environmental Social and Governance, Operations and Business Partner, Bayer

Editing and design

Laurence Denmark
Designer, Studio Miko

Sophie Ebbage
Designer, Studio Miko

Martha Howlett
Editor, Studio Miko

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World Economic Forum
91–93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744
contact@weforum.org
www.weforum.org