

PROTECTING POPULATIONS, PRESERVING FUTURES

Optimising the health
workforce to combat NCDs
and achieve UHC

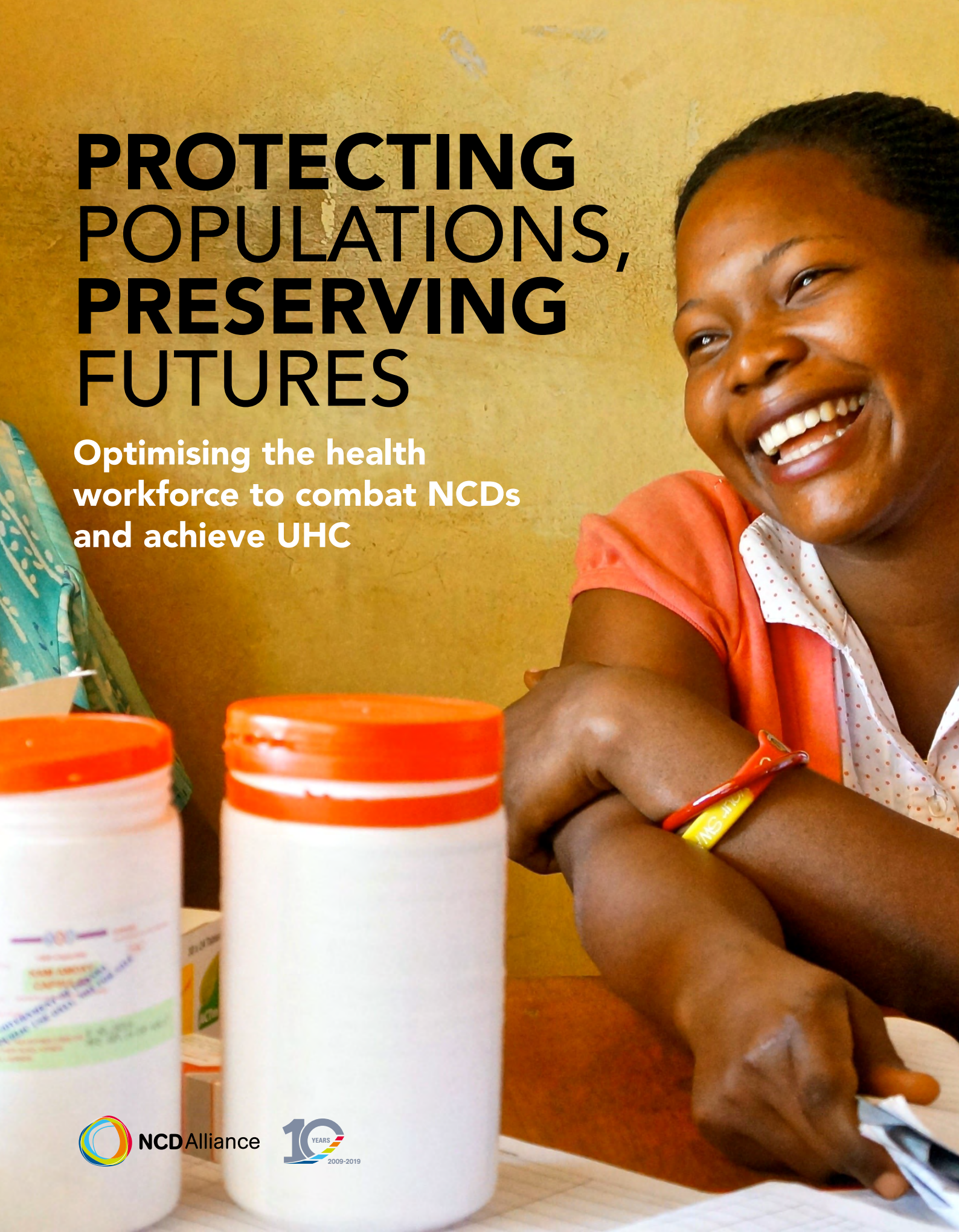
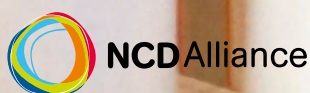


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Foreword

Plan, educate, invest, retain: Achieving Health for All hinges on the health workforce for NCDs

Timed to coincide with the first ever United Nations High-Level Meeting (UN HLM) on Universal Health Coverage (UHC) in September 2019, this report "*Protecting Populations, Preserving Futures: Optimising the health workforce to combat NCDs and achieve UHC*" explores health workforce needs to ensure more effective prevention and control of non-communicable diseases (NCDs).

Heads of State and Government will meet for the UN HLM in New York to reaffirm their commitment to UHC so that everyone, everywhere can access quality health services without suffering financial hardship (SDG3.8). The first five years of action towards the Sustainable Development Goals have not delivered the necessary progress on UHC nor on reduction of premature mortality from NCDs. Governments and the global health community must urgently step up to deliver on their promises with just 10 years to go until 2030.

Over half the world's population is still lacking access to essential health services and 100 million people worldwide are still being tipped into extreme poverty every year by their healthcare needs. The starting point for this report is that the promise of health for all will ring hollow unless the projected global shortfall of 18 million health workers by 2030 is addressed. The success of UHC and primary health care (PHC) hinges on the availability of sufficient human resources for health, both in terms of quality and quantity.

Whilst the findings and recommendations of this report are globally applicable, it has a particular focus on low- and middle-income countries (LMICs) who are at the frontline of the NCD epidemic and where health workforce challenges are most acute. An epidemiological transition has swept across many LMICs, due to ageing populations and increased exposure to the major risk factors for NCDs – tobacco and alcohol use, unhealthy diets, insufficient physical activity and air pollution, as well as pressure on mental health and well-being. As a result, NCDs are projected to overtake all other causes of premature mortality in sub-Saharan Africa before 2030. This report explores constructive approaches to ensuring the future health workforce can meet this unprecedented challenge of NCDs and mental health.

“

We need compassionate healthcare professionals who treat patients the same regardless of their socioeconomic status in life.

Our Views, Our Voices 2017 Community Conversations participant, Quezon City, Philippines.

This report aims to contribute evidence and instructive success stories to inform the ongoing dialogue around health system strengthening and workforce responses to NCDs. It is clear that all health systems must transition to become more person-centred, rather than working in silos according to disease or profession. The broad selection of case studies collected for this report show that workable solutions have already been put into practice in all income settings. It is our hope that the recommendations, approaches and examples identified here can be scaled up, replicated and anchored in policy to make a meaningful contribution to both the NCD and UHC response.

We thank our partners, Pfizer Upjohn, for making this report possible. As always, in the production of this report we have sought to ensure that the voices of people living with NCDs are well represented, as well as the views of health workers across different countries and professions. We are grateful to everyone who participated in the focus group sessions and the expert advisory group, and to all those who responded to the call for case studies to ensure that views and wishes of people most affected by NCDs are reflected.

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Acknowledgement of Expert Advisory Group Members

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We would like to thank the participants of our three focus groups – in Kigali on 7 March 2019, in New Orleans on 18 March 2019, and in Geneva on 20 May 2019 – comprising global health leaders representing international and local non-governmental organisations, multilateral institutions, academic institutions, and healthcare companies, for sharing their key insights on the role of healthcare workers in the non-communicable disease response in different contexts.

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Methodology

Scope and Purpose

This policy research report aims to explore the optimal health workforce for NCD prevention and control across the continuum of care, with a focus on primary healthcare level and targeted at national and local public health professionals and practitioners.

The **objectives** of this report are to:

- Outline the evidence on the current gaps, challenges, and barriers to an effective health workforce for NCDs, particularly in lower- and middle-income countries (LMICs).
- Explore the crucial role of the health workforce for NCD prevention and control across the continuum of care, with a focus on frontline health workers.
- Identify existing and novel strategies to support the planning, education, deployment, management and reward of the health workforce for NCDs at primary healthcare level.
- Highlight replicable best practices and approaches across the continuum of care from different regions.

Development

The development of this report was carried out through a combination of desk research, focus groups, interviews and the selection of case studies illustrating potential solutions:

1. Desk research, to help prepare an interview guide to frame the discussions with expert stakeholders.
2. Three focus groups – in Kigali, held alongside the 2019 Amref Africa Health Agenda International Conference; in New Orleans, alongside the American Congress of Cardiology Conference; and in Geneva, alongside the 72nd World Health Assembly – as well as strategic discussions to inform the production of a landscape analysis, including the most important sources on the theme.
3. Call for case studies illustrating successful practices related to the health workforce to be potentially scaled in LMICs, which formed the basis of the recommendations in this study.
4. Key informant interviews with experts and members of an Expert Advisory Group, to inform the development of this report and in particular the selection of case studies.

Four key questions led the collection and analysis of the information required to enable the identification of case studies and the design of practicable recommendations to explore the optimal health workforce for NCD prevention and control across the continuum of care:

1. What does “right care” look like in the context of human resources for health in regard to prevention and control of NCDs?
2. What are the key barriers to the integration of NCD services in primary care? What are the key challenges faced by community organisations in this area?
3. What tools do we have at our disposal to improve primary health care and the management of NCDs? Where have we seen them used with success?
4. Which innovative partnership models are making a difference in the availability and quality of primary care services?

Executive summary

An article in the *BMJ Global Health* journal says that “stories are told of patients wishing they had HIV rather than diabetes” because of fragmentation and barriers to care within the health system, illustrating today’s crisis of primary care management of noncommunicable diseases (NCDs).^{1,2} This crisis is projected to intensify in the coming years as the burden of NCDs continues to grow (particularly in LMICs), as populations age, and as the number of people living with multiple chronic diseases increases.³

Faced with these challenges, the global community has asserted its commitment to building comprehensive, integrated, and resilient primary health care systems through milestones such as the Astana Declaration and the G7’s consensus on practical systems and methods for driving integrated people-centred care, which is essential to combat chronic conditions like NCDs.⁴ Indeed, September 2019’s United Nations High-Level Meeting on Universal Health Coverage reiterated the importance of the Astana Declaration and the focus on primary health care. Such commitments will be essential to achieving the Sustainable Development Goals; in particular, the goal of reducing premature deaths from NCDs by one-third by 2030.⁵

In the context of NCDs, human resources for health can be a lever for health system change, and achieving an optimised health workforce will help to both deliver on the NCD targets enshrined in the Sustainable Development Goals and attain universal health coverage (UHC).⁶ Indeed, according to the World Health Organization, the global community must address a shortfall of an estimated 18 million health workers in order to attain UHC commitments.⁷

However, there remain numerous challenges and barriers impeding the recruitment, training, and retention of a health workforce capable of responding to the NCD burden. The lack of political will and the evident mismatch between political commitments and financial resources, the diverse and multi-fold barriers to the recruitment and retention of adequate human resources for health, and limited awareness and use of innovation and digital health tools create bottlenecks and impede the development and implementation of an optimised health workforce, adequately equipped and empowered to effectively prevent and manage NCDs.

Turning those challenges into solutions and shaping actionable recommendations will support and demonstrate to health professionals and practitioners how a comprehensive and holistic response will help to tackle NCDs.

Practical recommendations to enable an optimised health workforce:

1. Facilitate political engagement on NCD care, inclusive of the allocation of adequate resources for strengthening the health workforce
2. Enhance multi-sectoral collaboration to strengthen the health workforce
3. Put in place global, regional, and national regulatory frameworks for the development, deployment and retention of human resources for health
4. Utilise multidisciplinary care teams, with a robust role for community health workers, to deliver NCD education and care at the primary health care level
5. Leverage digital tools to enhance the capacity and reach of the health workforce

Introduction

This policy research report explores the optimal level of health workforce for non-communicable disease (NCD) prevention and control across the continuum of care. Recognising the relevance of effective primary care in the delivery of NCD services and in the attainment of universal health coverage (UHC), it also depicts the main challenges and barriers faced by all countries, and notably, lower- and middle-income countries (LMICs) in their attempt to tackle the growing burden of NCDs^{8,9} in the context of significant, and in some cases dire, shortages in human resources for health (HRH).

Methodology

The development of this report was carried out through a combination of desk research, focus groups, interviews and the selection of case studies illustrating potential solutions:

1. Desk research, to help prepare an interview guide to frame the discussions with expert stakeholders.
2. Three focus groups – in Kigali, held alongside the 2019 Amref Africa Health Agenda International Conference; in New Orleans, alongside the American Congress of Cardiology Conference; and in Geneva, alongside the 72nd World Health Assembly – as well as strategic discussions to inform the production of a landscape analysis including the most important sources on the theme.
3. Call for case studies illustrating successful practices related to the health workforce to be potentially scaled in lower- and middle-income countries, which formed the basis of the recommendations in this study.
4. Key informant interviews with experts, members of an Expert Advisory Group, to inform the development of this report, and in particular the selection of case studies.

The series of focus group conversations was aimed at assessing the health workforce and discussing solutions to effectively advance universal health coverage and manage the growing burden of NCDs. Each one of the focus groups welcomed between 15 and 30 participants, comprising thought leaders from the private and public sector, along with strong representation from multilateral institutions and global non-governmental organisations. Four key questions underpinned the focus group conversations and led the collection and analysis of the information required to enable the identification of case studies and the design of practicable recommendations to explore the optimal health workforce for NCD prevention and control across the continuum of care:

1. What does “right care” look like in the context of human resources for health in regard to the prevention and control of NCDs?
2. What are the key barriers to the integration of NCD services in primary care? What are the key challenges faced by community organisations in this area?
3. What tools do we have at our disposal to improve primary health care and the management of NCDs? Where have we seen them used with success?
4. Which innovative partnership models are making a difference in the availability and quality of primary care services?

Focus group participants also came prepared to share both urgent challenges and best practice HRH solutions from their particular contexts. This enabled a robust conversation on common barriers, and informed the development of a series of broadly replicable systems- and tactics-level recommendations for optimising the health workforce for the management of NCDs in primary care settings.

Three approaches for strengthening the health workforce

This report presents a number of key challenges and recommended solutions for optimising the health workforce and building its capacity to respond to the growing burden of NCDs, in a way that is people-centred and advances global commitments to well-being and universal health coverage. Finally, this report synthesises the perspectives of NCD experts and stakeholders, alongside desk research and a number of relevant case studies to highlight best practices in HRH optimisation across the continuum of care from different regions, categorised into three main approaches. These three approaches have been identified to be scaled up in other country contexts, thus enabling an optimal health workforce¹⁰ with a wide range of skills and expertise, both across the health system and in other sectors and segments of the community that are able to provide an effective response to the NCD burden. These approaches are detailed and illustrated in the main body of the report.



Primary care management of NCDs and the role of healthcare workers in the NCD response

The global environment is changing in ways that demand a new approach to NCD care and management. The global community has asserted its commitment to building comprehensive, integrated, and resilient primary care health systems through milestones such as the Astana Declaration, the United Nations High-Level Meeting on Universal Health Coverage, and the G7's consensus on practical systems and methods for driving integrated people-centred care.¹¹

At the same time, demographic and epidemiological trends point to a health landscape that demands action—populations are ageing, the number of people living with multiple chronic conditions is rapidly increasing, and the NCD burden continues to grow.¹² Further complicating the landscape, inequality and uneven access to care in high-income contexts risks leaving communities behind, while refugees and displaced persons struggle to have even their most basic care needs met. Historically, health systems have been based on a “disease model,” focused on treating illnesses as and when they arise¹³—a new primary care approach that uses multidisciplinary care teams to deliver proactive prevention and disease management services will be crucial to meeting the complex care needs of today's communities.

What does primary healthcare mean?

WHO defines primary healthcare as a “whole-of-society approach to health and well-being centred on the needs and preferences of individuals, families and communities,” and it necessarily “addresses the broader determinants of health and focuses on the comprehensive and interrelated aspects of physical, mental and social health and well-being.”¹⁴ Crucially, in the context of NCDs, primary healthcare provides whole-person care for health needs throughout the entire course of a person's life, and not just for a set of specific diseases. This is especially relevant for people living with NCDs, as NCDs are chronic in nature—i.e., lasting for the duration of a person's life—and are often accompanied by comorbidity risks.¹⁵ Primary healthcare is usually the first point of contact that people have with their healthcare system, and ideally should provide comprehensive, affordable, community-based care throughout life.

As primary healthcare (PHC) can meet the majority of a person's health needs for the course of their life,¹⁶ health systems with strong PHC are needed to achieve UHC.

In recognition of the central role that PHC plays in supporting health and well-being, WHO co-hosted a major global conference in Astana, Kazakhstan in October 2018, during which all countries pledged to renew a seminal commitment to PHC made in the Alma-Ata declaration of 1978.

At this conference, a cohesive definition was developed, based on three components which lay at the core of the outputs achieved through an optimised health workforce:

- Comprehensive approach to care across the continuum
- Addressing the social determinants of health
- Empowering individuals and community

< During a site visit, a nurse explains how Mobile Technology for Community Health is being used to strengthen the health system in Ghana. © 2013 Francis Gonzales, Courtesy of Photoshare

Additional Key Definitions

Secondary Care: Specialist care provision, above and beyond functions such as internal medicine, paediatrics, and gynaecology. Secondary-level hospitals are differentiated by function and are often referred to as “provincial hospitals” or “general hospitals.”

Tertiary Care: Highly specialised care, typically requiring technical equipment. A tertiary hospital typically includes staff specialised in cardiology, intensive care, and specialised imaging. These centres are often referred to as “central hospitals” or “academic hospitals.”

Source: Hensher M, Price M, and Adromakoh S. “Disease Control Priorities in Developing Countries.” 2006. Available at: <https://www.who.int/management/referralhospitals.pdf>

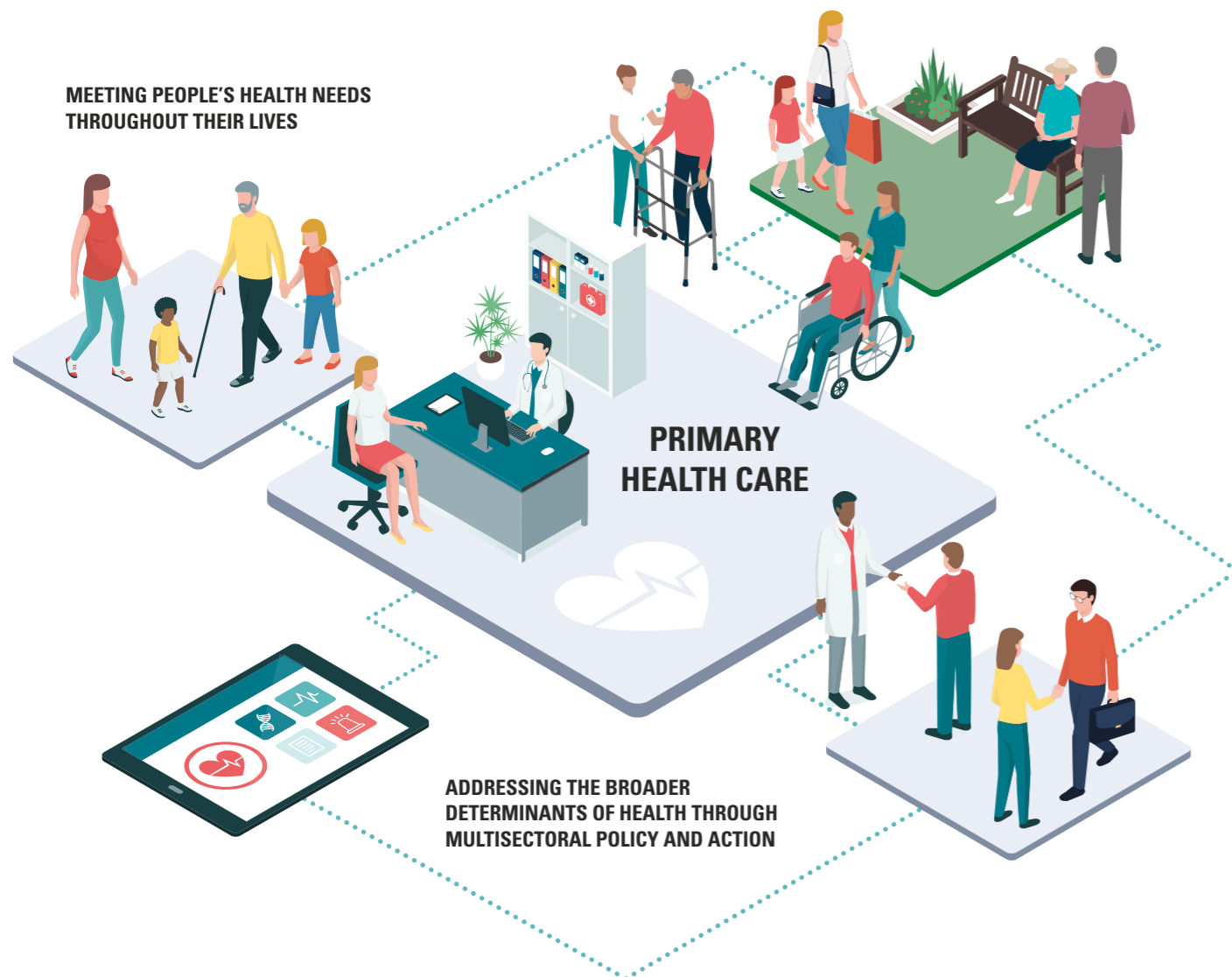
In 2019, WHO, following up on specific commitments made by in the Astana Declaration, redoubled its efforts in collaboration with partners to revitalise and strengthen primary healthcare systems globally as the foundation of UHC, in recognition of primary care’s centrality in resilient and sustainable systems for health. These global commitments challenge countries to re-orient the focus of their public health priorities, away from a historical focus on single disease programmes¹⁷ and towards the development of an integrated, people-centred health system with a robust mechanism for primary care delivery.

EMPOWERING INDIVIDUALS, FAMILIES AND COMMUNITIES TO TAKE CHARGE OF THEIR OWN HEALTH

MEETING PEOPLE’S HEALTH NEEDS THROUGHOUT THEIR LIVES

PRIMARY HEALTH CARE

ADDRESSING THE BROADER DETERMINANTS OF HEALTH THROUGH MULTISECTORAL POLICY AND ACTION



Why does primary healthcare matter?

A robust primary care system is proven to reduce the incidence of acute illness and premature death and is associated with more equitable distributions in health.¹⁸ By preventing illness from arising or by intervening early to address a disease before it progresses, primary care can reduce expenditures – both at the system level and at the level of patients’ out-of-pocket payments. Patients with access to PHC save money through lower use of healthcare resources and lower hospitalisation rates, while countries and regions with stronger primary care have lower health system costs and better health outcomes.¹⁹ There are a number of ways in which primary health care models can reduce health system costs—for example, the bulk of evidence suggests that primary care physicians order fewer diagnostic tests and procedures.

Furthermore, having a usual source of care, which is a defined function of PHC, is correlated with the lower use of healthcare resources and non-urgent emergency department visits.²⁰ Studies show that areas in the US with more primary care physicians per capita had significantly lower total costs; on a global level, countries with weak primary care systems had higher costs.²¹

By focusing on the person and not on a particular disease, primary care can deliver health services in a comprehensive and people-centred way while addressing the underlying determinants of health. Its critical role in preventative interventions promotes patients’ well-being and manages health issues before they escalate to more complex and costly conditions.²² For example, in Sweden, primary care physicians that are specialised in heart failure oversee nurse-led clinics providing ongoing care, counselling, and monitoring for heart failure patients. These clinics report reduced hospital admissions, mortality, and days spent in the hospital for people living with heart failure, resulting in significant savings for the health system.²³

There is also a link between strong primary care systems and reduced health inequities. Costa Rica’s reforms to its health system, which prioritised increasing access to primary care, were first rolled out in underserved areas with poor access and socioeconomic deprivation. This resulted in reduced disparities in access to health services, reduced mortality rates, and increased life expectancy across the country.²⁴ That Costa Rica is now internationally regarded for its healthcare system highlights the importance of primary care in delivering services, improving health outcomes, and achieving UHC.

There is an opportunity to leverage primary care in order to effectively and efficiently deliver health services in LMICs. In Malawi, many patients receiving antiretroviral therapy (ART) for HIV develop NCDs, yet patients predominantly receive ART at hospitals with low capacity to treat NCDs. A recent study found there is an opportunity for synergy between ART and NCD treatment at the primary care level to improve access to and quality of care.²⁵ This example of integrating ART and NCD services into the primary care system in Malawi is indicative of how orienting health systems around primary care can provide patients with more comprehensive and convenient care and accelerate progress towards UHC.



PRIMARY HEALTH CARE can address the vast majority people’s health needs throughout their lives

How will strengthening human resources for health help to deliver primary care?

The shortage in human resources for health (HRH) is a serious challenge to the sustainability of primary healthcare.²⁶ To effectively deliver PHC and attain UHC, an optimal health workforce with a wide range of skills and expertise, across the health system as well as in other sectors and segments of the community, is needed.²⁷

WHO's Global strategy on human resources for health: workforce 2030 states that an optimal health workforce, equipped to provide NCD prevention and control services, must be available, accessible, acceptable and of high quality.²⁸ This recognises the fact that people living with NCDs require consistent access to adequate, affordable, and high-quality care services to adequately manage their disease(s) and optimise their health and well-being. Given the higher demand for ongoing care required for chronic disease management, community organisations and systems are well positioned to

support health system institutions and respond quickly to needs within communities.²⁹ For example, an NCD Alliance expert focus group participant shared that when the Tonganese government recognised an unacceptable and rising number of amputations related to diabetes complications, it provided additional education to nurses on diseases associated with diabetes. These empowered nurses were able to better educate and engage patients, reducing the number of amputees and the number of people with adverse diabetes outcomes.³⁰ The success of such community-level health interventions will hinge upon the availability of human resources for health that are trained and deployed for community-outreach roles, as opposed to roles that sit within secondary or tertiary facilities. Delivering this tailored and community-centred care will require a robust and diverse set of human resources for health.



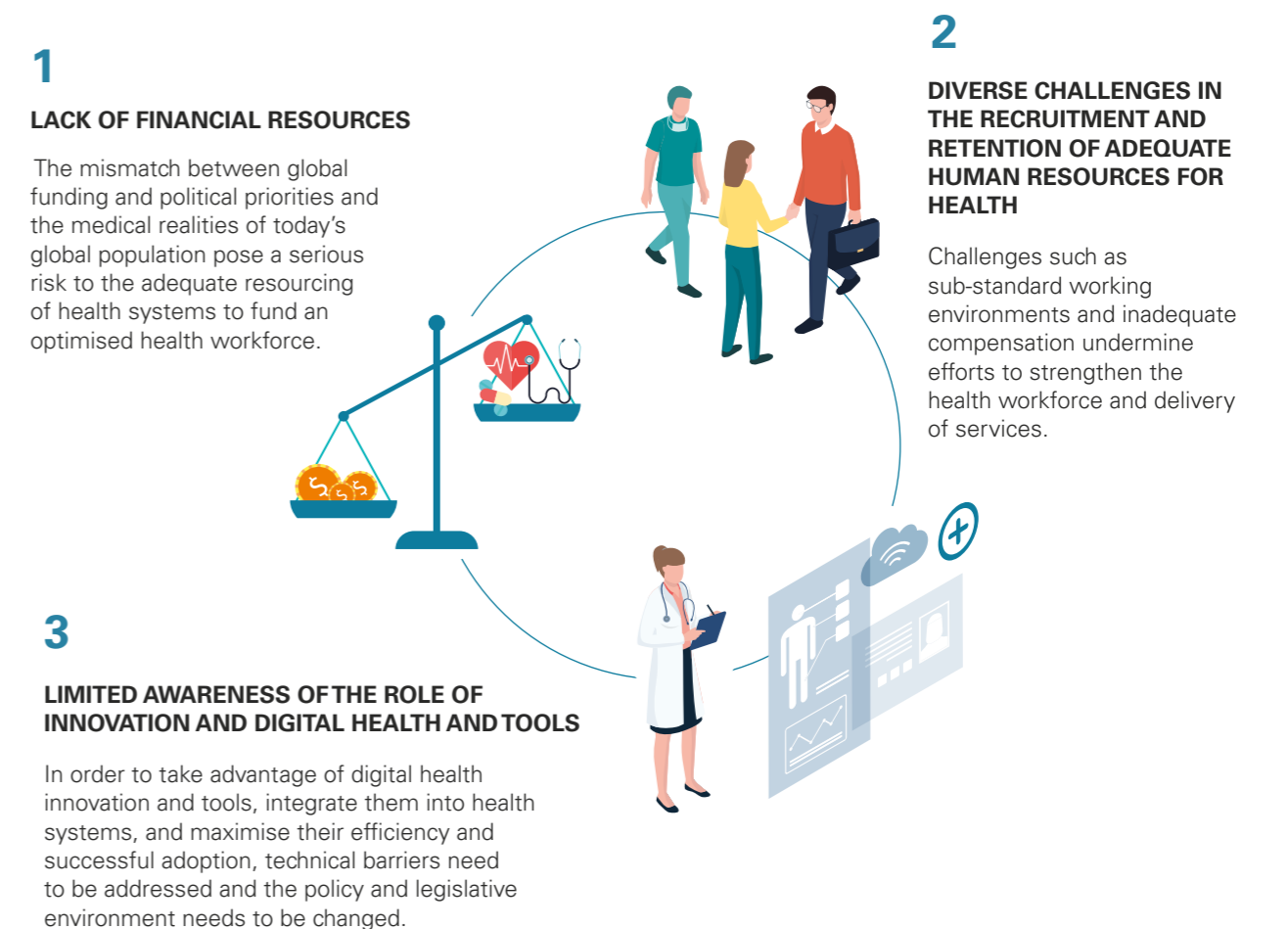
A postgraduate doctor performs an ear exam on a child in Dang, Gujarat, India. © 2017 Hetav Sadadiwala, Courtesy of Photoshare.

Building an optimal health workforce to fight NCDs: challenges and barriers

The growing burden of NCDs and population ageing will generate demand for 40 million additional health workers globally by 2030, requiring the global health workforce to effectively double in order to avoid a shortfall of 18 million workers.³¹

Similarly, WHO estimated in 2013 that 17.4 million health workers were needed worldwide in order to meet the global goal of reducing premature mortality due to NCDs by a third by 2030.³² The health workforce crisis is global; however, the shortage is particularly dire in LMICs—more than half of the 57 countries identified as experiencing a health workforce crisis are in Africa.³³ However, the distribution of health providers remains problematic across countries of all income levels. And, rural areas in all countries are more likely than urban areas to suffer from a shortage of healthcare providers.³⁴

NCD Alliance expert focus group conversations revealed a number of complex challenges and barriers that must be addressed to optimise the health workforce and boost global HRH capacity in order to grapple with the growing burden of NCDs and to meet international commitments to improve health and well-being. These challenges range from global and systemic (such as lack of political will) to tactical (such as limited uptake of digital tools).



These three main challenge areas are described in detail in pages 16 and 17.

1. Lack of financial resources

The lack of political will to effectively address NCD prevention and treatment, resulting in limited allocation of resources, poses a serious risk.³⁵ According to the 2015 Global Burden of Disease Study, NCDs accounted for 71%, or 40 million, of the 56 million deaths globally in 2015—and, NCDs are now a leading cause of death in many LMICs.³⁶ Nonetheless, globally, NCDs are chronically politically under-prioritised in contrast to the burden that they represent in terms of both lost life-years and economic impact.^{37,38} Today, there is a real risk of the commitments of the September 2018 United Nations High-Level Meeting (HLM) on NCDs going unfunded and unfulfilled. In South Africa, for

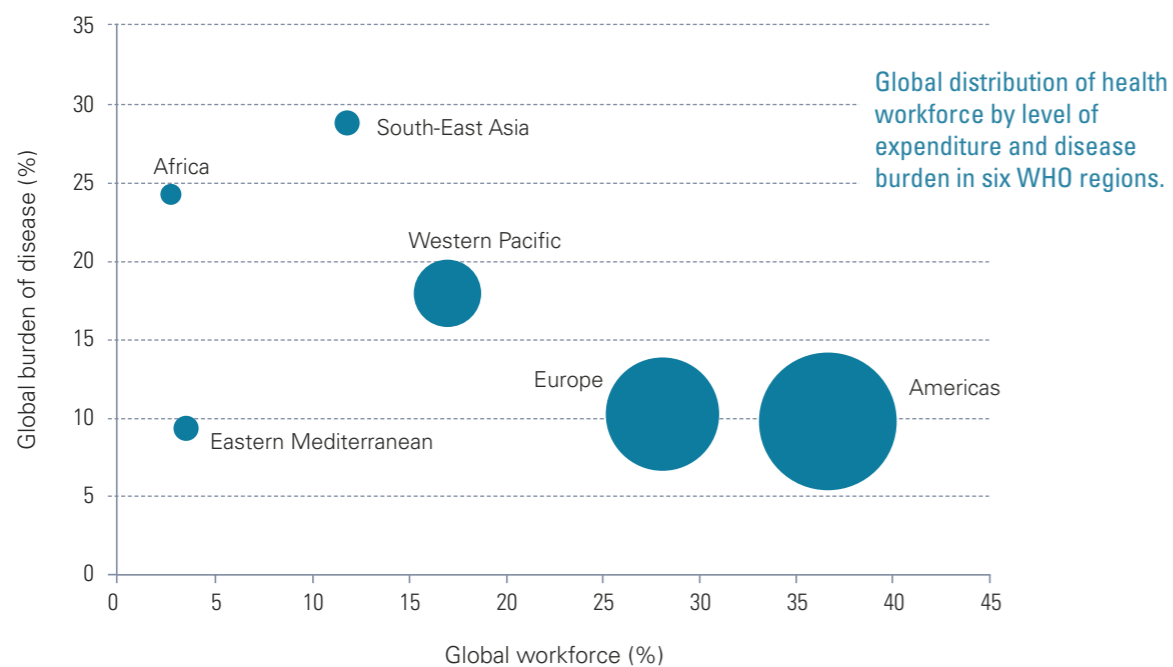
example, there is strong inequity between funding for communicable diseases and NCDs with a ratio of 99:1.³⁹ NCD Alliance expert focus group participants identified political challenges to adequate resourcing in high-income countries as well, noting that there is political resistance to increasing insurance payments that could inject resources into cash-strapped health systems.⁴⁰ Naturally, when governments and ministries of health do not allocate financial and human resources to the management of NCDs, NCD care management efforts are insufficient to meet the needs of communities.

2. Diverse challenges in the recruitment and retention of adequate human resources for health

The recruitment and retention of adequate human resources for health is complicated by a number of factors. In LMICs, people may opt not to join the health workforce, or to join the health workforce but then move on to new geographies because of poor compensation, poor working conditions, a perception of few opportunities for professional development or career advancement, a lack of community respect, and local instability.⁴¹ “Brain drain”—wherein health care providers are trained in LMICs and then migrate to wealthier geographies—remains a real issue. For

example, in Ethiopia, around 15-30% of doctors and around 20% of nurses leave the country in pursuit of higher incomes and better working conditions.⁴²

Participants in an NCD Alliance expert focus group in New Orleans (United States) discussed the complexities of “brain drain”. One participant from Barbados spoke on the challenges of losing trained healthcare workers to more developed markets that offer higher pay.⁴³ Another participant from the United Kingdom noted that the UK’s government is trying to be more cognizant



of the damage it can cause to LMIC health systems by relying on recruitment from LMIC markets.⁴⁴ The International Labour Organisation (ILO) and WHO recognise the challenge that brain drain represents, and have committed to work together in promoting supportive, enabling and healthy work environments for all.⁴⁵ The ILO has undertaken studies on the topic in the past, and advocates for policies – like the one in place in the United Kingdom – that ensure ethical recruitment and fair migration policies.⁴⁶

While the global community is faced with an unprecedented looming health workforce shortage, and international agencies and national governments are grappling with issues like brain drain, in some settings, a supply of trained health care workers is not the primary issue. NCD Alliance expert focus group participants noted that many countries also report a huge population of under- or unemployed young people. Despite this, incorporating unemployed individuals and individuals who have completed health care worker training programmes into the health workforce has proven difficult in many settings.^{47,48}

3. Limited awareness of the role of innovation and digital health and tools

Today, the global health community has yet to unlock the full potential of innovation and digital tools. The promise of digital tools for improving the reach and capacity of the health workforce is difficult to overstate. Indeed, as an article in the journal *Globalization and Health* states, “utilizing the full potential of digital health, and providing appropriate leadership, will accelerate the achievement of Sustainable Development Goal 3, Health for All.”⁴⁹

potential to play an enormously beneficial role in the treatment of NCDs in LMICs.⁵³ For example, virtual consultations may be one means of decreasing primary care costs while increasing access for geographically isolated communities and marginalised groups, and making the health system more patient-centred.⁵⁴ Despite these potential benefits, uptake remains slow because of lack of resources, lack of digital infrastructure⁵⁵, and often, because of resistance from medical professionals in the adoption of new technology-driven approaches.⁵⁶



A community health worker in India uses a mobile health platform to provide counsel. © 2016 Girdhari Bora /mSehat, Courtesy of Photoshare

Meeting 2030 global targets and achieving universal health coverage: from challenges to solutions

A robust primary healthcare workforce is central to the attainment of UHC, as the frontline of the health system and the key resource for community outreach. Furthermore, an appropriately skilled and deployed primary care workforce can optimise the care and management of NCDs, a critical enabler to the achievement of UHC and the realisation of global health targets enshrined in the SDGs.



During a vision screening event in a Local Government Area, Nigeria, assistants use Rosenbaum's pocket vision screeners to evaluate who needs reading glasses. © 2017 Tamara D Otey/Goldfarb School of Nursing, Courtesy of Photoshare.

Strengthening the health workforce and building its capacity to deliver high quality, integrated primary care services with a focus on the prevention, management, and treatment of NCDs will require a collection of evidence-based political, collaborative, and tactical solutions. Successful approaches are closely interlinked, and are conceived to work synergistically, multiplying impact if more than one is adopted.

Any approach to optimise the health workforce must be underpinned by an adequately resourced political commitment to building a strengthened and resilient health system. In the context of a whole-of-society approach, PPPs may be considered to increase available resources and expertise and reduce the cost and implementation burden on governments. A robust regulatory, training, and remuneration framework is

absolutely critical and must underpin all interventions related to human resources for health. If adopted, these approaches can establish an enabling environment for the continued optimisation of the health workforce, in line with the evolving needs of the community towards the achievement of UHC and the 2030 Agenda for Sustainable Development global targets.

The approaches detailed above, taken collectively, would require a paradigm shift for many health systems in both high-income countries and LMICs. Their implementation will take both time and an unprecedented financial commitment to PHC and the management of NCDs. The scale and urgency of the NCD challenge is difficult to overstate—the health community needs to fundamentally reshape the way HRH are trained, recruited, incentivised, and deployed

in order to meet community needs and advance global health goals. Such a paradigm shift will take a long time to fully implement. In the meantime, there are more immediate health workforce approaches that can be implemented. These shorter-term solutions include a multidisciplinary care team approach to health workforce deployment, with an emphasis on the development and empowerment of healthcare professionals and community health workers (CHWs) as key actors to deliver NCD care at the primary care level, and the uptake of innovations in financing mechanisms and digital health tools to accelerate the reach, capacity, and expertise of the health workforce.

There are instructive examples of health systems in diverse geographies that have already implemented

innovative approaches for advancing political and financial commitments, multi-sectoral partnerships, strengthened training and deployment frameworks for human resources for health, multidisciplinary care teams, and digital health tools. These approaches serve as inspiration to tackle today's complex challenges, and will help to usher in a new era of primary care, in which people living with NCDs receive coordinated, comprehensive, and affordable health services centred in their communities.

Practical recommendations to help address current health workforce challenges are drawn from a combination of desk research and expert focus group input, and are presented below:

1. Increase political engagement in NCD care, including adequate resources to strengthen the health workforce.

The UN HLMs on the prevention and control of NCDs in 2011, 2014, and 2018 put NCDs high on the global health policy agenda. Nevertheless, a lack of political will, and competing health priorities, have hampered action to turn high-level political commitments into adequately resourced national plans and programmes.⁵⁷ The lack of national-level NCD care roadmaps and supporting funding streams pose a serious challenge to the deployment of a robust health workforce, and thus to providing effective prevention, management, and treatment services.⁵⁸

LMICs increasingly grapple with a “double-burden” of communicable and noncommunicable diseases, where NCD rates are climbing whilst communicable diseases remain a major public health concern.⁵⁹ Securing adequate resources to strengthen the health workforce and improve NCD care at the primary level can be challenging in this broader epidemiological context. For example, in Uganda, a 2018 evaluation of policy setting processes shows that NCDs were not prioritised in the context of a double disease burden with limited resources.⁶⁰

In order to enhance political engagement and adequate resourcing, the country of South Africa is leveraging the platform developed for HIV prevention and care to provide a chronic disease model for NCDs—the health system incorporates lessons learned in HIV care, such as empowering primary care nurses to initiate and manage antiretroviral therapy,⁶¹ and even accesses development aid money for its NCD care programmes through this approach. This demonstrates an instructive path forward for other health systems looking to elevate political engagement and resourcing for NCD care and health system strengthening efforts.⁶² NCD Alliance expert focus group participants emphasised that there is a need for a sustained and multi-sectoral advocacy push around addressing NCDs, noting that while conversations on NCD prevention have enjoyed some success, there is still not enough attention being paid to ongoing care provision and building an adequate workforce.⁶³

2. Enhance multi-sectoral collaboration to strengthen the health workforce

Securing adequate funding for NCD care and health workforce remuneration is a chronic challenge—addressing this will require sustained, multi-stakeholder advocacy and a mix of creative public and private financing efforts. In the words of NCD Alliance expert focus group participant, “there will be no sustainable development without sustainable business models for the private sector.”⁶⁴

As the rising burden of NCDs represents a complex systems-level problem, its solution thus requires multi-sectoral collaboration.^{65, 66} The responsibility for NCD prevention and care does not lie with the health sector alone, but also involves other sectors and partners—a multi-stakeholder collaboration is a winning approach to identify and scale up tailored health workforce solutions.⁶⁷

WHO advocates for the development and implementation of national multi-sectoral action plans (MAPs) for the prevention and control of NCDs. These MAPs provide a framework to address NCDs and their risk factors through a holistic public health approach where partners both inside and outside the health sector come together to contribute to implementation. Multi-sectoral action focuses on integrating health concerns into relevant sectors’ policies and activities, reinforcing responsible stewardship and establishing sustainable financing mechanisms.⁶⁸

NCD Alliance expert focus group participants advocated for new thinking on increased uptake of innovative multi-sectoral partnerships. For example, some experts suggest that, instead of thinking about private sector engagement in NCD care provision through the lens of corporate social responsibility, the NCD community ought to instead adopt a shared value approach to partnering with the private sector.⁶⁹ By de-risking some of the players that already exist in the NCD care space—such as households, the finance industry, and the health system itself—the private sector could get

more involved in NCD care provision through a shared value approach.⁷⁰

While public-private collaboration is seen as a core component of multi-sectoral action to combat NCDs, the approach also encourages collaboration across government ministries and programmes that may not ordinarily interact. For example, a ministry of health may choose to create a MAP to combat physical inactivity in collaboration with major employers, along with representatives from the ministries of transport, urban planning, and education.

Multi-sectoral partnerships are a powerful—and largely untapped—tool to optimise the health workforce. For example, a multi-sectoral plan convening the ministries of health, labour and education alongside private sector stakeholders, such as major local employers or companies with expertise in health system issues, could effectively conceive and implement new programmes for training primary care workers or offering workplace NCD screening services.

3. Put in place a regulatory framework for the development, deployment and retention of HRH

The implementation and promotion of a regulatory framework tailored to the current NCD context and to HRH needs at primary care level is a crucial enabler to optimise the health workforce. The regulatory framework should reflect the local context and constraints and include guidelines for the recruitment, training, accreditation, deployment, and retention of HRH. Frameworks ought to be tailored to the emerging NCD care needs of populations, and should include training and deployment approaches that maximise the number of accredited multidisciplinary care providers. Furthermore, guidelines for recruitment and retention should be paired with complementary framework elements outlining the remuneration, deployment, and ongoing development of the health workforce in order to boost sustainability and safeguard worker retention over time.

WHO recommends a review of current health workforce regulations and that revisions be made in cases where existing training and deployment regulations may be impeding progress towards a health workforce that is

sufficiently focused on primary care, particularly in terms of new and advanced roles for existing practitioners.⁷¹ While appropriate training and accreditation is critical in order to ensure patient safety and high quality care, accreditation and regulation are best applied according to task and skill as opposed to professional designation.⁷² Consequently, the framework for health worker deployment should reflect this task- and skill-based accreditation process by deploying health workers based on their skillsets.

In the context of the rising burden of NCDs, there is a need for more robust training at an earlier stage on primary care provision and NCD management at all levels. As community health workers and nurses play larger and more significant roles in NCD screenings, care, and management, training programmes need to evolve accordingly. Ultimately, supporting and enabling the planning, education, deployment and retention⁷³ of human resources for health by defining new curricula and reforming education will help achieve a health workforce focused on primary care in terms of roles that are more relevant and effective in tackling NCDs.⁷⁴

In reshaping clinical education, increased emphasis on multidisciplinary training approaches has the potential to improve NCD care once workers are deployed in communities—for example, nurses, allied health professionals, and doctors could all be trained together on NCD management and primary care provision.⁷⁵ While it is standard practice for physicians to serve as teachers within nursing programmes, it is less common for nurses to teach in medical schools.⁷⁶ It would benefit the health community if clinical education institutions placed a greater focus on fostering inclusion and collaboration across the disciplines from the very beginning of health worker training.

Health workers, like workers in other industries, tend to move in search of better living and working conditions, improved salaries, and opportunities for professional development.⁷⁷ In contexts such as LMICs and rural or impoverished areas, this leads to migration and attrition and can add up to significant worker losses for health systems, thus threatening workforce sustainability.⁷⁸ The development of an appropriate financial incentive structure can help to improve health workforce retention.⁷⁹ Emerging research indicates that incentive programmes are most effective when paired with complementary programmes offering career development opportunities, pathways to advancement, and personal and family support programmes.⁸⁰



In Santo Domingo, Dominican Republic, patients and healthcare professionals discuss local patients statistics and TB-HIV integration at the IntraHealth and Dominican Republic regional service center. © 2015 Alfredo Fort, Courtesy of Photoshare

4. Leverage multidisciplinary care teams, with a robust role for community health workers (CHWs), to deliver primary health care for NCDs

Reorienting health systems towards a collaborative primary care approach built on multidisciplinary, team-based care has potential to better align with population needs, while improving cost-effectiveness. This approach exploits the potential contribution of different typologies of health workers,⁸¹ operating in closer collaboration and according to a more rational scope of practice. The approach entails health workers operating within the full scope of their training and accreditation while avoiding under-utilisation of skills and enabling high-performing primary care.^{82, 83}

Multidisciplinary care teams⁸⁴ represent a promising way forward to provide prevention and health promotion services, NCD screenings, and ongoing NCD care and management. In the words of one participant in an NCD Alliance expert focus group, multidisciplinary care teams aim to put the “right care team member, in the right place, at the right time, with the right competencies to deliver care.” A creative and inclusive approach to building the multidisciplinary primary care team includes a recognition of the role that nurses,

CHWs, pharmacists, dentists, physical therapists, and allied health professionals can play in contributing to a “critical mass” of primary health care specialists and improving quality of care.⁸⁵

CHWs are proven to be highly effective members of the care team in LMICs, serving as a bridge to the community and increasing community-member trust in the health system.^{86, 87} As such, CHWs are especially well-positioned to educate communities on NCD prevention, provide NCD screening services, and support patients in making behavioural modifications and treatment adherence choices that improve NCD care outcomes.⁸⁸ The empowerment and strategic deployment of CHWs within the multidisciplinary care team model is therefore central to the efficacy, sustainability, and acceptability of the health workforce. Emerging research suggests that CHWs could also play a valuable role supporting provision of NCD care in high-income countries.⁸⁹



5. Leverage digital tools to enhance the capacity and reach of the health workforce

Digital health technologies have the potential to play a beneficial role in the treatment of NCDs in LMICs and may have many applications aimed at reducing inefficiencies while enhancing access and quality.⁹⁰ Mobile healthcare or m-health strategies that aim to help CHWs address gaps in healthcare access in low-resource settings can improve the efficiency of the service provided.⁹¹ It is also important to note that digital health technologies carry the risk of increasing inequalities in access and outcomes if not carefully designed and implemented.⁹² For example, the “digital divide,” in technology access based on factors such as socioeconomic status, age, and gender must be addressed if digital tools are to be successful in helping to ensure good health for all.⁹³

Digital solutions provide an avenue for enhancing the efficiency and reach of NCD care programmes, by ensuring that human resources are focused primarily on those tasks in which human contact cannot be replaced.⁹⁴ An NCD Alliance expert focus group participant shared an example from China, where a company called “Ping An Good Doctor”⁹⁵ has built thousands of artificial intelligence-enabled remote clinics that are the size of a phone booth. People are evaluated by a “bot” and then either receive diagnostics and therapeutics on the spot or are referred to a tertiary facility. In other settings, artificial intelligence is being used to manage HIV care⁹⁶ and diagnose diabetic retinopathy.⁹⁷ These types of interventions demonstrate

the ways in which emerging digital solutions can take on some of the diagnostic work and provision of simple prescriptions for common acute conditions, which has historically fallen on primary care providers. This frees up additional human capacity for tackling the more complex aspects of caring for patients, such as the often-complicated treatment plans for people living with more than one NCD.

Outside of the diagnostics and treatment space, digital health tools can also generate new innovative mechanisms in health financing, insurance reimbursement, and digitally-enabled tools for enhancing the efficiency and affordability of NCD prevention.^{98, 99} For example, to enhance NCD prevention and promote a healthier lifestyle, there are applications like the one based on an activity-tracking and rewards programme, which is used by insurance companies to incentivise members to lead healthier lifestyles. Users can earn rewards, ranging from reduced premiums to gift cards and discounts, by meeting activity goals and making healthier food choices.¹⁰⁰

Finally, eLearning tools represent innovative health learning solutions that can be utilised and adapted in diverse settings—including LMICs—to encompass a diverse range of competencies in basic science, medical knowledge, specialisation, and clinical practice, providing a cost effective and flexible solution to health workforce capacity building.¹⁰¹



A health practitioner works on the archive of the Musaka clinic in Rwanda. © 2017 Riccardo Gangale/USAID, Courtesy of Photoshare

Three approaches to implementation

Existing and novel strategies to support the planning, education, deployment, management and reward of human resources for health to tackle NCDs at PHC level

Best practice case studies across the continuum of care from different regions—grounded in the recommendations outlined earlier in this report—have been identified and framed in three principle approaches that can empower health workers to deliver quality NCD care to more people in primary care settings. While the three approaches detailed below represent different principled strategies for addressing the health workforce challenge, they are intended to be synergistic, in that efforts to strengthen health systems would benefit from the application of one or all of these approaches concurrently.

Ultimately, scaling up and implementing these approaches will ensure that health workers are equipped with the right skills and resources, and are deployed within the right care teams, to deliver care in the most effective way to the greatest number of people affected by NCDs.

APPROACH 1 People-Centred

This approach relies on the strategic deployment of HRH to meet the holistic care needs of the communities over the course of their entire lives and across different care settings, instead of taking a disease-focused approach to HRH staffing models. This approach is especially appropriate for the prevention and control of NCDs, as these conditions frequently coexist and are chronic over the course of a person's life. The programmes and projects detailed within this approach embrace workforce models that emphasise delivering training in NCDs, deconstructing siloes between disease areas, and embedding health care providers into communities to boost access.

CASE STUDIES

Strengthening Capacity for Global Paediatric Immunisation Champions^{102, 103}



Implementing partners

American Academy of Pediatrics



Location

8 countries in Asia and Africa (Indonesia, Nepal, the Philippines, Ethiopia, Kenya, Nigeria, Tanzania & Uganda) and the United States



Disease area

Paediatric immunisation



Timeframe

2015 – ongoing



Target population

National paediatric societies in Indonesia, Nepal, the Philippines, Ethiopia, Kenya, Nigeria, Tanzania and Uganda



Setting

Rural and urban

CONTEXT

Improvements in child healthcare delivery on a global scale have contributed to a 56% decline worldwide in the under-five mortality rate and cut the infant mortality rate by nearly half. But there is still more work to do. Though vaccines are one of the most successful and cost effective health interventions in history, more than 19 million infants still do not have access to life-saving vaccines. Paediatricians can take on multiple roles that enable them to reach out to their communities. They can act as child health experts, civil society leaders, medical school professors, hospital supervisors, child health care providers, and immunisers. Therefore, national paediatric societies (NPS) are central actors in promoting vaccination programmes in their communities and countries.

This case study draws an analogy of what could be done for the prevention, treatment, and management of NCDs, based on a model of engaging paediatricians as advocates for child immunisation. Children and adolescents are increasingly affected by NCDs, especially in LMICs. Furthermore, many risk factors for NCDs occur during childhood and adolescence. The most common NCDs are cardiovascular diseases (CVD), cancers, respiratory diseases, and diabetes. The global community, including the WHO, is now increasing its focus on mental health conditions, which affect 10-20% of children and adolescents globally.¹⁰⁴

OBJECTIVES

To engage NPS at the country-level to support national and sub-national immunisation improvement through advocacy, education, and targeted action with the long-term goal of improving vaccination coverage.

INTERVENTIONS

Interventions in the eight countries consisted of needs assessments and workshops to train paediatricians as advocates for immunisation and to help NPS to develop advocacy plans. Following the initial assessment and training, sub-grants supported the national paediatric societies to implement their action plans. Each of the societies used a slightly different approach tailored to their needs and community.

Ethiopia

Community-level advocates and religious and community leaders were enlisted to help build trust in vaccines in their respective communities. The Ethiopian Paediatric Society developed culturally relevant tools to strengthen immuniser communication during service delivery and the paediatric response to immunisation issues by training paediatricians in advocacy skills to ensure awareness of immunisation programme needs.

Kenya

In coordination with the Ministry of Health, the Kenya Paediatric Association developed a pre-service training curriculum focused on immunisations, vaccinology, service delivery, and patient communication. They also trained paediatricians in core advocacy skills. The goal was to improve child healthcare worker ownership—especially paediatricians—of child vaccination status and coordinate vaccine service delivery across all cadres of the health system.

Nigeria

The Paediatric Association of Nigeria advocated to national and regional governments, highlighting the importance of vaccine financing, educated communities on the importance and safety of vaccines, and strengthened advocacy by society members through trainings. The goal was to encourage country ownership, particularly around vaccine financing, across its immunisation programme.

Tanzania

The Paediatric Association of Tanzania trained media and journalists in immunisation communication, educated the community through print and radio on the importance of routine immunisation, introduced vaccines (human papillomavirus and inactivated polio vaccine), and trained healthcare workers at regional level on immunisation communication and new vaccines. The goal was to increase awareness of newly introduced immunisations and improve community acceptance.

Indonesia

The Indonesia Paediatric Society developed an electronic information system to collect private sector immunisation data; provided private data and reporting to the Ministry of Health for decision making; and trained new paediatricians, midwives, and general practitioners in immunisation service delivery, management, and advocacy skills.



Mothers wait with their infants for maternal-child health consultations at Polana Caniço Hospital in Maputo, Mozambique.
© 2017 Arturo Sanabria, Courtesy of Photoshare

IMPACT

National paediatric societies in five low and middle income countries have increased their support of public and private immunisation systems with actions including: advocating to 100 government agencies and policymakers, training approximately 1,200 health workers, and providing educational outreach for 3,000 care providers.

Examples of country-specific results include:







- Development of an immunisation pre-service training curriculum that will reach 86% of health workers in Kenya;
- Supporting public-private partnerships for immunisation service delivery in rural areas of Indonesia, which led to a 40% improvement in vaccine coverage;
- Development of new written commitments for sub-national financing by six permanent secretaries and obtaining a 1% increase for healthcare financing at the national level in Nigeria.

Scalable and Replicable Elements of the Programme

1. The AAP global immunisation advocacy programme emphasises the important role that paediatricians and other child healthcare providers can play in promoting immunisations beyond their clinics; as trusted leaders in their communities, they can also lead or participate in campaigns targeting NCD prevention and the importance of screenings.
2. Paediatricians can sensitise **parents** providing direct care as well as other **health workers** (e.g. nurses or health assistants offering direct routine care) to NCDs, taking advantage of the access paediatricians have to their communities and other health worker cadres. Brief interventions may include counselling on healthy eating, helping their children avoid exposure to secondhand smoke, and observing for developmental milestones.
3. Paediatricians trained in advocacy can also work directly with their **governments** to identify policy and service gaps in coverage for children across national health systems, and recommend solutions. Paediatricians and NPS play an important role linking communities and civil society to policymakers.
4. Paediatricians provide a credible, expert voice to **civil society organisations** focused on NCDs; they are able to speak from direct clinical experiences with children and families and about the long-term health consequences of health systems which do not prioritise NCD prevention and control.

Additionally at a global level, AAP developed a publication, "*Professional Association Sustainability Framework for Immunization Activities: What are the Essential Elements of a Well-Functioning Pediatric Society*" to guide integration of immunisation advocacy into routine NPS structures. It also developed a two-day training curriculum on immunisation advocacy for use by NPS and partners working with professional associations.¹⁰⁵

Healthy Heart Africa Programme for Hypertension Management

	Implementing partners AstraZeneca
	Location Kenya, Africa
	Disease area Hypertension
	Timeframe 12-month study (March 2015 – March 2016)
	Target population Kenyan healthcare providers (HCPs) and the general public
	Setting Urban and rural



CONTEXT

Given the rising burden of hypertension in Africa, the Healthy Heart Africa (HHA) programme was developed to contribute to the prevention and control of hypertension and improve access to quality hypertension care in the primary care setting, thereby decreasing the burden of cardiovascular disease. Currently present in Kenya, Ethiopia, Tanzania and Ghana, the programme supports sustainable models by working with local health systems. Each model works independently with partners in the country to address different health challenges and health environments, with the aim of providing a sustainable means of fighting hypertension in Africa.¹⁰⁶

For the launch pilot study referenced here, HHA collaborated with five implementing partners (Academic Model Providing Access to Healthcare, African Medical and Research Foundation, Christian Health Association of Kenya, Jhpiego, and Population Services Kenya) to integrate hypertension education and care into primary health and outreach services provided at public, private, and faith-based facilities.

OBJECTIVES

The overall objective of the programme was to improve access to quality hypertension care in the primary care setting by improving healthcare providers' (HCPs) knowledge of hypertension and facility-level services in Kenya; by creating a protocol for hypertension care; and by increasing access to affordable hypertension medications.¹⁰⁷

INTERVENTIONS

Intervention facilities were selected by stratified random sampling and matched to similar control facilities. Selected intervention facilities received a hypertension treatment protocol, equipment, training and patient education materials, and an improved medical supply chain.¹⁰⁸

< A health worker rechecks a patient's blood pressure at a clinic in Umueleagwa Onicha, Ezinihitte Mbaise Local Government Area, Nigeria. © 2017 Tamara D Otey/ Goldfarb School of Nursing, Courtesy of Photoshare

IMPACT

HCPs responsible for hypertension care were surveyed at baseline and 12 months later. Hypertension screening and treatment data were abstracted from service delivery registers. A differences-in-differences analysis estimated the impact of Healthy Heart Africa on HCPs' knowledge, hypertension services, and the number of patients diagnosed with and seeking treatment for hypertension.¹⁰⁹

During the initial pilot, the programme:

- Conducted over 1.7 million blood pressure screenings in the community and in healthcare facilities.¹¹⁰
- Identified over 340,000 people living with high blood pressure. The development and dissemination of uniform hypertension management protocols, and the efficient supply and distribution of hypertension medications, was crucial in identifying the people suffering from hypertension, but also in making sure they received the adequate treatment.¹¹¹
- Trained over 3,000 healthcare workers, including doctors, nurses, community health volunteers and pharmacists to provide education and awareness, screening and treatment services for hypertension.¹¹²
- Activated over 400 healthcare facilities in Africa to provide hypertension services, including the establishment of secure supply chains for low cost, high quality branded antihypertensive medicines.¹¹³
- Improved HCPs' knowledge of risk factors for hypertension and methods for reducing or managing hypertension. However, the programme was not found to have any effect on HCP's knowledge of hypertension consequences.¹¹⁴
- Improved HCP training and the quality of hypertension services by integrating hypertension services into primary and community health care systems, which largely focused on maternal/child health, human immunodeficiency virus, and malaria.¹¹⁵

Overall, the HHA programme positively affected HCPs' knowledge and practice of hypertension care at 12 months and supported the public-private partnership (PPP) approach to expand access to care across a diverse population, differentiated by health care sources.¹¹⁶ Through collaboration with the Kenyan Ministry of Health and leading implementation partners, HHA was able to utilise the existing healthcare infrastructure to expand its outreach and provide improved care for people in Kenya.

Scalable and Replicable Elements of the Programme

1. A PPP approach can be effective in disseminating knowledge of hypertension to HCPs and reaches a greater number of people who use different care providers (pharmacists, doctors, nurses, community health volunteers).
2. Efficient supply and distribution of hypertension medication needs to go hand-in-hand with primary care physicians' education on hypertension to have an impact on population health.
3. Using existing healthcare structures, in particular primary care services that do not traditionally focus on NCDs but rather on infectious diseases like HIV, malaria, and maternal and child health, can expand programme reach and improve cost efficiency.

Since launching in Kenya and subsequently expanding to Ethiopia in 2016, Tanzania in 2018 and Ghana in 2019, HHA has¹¹⁷:

- Conducted over 11 million blood pressure screenings in the community and in healthcare facilities.
- Trained over 5,800 healthcare workers, including doctors, nurses, community health volunteers and pharmacists to provide education and awareness, screening and treatment services for hypertension.
- Activated over 700 healthcare facilities in Africa to provide hypertension services, with the establishment of secure supply chains for low cost, high quality branded antihypertensive medicines.
- Identified over 2 million elevated blood pressure readings.

AstraZeneca has continued to refine the model, applying resources where they have the most impact and identifying learnings that they have built into the ongoing operation of the programme in Kenya and other countries in Africa.

HealthRise India^{118, 119, 120}



Implementing partners

Medtronic Foundation



Location

India



Disease area

Cardiovascular disease, diabetes



Timeframe

3 years (2016-2018)



Target population

Indian frontline health workers and HCPs in government facilities in two districts, and the general public



Setting

Urban and rural



Indian senior patient queuing to have a free medical consultation in Agra, India 2010. ©Shutterstock.

IMPACT

- The programme boosted early detection of CVDs and diabetes. Raising awareness and extending care into communities and homes promoted NCD detection, self-care, and monitoring and treatment adherence.
- The programme fostered community empowerment. The SALT approach—Stimulate and support, Appreciate, Listen, and Transfer—helped people connect with each other and motivated communities to take action. Group members started regular exercise routines with their families, organised screening camps in villages, and participated in tree planting and cleanliness drives.
- The programme also initiated a digital health programme, the E-Health Card. The programme introduced technology solutions to improve service delivery and data collection. An outbound call centre provided follow-up reminders while an Interactive Voice Response System answered questions through automated responses. An e-clinic provided remote access to a specialist located in a tertiary hospital, thus saving travel costs, opportunity costs, and wait times. Frontline health workers used the E-Health Card as a surveillance tool for ten NCDs. Indian Prime Minister Narendra Modi recognised the tool with an Innovation Award in 2018.



Before SALT, people used to think of themselves. Now they think about the whole village.

Asha Meghwa, Outreach worker

CONTEXT

HealthRise is a five-year, \$17-million global effort funded by the Medtronic Foundation designed to expand access to care for cardiovascular disease (CVD) and diabetes among underserved populations in Brazil, India, South Africa and the United States. In underserved areas of India, shortages of equipment, staff and pharmaceuticals lead to service-delivery gaps. To make matters worse, without screening at primary care facilities, symptomatic patients are often forced to seek care at expensive tertiary facilities. This often leads to catastrophic health spending, with Indian households spending up to 25% of their annual income on diabetes care.

OBJECTIVE

HealthRise aims to contribute to the World Health Organization's goal of reducing premature mortality associated with chronic NCDs by 25% by 2025 through the implementation and evaluation of innovative, scalable, and sustainable community-based demonstration projects. In particular, the programme's goal is to encourage people to test for diabetes and hypertension.

INTERVENTIONS

HealthRise pioneered a model for coordinated care that integrated communities, patients, frontline health workers, and health care providers at government health facilities. The programme leveraged two key interventions:

Frontline health worker-led awareness campaigns

Campaigns included door-to-door visits, street plays and other community forums to explain the importance of testing for diabetes and hypertension. During the events, health workers screened participants for these conditions.

Routine home visits and telephone reminders

Patients were encouraged to complete a confirmatory diagnosis at a nearby health facility.

Scalable and Replicable Elements of the Programme

1. A model of people-centred, coordinated care that brings together community-health workers and healthcare providers at government-run health facilities increases access for underserved populations.
2. Follow-up is crucial after screening the population, and digital tools represent a great opportunity to send reminders via smartphones to patients to take their medication and to schedule remote appointments with specialists at a reduced cost.
3. Community ownership is important to encourage people to feel responsible for their own health and the health of their community, and to initiate demand so that people will seek screening and adhere to their treatment in a sustainable way.

National Programme for the Promotion of Oral Health¹²¹



Implementing partners

Portuguese Ministry of Health and the Portuguese Dental Association



Location

Portugal, Europe



Disease area

Oral care



Timeframe

2016 – ongoing



Target population

Primary care providers (PCPs) in Portugal, and the general public



Setting

Urban and rural

CONTEXT

Oral health care has remained out of reach for many people in Portugal due to high treatment costs – the National Programme for the Promotion of Oral Health was conceived to make quality oral health care more accessible to those who need it most. Investment in oral health is linked to positive outcomes that extend far beyond the mouth: according to WHO, effective national strategies to promote oral health and prevent oral diseases show that population-wide improvement of oral health can contribute to preventing the leading NCDs.



Democratizing access to oral health care, not limiting access to just a few patient groups, is the vision we want to share.

Dr. Fernando Araújo, State Secretary for Health of Portugal and mentor of the National Programme for the Promotion of Oral Health

OBJECTIVE

To offer oral health services in at least one primary healthcare centre in each municipality in Portugal to increase access to oral health care among the population.

INTERVENTIONS

Patient screening is conducted by local general practitioners (GPs), who refer the cases to dentists in their respective healthcare centres. A number of people living in low-income households have never had a dental appointment before and have serious oral health problems.

IMPACT

- Over 60 municipalities in Portugal have integrated oral health and primary healthcare facilities.
- As of November 2018, more than 37,300 patients have had access to a total of 90,500 dental appointments and 105,000 treatments.
- The programme has been well-received by patients and has increased demand for oral care.

Scalable and Replicable Elements of the Programme

1. NCD prevention, detection and management can be carried out by health workers in primary care. The programme shows that to be sustainable, NCD care should be an integral part of the medical curriculum, especially for disciplines like oral health that have historically existed as a separate specialty.
2. Incentives to integrate NCD care into primary care settings should have both “top-down” and “bottom-up” components in order to ensure that services are coordinated and well-received by the population.

APPROACH 2

Multidisciplinary care teams to enhance the community health workforce

Multidisciplinary care teams are defined as “a partnership between different cadres of health care workers, inside and outside the health sector and the community they serve, with the goal of providing continuous, comprehensive and efficient health services.”¹²² In the context of NCD care, this approach aims to design and utilise multidisciplinary care teams through a task-sharing approach to enhance the role of primary and community-based care in the prevention, detection, and control of NCDs.

Crucially, the implementation of this approach could benefit from a bidirectional strategy: a top-down new regulatory framework supporting and enabling the planning, education, deployment and retention of human resources for health (i.e. new curricula, new frameworks and paths, reform of education, etc.) associated to a bottom-up strategy to empower local communities and families by increasing awareness about NCD-related risks, strengthening community healthcare workers, and training people and family members to help each other while living with NCDs. The following case studies offer concrete examples of a bottom-up approach for hypertension care in Vietnam

and for diabetes care in India. They demonstrate, in particular, that commitment from governments to reform medical education curricula and integrate CHWs in government-led health structures is key to maximise the impact of multidisciplinary care teams. Political commitment is crucial to ensure that multidisciplinary care teams are adequately resourced, and that NCD care is integrated into existing health infrastructures to minimise costs. It also helps ensure that CHWs and primary care providers have the right skills to conduct NCD screenings, detection, and follow-up in their respective communities.

CASE STUDIES

Communities for Healthy Hearts Programme^{123, 124, 125, 126, 127, 128}



Implementing partners

Novartis Foundation; & PATH



Location

Ho Chi Minh, Vietnam



Disease area

Hypertension



Timeframe

2016 – ongoing



Target population

Approximately two million adults aged 40 and over in the urban population, and community-health workers in four districts of Ho Chi Minh City, Vietnam



Setting

Urban

CONTEXT

Nearly 25% of the adult population in Vietnam has hypertension, but less than half of them are aware of their condition. Of those diagnosed with hypertension, only 11% have it under control. In urban areas of Vietnam, the prevalence of hypertension is higher at 33%, with Ho Chi Minh City being home to the largest urban population in the country. Levels of awareness about hypertension, its consequences, and the importance of early detection are low among residents of Ho Chi Minh City. The health systems and services are historically set up to address infectious diseases and acute conditions rather than chronic conditions like hypertension.

OBJECTIVE

The Communities for Healthy Hearts Programme aims to improve health outcomes of adults with hypertension living in low-income households in urban Vietnam.

INTERVENTIONS

The project takes a diverse and multi-pronged approach to improving health outcomes, focusing on multi-sectoral delivery modalities, and the utilisation of new innovative digital health tools.

Increasing access to screening through community-based initiatives

Communities for Healthy Hearts aims to improve early detection of hypertension through volunteer-led screenings and referrals at well-known, convenient, yet non-traditional locations such as community leaders' homes, local markets, and tea shops.

Partnering with social entrepreneurs

Communities for Healthy Hearts works with social enterprise clinics Glink and Galant, to add high blood pressure screening to their existing clinic services and social outreach activities.

Fostering high quality hypertension services across the continuum of care

Communities for Healthy Hearts worked with international and national hypertension experts to develop a training and service delivery package for standardised hypertension services. This package is implemented by more than 75 public and private health care providers to foster a network of high-quality hypertension services.

Raising awareness and generating demand for services

Communities for Healthy Hearts developed a public awareness campaign, based on an audience assessment, to create a sense of urgency around hypertension and encourage people to proactively seek hypertension services. Campaign messaging focused on raising awareness and motivation for controlling modifiable risk factors and seeking hypertension screening. Messages were disseminated through social media, word of mouth via community health volunteers, and community outlets like health centres, neighbourhood posters and banners, and mobile loudspeaker announcements.



The number of patients who have been examined and are being monitored by the Ward 9 health station has significantly increased: more than 6,000 people in this area have now had their blood pressure checked. I see this model is very effective.

Dr. Nguyen Thanh Dien, Head of the Ward 9 Commune Health Station in District 8, Ho Chi Minh City

Leveraging digital health technology

Digital technology can help primary health care workers to provide higher quality care for people with chronic conditions, and enable patients to self-manage their condition. Communities for Healthy Hearts developed the eHTN.Tracker, Vietnam's first digital patient tracker for a non-communicable disease, which supports health workers to log and track patient and service delivery data and provide prompt follow-up over time. The eHTN.Tracker also provides an optional SMS reminder service for patients, sending messages direct to their mobile phones to remind them to take medicines, make healthy lifestyle choices, and attend follow-up appointments with their doctors.

IMPACT

- Between September 2016 and February 2019, more than 1.1 million people have been reached with hypertension-related messaging, developed and distributed by Communities for Healthy Hearts.
- By the end of 2018, more than 520 community blood pressure checkpoints had been set up in popular and high-traffic neighbourhood locations. Between September 2016 and the end of June 2019, 161,082 people had received a blood pressure measurement from community volunteers at these checkpoints.
- Creation of eHTN.Tracker, Vietnam's first digital patient tracker for a non-communicable disease.

Scalable and Replicable Elements of the Programme

- Generating demand for NCD services and creating ownership of health across communities is essential to make sure that screening services are well-received and that there is demand from the population.
- Once demand has been generated, there must be screening services in place in communities for people to get diagnosed, and to have access NCD care close to their homes when needed. This is done by establishing and disseminating treatment guidelines for NCD care to healthcare professionals.
- Digital tools have the potential to enable health workers to provide more effective support for people with chronic conditions, and empower patients to take ownership of their health management.

Integrated Model of Care for Diabetic Retinopathy within the Health System of Pakistan



Implementing partners

The Fred Hollows Foundation; Lahore General Hospital; Gurkhi Trust Teaching Hospital; and Sindh Institute of Ophthalmology and Vision Sciences

Funding Partner

The Queen Elizabeth Diamond Jubilee Trust



Location

Pakistan



Disease area

Diabetic Retinopathy (DR)



Timeframe

The Fred Hollows Foundation supported the implementation of a three-year project (2016-2018) entitled "Integrated Model of Care for Diabetic Retinopathy within the Health System of Pakistan" in two target districts.



Target population

People at risk of vision loss due to diabetes-related eye disease.



Setting

Rural and urban

CONTEXT

NCDs and uneven access to health services are key barriers to poverty alleviation and sustainable development in Pakistan. According to the 2017 National Diabetes Survey of Pakistan, the prevalence of diabetes in Pakistan is 26.3%. In real terms, this means that approximately 27.4 million people over 20 years of age suffer from diabetes. Diabetic retinopathy (DR) is a leading complication of diabetes that damages blood vessels inside the retina at the back of the eye and can lead to loss of vision and eventual blindness. The disease affects an estimated one-third of all people with diabetes and is the leading cause of vision loss in working-age adults. In fact, every person with diabetes is at risk of developing DR and all will potentially have it in later life.¹²⁹ However, regular eye exams reduce the risk of vision loss and blindness caused by DR. In 2014, an estimated 1.7 million people in Pakistan were registered as blind, from any cause. By 2030, it is projected that at least 1.8 million people will be afflicted by sight-threatening diabetic retinopathy alone.¹³⁰

OBJECTIVES

The project aimed to avert blindness in people at risk of vision loss due to diabetes through the delivery of frontline diabetic care and by strengthening the health system. The long-term project objective was to integrate diabetes and diabetic eye health into existing public health strategies by optimising the capacity of Lady Health Workers (LHWs) – an indispensable part of the health system in Pakistan – and linking primary, secondary and tertiary levels of care.

INTERVENTIONS

This project featured several strategic components in order to deliver the required eye care support for patients and establish a diabetic continuum of care across the health systems. They were:

Community awareness, identification and referral of persons with diabetes

The programme trained frontline community health workers (CHWs) to use a diabetes risk assessment (DRA) guide to detect persons with diabetes or known diabetics at risk of developing diabetic retinopathy and refer them to a primary health care facility.

Initial screening

The programme enlisted optometrists as part of a screening team to visit primary health care facilities called Basic Health Units (BHUs), where CHWs referred their patients.

Referral system

The project developed a referral system from the BHU to the respective tertiary centres with functional diabetic clinics and medical retina services.

Cooperation between diabetic clinics and eye care for diabetic retinopathy

The project developed a collaborative arrangement between diabetic clinics and medical retina services to create a joint diabetic eye clinic and refer patients to each other's clinic for investigation and treatment. This proved to be a highly effective strategy to ensure that patients who ended up in either disease unit (diabetes or ophthalmology) were placed in an ongoing patient diabetes management pathway treating all complications.

Data management

Customised software was developed to assist data management and to improve treatment, decision making and patient tracking.

IMPACT

- 1,302 LHWs were trained in diabetes, eye health and the use of the DRA with another 30,000 yet to be trained. The project exceeded its target despite the limited availability of LHWs for training activities, as they were constantly involved in other programmes like family planning, immunisation and nutrition.
- The project improved access for people with diabetes or at risk of developing diabetes, firstly to LHWs, and thereafter to BHUs and tertiary centres. In normal circumstances, most of these people would not have had the opportunity of a DRA and DR screening at the primary health care facility level. The screening teams were able to detect DR and refer the patients to the respective tertiary centres for further management and treatment.
- There was a significant increase in the numbers of both men and women through the DRA screening process and further DR screening at BHUs between 2017 and 2018, with a total of 104,202 people screened for diabetes. The sex-disaggregated impact was more pronounced for women, primarily due to the fact that LHWs mainly interacted with female community members.
- By training LHWs in the use of the DRA and developing a referral link to a primary health facility for DR screening, the programme achieved a cost-efficient intervention at the primary health care level. Furthermore, the formal referral link established between the BHUs at the project sites and the respective tertiary hospitals resulted in 3,880 people receiving DR procedures.

- Material on diabetes and DR were included in the course curriculum of LHWs, meaning that all existing LHWs in the Sindh province and all new inductees will continue to receive training on diabetes and DR, thus formally integrating the initiative into the existing health system.

Scalable and Replicable Elements of the Programme

- The use of non-physician community health professionals, like CHWs, for health promotion and awareness and to conduct DRA at the community level is both scalable and replicable.
- Establishing a diabetic eye clinic in a tertiary setting in formal collaboration with diabetic clinics and ophthalmology clinics was a highly feasible and sustainable intervention, which can be scaled up to other tertiary centres.
- The project demonstrated successfully that a screening service for diabetic retinopathy by an optometrist can be developed at the primary health level, thus further establishing a referral pathway to tertiary diabetic and medical retina services.
- Setting up a Project Steering Committee chaired by senior health officials played a significant role in the facilitation and coordination of programme activities and helped maintain momentum for the project.
- Incorporation of operational research in the project design helped identify bottlenecks to referral uptake at tertiary medical retina services, which improved after remedial measures were taken, and informed future strategic options and programme design.
- When developing DR programmes, it is desirable to develop partnerships with NCD programmes so that DR prevention and control strategies are synergistically aligned with NCD strategies for strategic integration and sustainable programmatic impact.

The Stroke Foundation Uganda Project^{131, 132}



Implementing partners

Stroke Foundation Uganda Project



Location

Uganda



Disease area

Stroke



Timeframe

2016 – ongoing



Target population

People who have suffered a stroke



Setting

Urban

RESULTS

- This outreach has been vital in supporting people affected by stroke, and reducing stigma and discrimination. It has helped people to understand the importance of seeking early treatment and that there can be life after stroke through rehabilitation.
- The Stroke Foundation Uganda has raised awareness, not only among people affected by stroke but also among medical staff and politicians, of the importance of rehabilitation. There is now increased collaboration with primary health facilities.

CONTEXT

Lack of understanding around how to care for someone who has suffered a stroke and stigma surrounding stroke survivors is a challenge in Uganda. Strokes, caused when the blood supply to part of the brain is cut off, may result in long-term impairments. Stroke Foundation Uganda is based at the Stroke Rehabilitation Centre in Kampala. The Stroke Rehabilitation Centre helps stroke survivors who cannot afford private rehabilitation costs.

OBJECTIVES

To provide care and support for stroke survivors.

INTERVENTIONS

The Foundation's stroke support group utilises a cadre of trained volunteers who visit survivors and caregivers in their homes, providing information on after-stroke care and linkages to other support services. The Stroke Rehabilitation Centre also offers holistic rehabilitation services and keeps raising awareness about stroke risk factors and rehabilitation services, for example by organising the World Stroke Day.

Scalable and Replicable Elements of the Programme

- It is crucial to involve caregivers in the ongoing support and management of people living with NCDs. Caregivers should know how to provide appropriate care, and must understand the consequences of stroke.
- Stigma remains a major challenge when it comes to NCDs, and offering services that include psychosocial support is paramount for patients to live more easily with their condition. Medical staff should be offered training on the psychological impacts of NCDs.

APPROACH 3 Innovation and Digital Health

In its first set of guidelines on digital health interventions, WHO defined digital health, as “the use of information and communications technology in support of health and health-related fields.”¹³³ Digital health offers a range of benefits to health workers, in particular CHWs, in relations with their patients but also in terms of educating themselves and communicating with their care team.

Digital tools such as software, digital platforms, or even simple text messages can help health workers in their decision making, enable them to track their patients’ records and follow up more easily with them, access educational material, and communicate more effectively with their team; for example, by receiving advice from clinical experts or peers. Mobile health is defined as a subset of eHealth that implies the use of

mobile technology for health, such as mobile phones, tablets and laptops, and it is increasingly being used in low-resource settings for the multiple uses cited above. Digital technologies for health are not an end in themselves, but they have potential to significantly improve coverage and care quality, as illustrated through the following set of case studies.

CASE STUDIES

Empowering Health Workers and Leveraging Digital Technology in Myanmar^{134, 135, 136, 137, 138}



Implementing partners

Sanofi, Myanmar Medical Association, Myanmar Health Society, World Association of Social Psychiatry (WASP), and World Francophone Digital University (UNFM)



Location

Hlaing Thar Yar Township, Myanmar



Disease area

Mental health, specifically psychotic disorders, major depressive disorder, and epilepsy



Timeframe

3-year pilot programme (2017 – 2020)



Target population

Primary health care providers, community health workers, potential patients, and the wider community



Setting

Suburban

CONTEXT

With one in four people globally suffering a mental health disorder at some point in their lifetime, it is likely everyone will be affected by a mental health problem, either personally, or through a friend or family member. Although there is a plethora of effective treatments, medicines and therapies for managing mental disorders, many – particularly those in low- and middle-income countries – are unable to access these treatments.

OBJECTIVES

To reduce the treatment gap by 20% for psychoses (including schizophrenia), major depressive disorders, and epilepsy within 24 months. The programme aims to train 75 community health workers (CHWs) and 90 primary health care professionals.

INTERVENTIONS

The pilot programme leverages existing CHWs and primary health care providers with the use of new technologies to improve access to mental health care. It has a two-pronged approach to closing the mental health care gap and reducing stigma, and utilises new technology in each prong.

Training CHWs to screen and identify people with mental disorders, and general practitioners (GPs) to diagnose and manage patients: The first prong of the programme focuses on CHWs, who are trained to identify people with mental health disorders, to direct them to seek care from GPs, and to follow up. CHWs receive training on how to identify potential patients using smartphones with interactive questionnaires.

The second prong of efforts to eliminate the mental health care gap is to address the shortage of trained mental health care providers in Myanmar. There are an estimated 300 psychiatric professionals in a country of 52 million people and most physicians are not trained to treat mental disorders. This means patients that need mental health care must go to the hospital to receive treatment, which is often a less convenient and more costly option. The programme provides a training course for GPs to equip them with the skills to diagnose, treat, and support people with psychotic disorders, depressive disorders, and epilepsy, and if necessary, refer them to a psychiatrist. GPs receive tablet devices with an interactive version of the World Health Organization’s Mental Health Gap Action Program intervention guide, and e-medical records, making it easier to diagnose and manage patients, record their medical information, and follow up.

Raising awareness among populations

CHWs are also given tools to raise awareness and educate community members about mental health disorders. They hold weekly meetings in the township to educate community members on mental health disorders, thereby reducing stigma, and identifying potential patients. After they have screened the patient, CHWs can refer them to the local GP (or another primary health care provider) if needed.



Previously, apart from epilepsy, I couldn’t give treatment for psychosis and depression. I had to refer them to the hospital and specialist unit. It was not convenient for the patient. After the 5-day training course, I can handle all three diseases in my clinic. Thanks to the tablet I received from the project, I can review the progress of my patient.

Dr. Ning Lin Kyaw, General Practitioner in Hlaing Thar Yar Township

IMPACT

The pilot programme has already shown positive outcomes and has made and continues to make great strides in connecting patients with mental health care and raising awareness of mental disorders among community members.

- To date, more than 17,000 people have been reached through informational meetings held by 75 CHWs.
- Over 1,300 people have been screened and referred by CHWs to see one of the 50 trained general practitioners or 40 other primary health care providers.
- Over 1,000 of those referred have seen a health care provider and been diagnosed and treated for a mental disorder.

Scalable and Replicable Elements of the Programme

1. Smartphones and tablets are convenient and secure tools to help identify those who need treatment and manage their care. Rather than requiring participants to learn a complicated new system, smartphones and tablets utilise technologies that are accessible because they mirror the technology people use in their daily lives. Although the CHWs and general practitioners offer comprehensive mental health care, telemedicine is an effective system to fill in any gaps and be able to provide care.
2. Stigma is a significant barrier that stands in the way of a patient receiving care. Empower CHWs to play a central role in raising awareness among community members, thereby reducing stigma and creating an environment where people feel safe to seek support.
3. There is overlap between risk factors for mental disorders and other NCDs, with those suffering mental disorders at a higher risk of developing other NCDs such as cardiovascular disease and diabetes, and vice-versa. By reducing the mental health care gap, consider opportunities to leverage the programme to help improve overall community health.

The Global CVD Prevention Programme^{139, 140, 141}



Implementing partners

Pfizer Upjohn and the American College of Cardiology (ACC)



Location

10 countries around the world (China, Indonesia, Vietnam, Malaysia, Russia, Saudi Arabia, Egypt, the United Arab Emirates, Mexico, and Argentina)



Disease area

Cardiovascular disease



Timeframe

2016 – ongoing (the programme was quickly expanded to the nine other countries after initial success in China)



Target population

Physicians and hospital systems



Setting

Rural and urban



To be effective in changing the culture around treating and preventing heart disease, you have to reach clinicians where they live and practice and beyond a single intervention. We are committed to working with our colleagues in ACC's international chapters to implement this programme in a way that achieves maximum impact and furthers the College's mission to prevent cardiovascular disease and improve patient care on a global scale.

Daniel José Piñero, Chair of the ACC's Assembly of International Governors

CONTEXT

No strategy for curtailing the NCD epidemic would be complete without placing cardiovascular disease front and centre. CVD accounts for half of NCD deaths, yet many of these cases may be effectively managed or entirely prevented through healthier choices and readily available treatments.

The ACC's response has been the CVD Prevention Programme, an ambitious effort supported by an educational grant from Pfizer Upjohn to raise awareness and provide training to the medical community. Though initially targeted at cardiologists, in 2019 the programme shifted its main audience to primary care providers, internists, and general practitioners who serve on the front lines of patient care. As specialised clinicians such as cardiologists are relatively scarce throughout much of the developing world, NCDs can only be effectively managed with significant support from other clinical staff. By equipping doctors around the world with the most up-to-date knowledge the medical community has to offer on cardiovascular disease and its prevention, the programme ensures that doctors have the basic competencies to recognise disease risk factors, provide treatment, and pass their knowledge on to patients.

As the programme has shifted audiences, the format has also evolved. In late 2019, the ACC will complete a webinar series in four countries—Mexico, the UAE, Russia, and Indonesia—with a final instalment on continuing care for post-myocardial infarction patients in the primary care setting. In 2020 the ACC will launch a fully online, mobile-compatible programme so that clinicians across low- and middle-income countries may learn and practice clinical skills at their own pace.

OBJECTIVES

- To equip all health care providers who play a role in managing cardiovascular disease with the knowledge to care for cardiovascular health, and to improve preventative care for patients at high risk of developing cardiovascular disease.
- To establish a model for effective public/private partnerships toward reducing the impact of NCDs and supporting the United Nations sustainable development goals (SDGs).

INTERVENTIONS

The programme comprises two core elements:

Webinar Education

Historically, the programme has consisted of a three-part webinar series covering primary prevention, secondary prevention, and prevention for those with multiple risk factors. This series has been conducted in 10 countries for cardiovascular specialists and is being repeated in four countries in 2019 for primary care doctors.

NCD Prevention Certificate Programme

The online programme that ACC is now developing will start with modules on prevention and management of CVDs, before growing into a first-of-its-kind learning destination for clinical knowledge on NCDs through the addition of modules on conditions such as cancer, etc. As they complete programme activities, participants will be able to receive certificates related to various competencies and disease states as a way to maintain and demonstrate their skills in managing some of the world's most burdensome conditions

IMPACT

- The pilot programme in China consisted of webinars that reached more than 350 hospitals, and a public awareness campaign that reached 1.8 million people on the WeChat social media platform. The rapid success of the pilot programme in China resulted in expansion to nine other countries that have seen similar success.
- Expanding its target audience from cardiologists to all primary care providers is another indicator of the programme's success.
- In total, the programme has amassed over 60,000 audience members, which translates to over 60 million potential patient encounters annually.
- Audience members have demonstrated significant improvement in their confidence regarding CVD risk reduction and management, as well as improved performance on patient case exams.
- The programme has been recognised with a Power of A award by the Center for Association Leadership.

Scalable and Replicable Elements of the Programme

- It is important to balance global efforts with local initiatives. A successful programme is likely to be a collaborative effort between international and local experts, with the global project lead actively seeking local engagement to adapt the programme to fit the local context. This emphasis on customising the programme for each participating country results in local partners having a greater sense of ownership over it and in more effective programmes.
- The nature of the programme makes it easily adaptable and allows the programme to evolve and expand to meet growing demand. The programme can design new social media campaigns and curriculums for webinars that reflect the latest scientific developments and centre around specific topics.



Ali carries his father to a nearby hospital in Mymensing, Bangladesh. © 2015 Md. Zakirul Mazed Konok, Courtesy of Photoshare

The Joint Asia Diabetes Evaluation (JADE) Programme^{142, 143}



Implementing partners

Asia Diabetes Foundation



Location

China, Hong Kong, Taiwan, Singapore, Malaysia, Thailand, the Philippines, Korea, Macau, Indonesia, India and Brunei



Disease area

Diabetes



Timeframe

JADE was developed in 2006 and made available to registered users in November of 2007



Target population

Diabetes patients and health care providers



Setting

Rural and urban

CONTEXT

Asia is the continent with the highest prevalence of diabetes, with a disproportionate number of young and middle-aged people living with the disease. Diabetes can reduce life expectancy by 10-12 years on average if left untreated; however, it is easily preventable and treatable, underscoring the importance of access to care. The web-based Joint Asia Diabetes Evaluation (JADE) Programme, which is the first of its kind, leverages information technology to enable and support evidence-based care and promote collaborative research. JADE incorporates risk stratification, care protocols, and self-management support to improve ambulatory diabetes care. Anonymous clinical data, submitted with the consent of patients and health care providers, builds a diabetes registry to better estimate risk. The information feeds JADE's risk engine to predict the five-year probability of major clinical events. JADE then uses this risk stratification to recommend individualised care.

OBJECTIVES

The objective of JADE is to use information technology to facilitate health care teams to deliver tailored diabetes care based on individual risk, so as to reduce complication rates and support self-care. The programme accesses a diabetes registry to manage, track, and analyse clinical data to continuously improve its risk assessment and care recommendations.

INTERVENTIONS

There are four different programme components that define JADE's innovative approach to enabling evidence-based diabetes care.

Collecting patient data

The JADE portal collects patient information and uses this data to stratify risk and recommend care that is tailored to the patient's risk level. At each review visit, key parameters, as recommended by international guidelines, are captured to document clinical progress. They include blood pressure, body weight, risk factor control (HbA1C, lipids, renal function and albuminuria), self-care, hypoglycaemia, and admissions since the last visit. This data can be collected online at a point-of-care, or offline using paper format followed by data entry to the e-portal at a later date, depending on the clinic set up and operation.

Using patient data for decision-making

The programme leverages data collected during patients' annual examinations to inform its care protocols and serve as a database for research, publication, and data tracking. Health care professionals are able to more easily record, track, and analyse clinical information. Each step of collecting and utilizing the data contributes to the overall innovative approach to care:

1. In order to standardise the collection of information during the clinical course of diabetes, the JADE portal incorporates templates to guide standardised clinical assessment and data capture for risk categorisation.
2. Validated risk equations are employed to estimate five-year probabilities of major clinical events. Based on this risk stratification, the JADE portal recommends a care protocol tailored to these risk levels, with decision support triggered by various risk factors.
3. Personalised feedback reports are generated with bar charts indicating risk profiles and target values, and diagrams that show temporal trends of risk factor control.
4. Individualised decision support for both doctors and patients, triggered by attained target values.

Creating a dialogue between the patient and their doctor

Apart from establishing a registry for quality assurance and data tracking, the JADE portal also displays trends in risk factor control at each visit to promote doctor-patient dialogue and to empower both parties to make informed decisions. This encourages patients to take ownership over their health care and to make informed decisions. Furthermore, the portal provides matrices to help doctors monitor patients' levels of adherence to care processes (e.g. annual assessment, review visits, education sessions, laboratory tests, etc.) and self-management as well as their status of attainment of treatment targets.

Providing a multidisciplinary team for diabetes care

The administration of the programme is supported by a multidisciplinary team including a part-time endocrinologist, a programmer, and a project coordinator. The platform facilitates information sharing among team members.


IMPACT

- Using a multidisciplinary approach, doctors can use the JADE portal to reorganise the process of care delivery and establish a diabetes registry to manage, track and analyse the large amount of clinical information to improve decision making. JADE has created a diabetes registry and diabetes care model that improved clinical outcomes in 12 countries and regions across Asia – China, Hong Kong, Taiwan, Singapore, Malaysia, Thailand, Philippines, Korea, Macau, Indonesia and Brunei. Interventions have shown better clinical outcomes for diabetes than traditional care, as well as improved control of cardio-metabolic risk factors.
- On a research front, the JADE Programme provides a virtual platform to collect epidemiological data and devise disease management programmes to improve understanding of the natural history of diabetes and evaluate the effectiveness of various interventions in an established scientific setting.
- The portal facilitates patient participation in and ownership over their health care by making information and care recommendations more accessible. It also creates transparency by allowing patients and medical personnel to ensure adherence to the care process, including the annual clinical assessment, laboratory tests, treatments and other procedures.

Scalable and Replicable Elements of the Programme

1. Development of a platform to provide a comprehensive, integrated approach to diabetes care that facilitates medical research, provides evidence-based care recommendations, and promotes patient agency over their health care.
2. Put technology directly in the hands of the patients, encouraging greater patient buy-in while also serving as a tool for those in the medical field to innovate in diabetes care.
3. Provide patients with access to their data to boost ownership of their own health and encourage dialogue between the patient and their doctor.
4. Embed an ability for the platform to continuously update its care recommendations and produce more accurate risk assessments based on new data.

SMARThealth in Indonesia^{144, 145, 146, 147, 148}

	Implementing partners Pfizer Foundation and the George Institute
	Location East Java Province, Indonesia
	Disease area Cardiovascular disease
	Timeframe August 2016 – ongoing
	Target population Rural community members at risk of cardiovascular disease (adults over 40 years)
	Setting Rural

CONTEXT

Stroke, heart disease, and diabetes were ranked among the top 10 causes of premature mortality in Indonesia in 2010. Despite the number of easy-to-adopt and evidence-based prevention practices, 20% of Indonesians aged 41 to 50 years old are at high risk of cardiovascular disease (CVD). That number jumps to 70% for 51- to 60-year-olds, around 60% of whom do not receive treatment.

OBJECTIVE

SMARThealth (Systematic Medical Appraisal Referral and Treatment), an android-based technology platform, aims to deliver low-cost, high-quality healthcare through the existing, government-funded primary healthcare system. A mobile device-based clinical decision support system, SMARThealth was previously developed in a rural area of South India, and has already been implemented in other remote and rural areas. The objective of this programme is to determine whether SMARThealth can be efficiently and effectively scaled up in large rural communities to provide affordable cardiovascular care.



A volunteer with the Red Cross checks the blood pressure of an elderly couple as part of a regular health service in the Baganuur district of Mongolia. © 2007 Carl Whetham, Courtesy of Photoshare.

SMARThealth Extend proposes to test an innovative, multifaceted intervention that draws on three elements: capacity strengthening of primary care doctors and non-physician health workers (NPHW); the development of a mobile device-based clinical decision support system (CDSS) for use by these healthcare providers; and integration of this system within the existing public primary healthcare sector. The study tries to address the existing gaps (both manpower and technology) in the primary health care system, by using an android application for measuring the CVD risk of adults between 40 and 85 years of age, through household screening by trained, non-physician healthcare workers.

INTERVENTIONS

Two core interventions define the SMARThealth programme.

Training CHWs to screen for CVDs

SMARThealth trains CHWs (known as kaders) to carry out household screening for cardiovascular risk among adults over 40 years of age. CHWs are provided with technology that allows them to assess an individual's risk and provide advice on healthier choices to prevent cardiovascular disease. CHWs play an integral role in the health care network created by SMARThealth; they provide treatment plans for at-risk individuals, conduct follow-up visits, and are responsible for institutionalising care in the community and promoting habits that will mitigate the risk of cardiovascular disease. In addition, SMARThealth offers primary care providers digital applications that include an electronic health record, wireless point-of-care diagnostics, and algorithms to manage patients faced with or at a high risk of premature death or disability.

Raising awareness in communities through CHWs

SMARThealth provides CHWs with the training and tools to promote community awareness around CVDs. SMARThealth provides a risk communication tool with pre-recorded animations on the platform that are used by the CHWs during household visits. It also sends automated, pre-recorded personalised voice messages to high-risk patients to promote lifestyle changes, medication adherence and medical follow-up.

IMPACT

- The programme trained primary care doctors and non-physician healthcare workers to serve approximately 48,000 community members.

Based on these results, the Malang District Health Agency is planning a scale-up of SMARThealth across the Malang District. This scale-up will be supported by technical assistance and evaluation services, provided by the George Institute for Global Health, the University of Brawijaya and Manchester University. The academic consortium providing technical and evaluation support is funded through a Global Alliance for Chronic Disease Grant, awarded by the Australian National Health and Medical Research Council.¹⁴⁹

Scalable and Replicable Elements of the Programme

- Affordability and accessibility are core tenets of SMARThealth's success. Services must be affordable to those in the rural communities where the platform operates; if not, patients at high risk of premature death or disability will not seek care and the programme will not have an impact.
- SMARThealth is designed with users in mind. It is essential that health care providers find that the services enhance their daily practice, CHWs find the technology interface user-friendly, and patients find the health care that the programme provides to be affordable and accessible.
- By integrating community members, CHWs, and care providers, SMARThealth creates a strong network in rural areas upon which its success depends. Being known in the community as a reliable and affordable healthcare provider lends the programme credibility; encourages patients to access care and follow advice on lifestyle changes; and mitigates the risk of premature death and disability due to cardiovascular disease. The ability to create a network will help the programme build on its previous success as it seeks to expand to new areas.

Conclusions

Optimising the Health Workforce for the NCD Response

A primary health care led approach to NCD care and management embeds frontline health workers in communities, where frequent interactions with patients and a close understanding of the communities' culture can enhance NCD care provision. Furthermore, robust and resilient primary care systems enhance NCD prevention efforts, and help to reduce the risk of diseases escalating and reaching a crisis point that might require costly hospital interventions. Finally, primary care systems are – by design – oriented towards treating the patient holistically, taking into consideration the full picture of their care needs, as opposed to taking a disease-focused approach. Such integrated care is a key enabler to the effective prevention and management of NCDs.

In order to ensure universal access to primary health services and effective NCD care, the global community must prioritise strengthening the health workforce. Globally, we are experiencing a serious shortage in human resources for health. Health worker shortages range from “absolute deficiency” in places like Kenya, where there is only one cardiologist to serve one million people, to serious nurse shortages in countries like Germany and the UK. Absolute deficiencies render the shortage particularly dire in LMICs—more than half of the 60 countries designated as experiencing a health workforce crisis are in Africa. For example, rural areas in all countries are more likely to suffer from a shortage of health care providers than their urban counterparts.

The barriers to the recruitment and retention of adequate human resources for health are diverse and multi-fold, ranging from systems-level challenges such as political will and the societal value that communities place on physicians versus frontline health workers and sub-standard working conditions in health facilities, to individual considerations such as healthcare workers' desire for better compensation and opportunities for professional growth.

Uptake of innovative care models—such as leveraging multidisciplinary care teams and exploring digital health solutions—has the potential for strengthening the health workforce and improving the education, deployment, and ongoing management of human resources for health at the primary health care level. Political engagement in NCD care, with an emphasis on ensuring the allocation of adequate resources for strengthening the health workforce, will be critical. Creative political approaches are also worth exploring—for example, enhancing multi-sectoral collaboration could help close some of the resource gaps in today's health systems. There are a number of tactical solutions that health systems can adopt in the short-term to strengthen the health workforce for NCD management, including: empowering nurses and community health workers to play central roles in NCD prevention and care efforts; utilising multidisciplinary care teams; and leveraging digital tools to enhance the capacity and reach of the health workforce.

Global commitments to universal health coverage and a one-third reduction in premature deaths due to NCDs marks an unprecedented declaration about the importance of securing health and well-being for all. The path to achieving these goals is complicated, and hinges upon the global community's ability to adequately resource, recruit, and deploy human resources for health. While optimising the health workforce for NCD prevention, care and management is singularly challenging, there are health innovators across the world introducing new and effective approaches for care delivery. Replicating and scaling these best-in-class examples of HRH deployment for NCD care represents a first and important step in advancing health and well-being for all.

REFERENCES

- 1 Browne JL, Ventura A, Mosely K, & Speight J. “‘I call it the blame and shame disease’: a qualitative study about perceptions of social stigma surrounding type 2 diabetes.” October 2013. Available at: <https://bmjopen.bmj.com/content/bmjopen/3/11/e003384.full.pdf>.
- 2 Pemberton M. “As a doctor, I'd rather have HIV than diabetes.” In *The Spectator*. 19 April 2014. Accessed 31 July 2019. Available at: <https://www.spectator.co.uk/2014/04/why-id-rather-have-hiv-than-diabetes/>.
- 3 Divo MJ, Martinez CH, & Mannino DM. “Ageing and the epidemiology of multimorbidity.” August 2014. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4918092/>.
- 4 Nishtar S, & Ralston J. “Can human resources for health in the context of noncommunicable disease control be a lever for health system changes?” November 2013. Available at: https://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0042-96862013001100895.
- 5 World Health Organization. “Sustainable development goals (SDGs): Goal 3. Target 3.4.” Accessed 31 July 2019. Available at: <https://apps.who.int/iris/handle/10665/208282>.
- 6 Nishtar S, & Ralston J. “Can human resources for health in the context of noncommunicable disease control be a lever for health system changes?” November 2013. Available at: https://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0042-96862013001100895.
- 7 World Health Organization. “Global Strategy on Human Resources for Health: Workforce 2030.” 2016. Available at: https://www.who.int/hrh/resources/global_strategy_workforce2030_14_print.pdf.
- 8 The NCD Alliance. “Policy brief – Universal health coverage and noncommunicable diseases: a mutually reinforcing agenda.” 2014. Available at: https://www.msh.org/sites/default/files/uhc_and_ncds_2014_a4_final_web.pdf.
- 9 Baghirov R, Ah-Ching J, & Bollars C. “Achieving UHC in Samoa through revitalizing PHC and reinvigorating the role of village women groups.” January 2019. Available at: <https://www.tandfonline.com/doi/full/10.1080/23288604.2018.1539062>.
- 10 World Health Organization, & the United Nations Children's Fund (UNICEF). “A vision for primary health care in the 21st century: towards universal health coverage and the Sustainable Development Goals.” 2018. Available at: <https://www.who.int/docs/default-source/primary-health/vision.pdf>.
- 11 Nishtar S, & Ralston J. “Can human resources for health in the context of noncommunicable disease control be a lever for health system changes?” November 2013. Available at: https://www.scielosp.org/scielo.php?script=sci_arttext&pid=S0042-96862013001100895.
- 12 Divo MJ, Martinez CH, & Mannino DM. “Ageing and the epidemiology of multimorbidity.” August 2014. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4918092/>.
- 13 World Health Organization. “Technical Series on Primary Health Care: closing the gap between public health and primary care through integration.” 2018. Available at: https://www.who.int/docs/default-source/primary-health-care-conference/public-health.pdf?sfvrsn=2ca0881d_2.
- 14 World Health Organization. “What is Primary Care?” Accessed on 28 August 2019. Available at: <https://www.who.int/news-room/fact-sheets/detail/primary-health-care>.
- 15 World Health Organization. “What is Primary Care?” Accessed on 28 August 2019. Available at: <https://www.who.int/news-room/fact-sheets/detail/primary-health-care>.
- 16 Huang W, Long H, Li J, Tao S, Zheng P, Tang S, & Abdullah AS. “Delivery of public health services by community health workers (CHWs) in primary health care settings in China: a systematic review (1996-2016).” June 2018. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5989355/>.
- 17 World Health Organization. “Ten threats to global health in 2019.” Accessed 31 July 2019. Available at: <https://www.who.int/vietnam/news/feature-stories/detail/ten-threats-to-global-health-in-2019>.
- 18 Macinko J, Shi L, & Starfield B. “Contribution of Primary Care to Health Systems and Health.” September 2005. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690145/>.
- 19 Shi, L. “The Impact of Primary Care: A Focused Review.” December 2012. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3820521/>.

- 20 Friedman B and Basu J. "Health Insurance, Primary Care, and Preventable Hospitalization of Children in a Large State. 2001. Available at: https://www.researchgate.net/profile/Jayasree_Basu/publication/11951384_Health_Insurance_Primary_Care_and_Preventable_Hospitalization_of_Children_in_a_Large_State/links/09e4150f764a25d269000000/Health-Insurance-Primary-Care-and-Preventable-Hospitalization-of-Children-in-a-Large-State.pdf
- 21 Macinko J, Shi L, & Starfield B. "Contribution of Primary Care to Health Systems and Health." September 2005. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690145/>.
- 22 Macinko J, Shi L, & Starfield B. "Contribution of Primary Care to Health Systems and Health." September 2005. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2690145/>.
- 23 <https://www.ncbi.nlm.nih.gov/pubmed/24862840>
- 24 Rosero-Bixby, L. "Spatial access to health care in Costa Rica and its equity: a GIS-based study." April 2004. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S0277953603003228?via%3Dihub>
- 25 Hoffman R, Mwagomba B, Pfaff C, & Scott V. "You can treat my HIV – But can you treat my blood pressure? Availability of integrated HIV and non-communicable disease care in northern Malawi." February 2017. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5320467/>.
- 26 Alameddine M, Khodr H, Mourad Y, Yassoub R, & Ramia JA. "Upscaling the recruitment and retention of human resources for health at primary healthcare centres in Lebanon: a qualitative study." March 2015. Available at: <https://onlinelibrary.wiley.com/doi/abs/10.1111/hsc.12210>.
- 27 World Health Organization, & the United Nations Children's Fund (UNICEF). "A vision for primary health care in the 21st century: towards universal health coverage and the Sustainable Development Goals." 2018. Available at: <https://www.who.int/docs/default-source/primary-health/vision.pdf>.
- 28 World Health Organization. "Global strategy on human resources for health: Workforce 2030." 2014. Available at: https://www.who.int/hrh/resources/pub_globstrathrh-2030/en/.
- 29 Allotey P, Davey T, & Reidpath DD. "NCDs in low and middle-income countries - assessing the capacity of health systems to respond to population needs." June 2014. Available at: <https://bmcpublihealth.biomedcentral.com/articles/10.1186/1471-2458-14-S2-S1#CR5>.
- 30 NCD Alliance Expert Focus Group Outcomes Document. Geneva, Switzerland. May 2019.
- 31 World Economic Forum. "Five Ways to Bridge the Global Health Worker Shortage." 15 July 2019. Available at: <https://www.weforum.org/agenda/2019/07/5-ways-to-bridge-the-global-health-worker-shortage/>.
- 32 Joshi R, & Peiris D. "Task-sharing for the prevention and control of noncommunicable diseases." June 2019. Available at: [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(19\)30161-5/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(19)30161-5/fulltext).
- 33 Miseda M, Were SO, Murianki CA, Mutuku MP, & Mutwiwa SN. "The implication of the shortage of health workforce specialist on universal health coverage in Kenya." December 2017. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5710014/>.
- 34 IntraHealth. "The Case for Frontline Health Workers in Addressing Noncommunicable Diseases Globally." November 2016. Available at: <https://www.intrahealth.org/sites/ihweb/files/files/media/the-case-for-frontline-health-workers-in-addressing-non-communicable-diseases-globally/NCDBrief.pdf>.
- 35 Maher A, & Sridhar D. "Political priority in the global fight against non-communicable diseases." December 2012. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3529321/>.
- 36 Murray C et al. "Global, regional, and national life expectancy for 249 causes of death, 1980-2015: A systematic analysis for the Global Burden of Disease 2015." October 2016. Available at: [http://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(16\)31012-1/fulltext](http://www.thelancet.com/journals/lancet/article/PIIS0140-6736(16)31012-1/fulltext).
- 37 Akselrod S, Bloomfield A, Marmot M, Moran AE, Nishtar S, & Placella E. "Mobilising society to implement solutions for noncommunicable diseases." May 2019. Available at: <https://www.bmj.com/content/365/bmj.l360>
- 38 Mckee M, Haines A, Ebrahim S, Lamptey P, Barreto ML, Matheson D, Walls HL, Foliaki S, Miranda JJ, Chimeddamba O, Garcia-Marcos L, Vineis P, & Pearce N. "Towards a comprehensive global approach to prevention and control of NCDs." October 2014. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4215019/>.
- 39 Pinkney-Atkinson V. "Moving forward, taking NCDs into the SDG era with political will, policy coherence and stewardship." June 2019. Available at: https://www.researchgate.net/publication/334194973_Moving_forward_taking_NCDs_into_the_SDG_era_with_political_will_policy_coherence_and_stewardship.
- 40 NCD Alliance Expert Focus Group Outcomes Report. New Orleans, United States of America. March 2019.
- 41 World Health Organization. "Working together for health – The world health report 2006." 2006. Available at: https://www.who.int/whr/2006/whr06_en.pdf?ua=1.
- 42 Cabri. "Human Resources for Health in Ethiopia." 2016. Available at: https://www.cabri-sbo.org/uploads/files/Documents/case_study_2016_health_dialogue_human_resources_for_health_in_ethiopia_engl.pdf.
- 43 NCD Alliance Expert Focus Group Outcomes Report. New Orleans, United States of America. March, 2019.
- 44 NCD Alliance Expert Focus Group Outcomes Report. New Orleans, United States of America. March, 2019.
- 45 International Labour Organisation. "Tale of a Journey: Migrant Health." Accessed 28 August 2019. Available at: <https://www.ilo.org/global/topics/care-economy/hc-services/lang-en/index.htm>
- 46 International Labour Organisation. "'Care trade:' The international brokering of health care professionals." 2006. Available at: https://www.ilo.org/global/topics/labour-migration/WCMS_068452/lang-en/index.htm
- 47 World Health Organization. "Health employment and economic growth – An evidence base." 2017. Available at: https://www.hhr-rhs.ca/index.php?option=com_mtree&task=att_download&link_id=12054&cf_id=68&lang=en.
- 48 Tweheyo R, Reed C, Campbell S, Davies L, & Daker-White G. "'I have no love for such people, because they leave us to suffer': a qualitative study of health workers' responses and institutional adaptations to absenteeism in rural Uganda." April 2019. Available at: <https://gh.bmj.com/content/4/3/e001376>.
- 49 Labrique AB, Wadhvani C, Williams KA, Lamptey P, Hesp C, Luk R, & Aerts A. "Best practices in scaling digital health in low and middle income countries." November 2018. Available at: <https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-018-0424-z>.
- 50 Balicer RD, & Afek A. "Digital health nation: Israel's global big data innovation hub." May 2017. Available at: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)30876-0/fulltext#back-bib6](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30876-0/fulltext#back-bib6).
- 51 McGrail KM, Ahuja MA, & Leaver CA. "Virtual Visits and Patient-Centered Care: Results of a Patient Survey and Observational Study." May 2017. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5479398/>.
- 52 Armstrong N, Hearnshaw H, Powell J, & Dale J. "Stakeholder Perspectives on the Development of a Virtual Clinic for Diabetes Care: Qualitative Study." March 2007. Available at: <https://www.jmir.org/2007/3/e23/>.
- 53 Esposito J. "Digital health to improve outcomes related to noncommunicable diseases." September 2018. Available at: <https://itpeernetwork.intel.com/digital-health-non-communicable-diseases/#gs.t8df3f>.
- 54 Ashrafzadeh S, & Hamdy O. "patient-driven diabetes care of the future in the technology era." March 2019. Available at: <https://www.sciencedirect.com/science/article/abs/pii/S1550413118305709>.
- 55 Kiberu VM, Mars M, & Scott RE. "Barriers and opportunities to implementation of sustainable e-Health programmes in Uganda: A literature review." May 2017. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5458569/>.
- 56 Safi S, Thiessen T, & Schmailzl KJG. "Acceptance and Resistance of New Digital Technologies in Medicine: Qualitative Study." December 2018. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6299231/>.
- 57 Akselrod S, Bloomfield A, Marmot M, E. Moran A, Nishtar S, & Placella E. "Mobilising society to implement solutions for noncommunicable diseases." May 2019. Available at: <https://www.bmj.com/content/365/bmj.l360>.
- 58 McKee M, Haines A, Ebrahim S, Lamptey P, Barreto ML, Matheson D, Walls HL, Foliaki S, Miranda JJ, Chimeddamba O, Garcia-Marcos L, Vineis P, & Pearce N. "Towards a comprehensive global approach to prevention and control of NCDs." October 2014. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4215019/>.
- 59 Essue BM, & Kapiriri L. "The unfunded priorities: an evaluation of priority setting for noncommunicable disease control in Uganda." February 2018. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5819649/>.
- 60 Essue BM, & Kapiriri L. "The unfunded priorities: an evaluation of priority setting for noncommunicable disease control in Uganda." February 2018. Available at: <https://globalizationandhealth.biomedcentral.com/articles/10.1186/s12992-018-0324-2>.
- 61 Fairall L. et al. "Task shifting of antiretroviral treatment from doctors to primary-care nurses in South Africa: a pragmatic, parallel, cluster-randomised trial." September 2012. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3442223/>
- 62 Yonga, G. "Scaling up care systems: leveraging HIV programs to support NCD services." Accessed July 2019. Available at: <https://www.iapac.org/909090-workshop/presentations/909090tw17-Su1430-Yonga.pdf>.
- 63 NCD Alliance Expert Focus Group Outcomes Report. New Orleans, United States of America. March, 2019.
- 64 NCD Alliance Expert Focus Group Outcomes Report. Geneva, Switzerland. May, 2019.
- 65 Juma PA, Mapa-Tassou C, Mohamed SF, Matanje Mwagomba BL, Ndinda C, Oluwasanu M, Mbanya JC, Nkhata MJ, Asiki G, & Kyobutungi C. "Multi-sectoral action in non-communicable disease prevention policy development in five African countries." August 2018. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/30168391>.

- 66 Kuruvilla S & al. "Business not as usual: how multisectoral collaboration can promote transformative change for health and sustainable development." December 2018. Available at: <https://www.bmj.com/content/363/bmj.k4771#aff-1>.
- 67 Ravelo, J L. "New partnership aims for NCD 'best practices' in conflict, fragile settings." In Devex. 24 April 2018. Accessed July 2019. Available at: <https://www.devex.com/news/new-partnership-aims-for-ncd-best-practices-in-conflict-fragile-settings-92613>.
- 68 World Health Organization. "Noncommunicable diseases." Accessed July 2019. Available at: <http://www.emro.who.int/noncommunicable-diseases/publications/questions-and-answers-on-the-multisectoral-action-plan-to-prevent-and-control-noncommunicable-diseases-in-the-region.html>.
- 69 NCD Alliance Expert Focus Group Outcomes Report. Geneva, Switzerland. May, 2019.
- 70 NCD Alliance Expert Focus Group Outcomes Report. Geneva, Switzerland. May, 2019.
- 71 Dussault G, Kawar R, Castro Lopes S, & Campbell J. "Building the primary health care workforce of the 21st century - Background paper to the Global Conference on Primary Health Care: From Alma-Ata Towards Universal Health Coverage and the Sustainable Development Goals." 2018. Available at: https://www.who.int/docs/default-source/primary-health-care-conference/workforce.pdf?sfvrsn=487cec19_2.
- 72 Nancarrow S A. "Six principles to enhance health workforce flexibility." 2015. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/1478-4491-13-9>.
- 73 Rawal, L B, Joarder T, Islam SM, Uddin A, & Ahmed SM. "Developing effective policy strategies to retain health workers in rural Bangladesh: a policy analysis." 2015. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-015-0030-6>.
- 74 Dussault G, Kawar R, Castro Lopes S, & Campbell J. "Building the primary health care workforce of the 21st century - Background paper to the Global Conference on Primary Health Care: From Alma-Ata Towards Universal Health Coverage and the Sustainable Development Goals." 2018. Available at: https://www.who.int/docs/default-source/primary-health-care-conference/workforce.pdf?sfvrsn=487cec19_2.
- 75 AL-Ruzieh MA, Ayala de Calvo LE, Bosco Bigirimana J, Burg A, Buswell L, Challiunor J, Cummings G, Day SW, Galassi A, Houlahan K, Nevidjon B, Schneider J, Teahon M, So WKW, Were PA, & Williams M. "Strengthening the oncology nursing workforce in low- and middle-income countries to address the growing cancer burden." 2015. Available at: https://cdn.ymaws.com/www.isncc.org/resource/resmgr/publications/White_Paper_Final_Revisions_.pdf.
- 76 Gilmour J, Huntington A, Bogossian F, Leadbitter B, Turner C. "Medical education and informal teaching by nurses and midwives." August 2014. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4217524/>.
- 77 Dolea C, Braichet JM, & Shaw DMP. "Health workforce retention in remote and rural areas: call for papers." Accessed July 2019. Available at: <https://www.who.int/bulletin/volumes/87/7/09-068494/en/>.
- 78 World Health Organization. "Working together for health – The world health report 2006." 2006. Available at: https://www.who.int/whr/2006/whr06_en.pdf?ua=1.
- 79 Bärnighausen T, & Bloom DE. "Designing financial-incentive programmes for return of medical service in underserved areas: seven management functions." June 2009. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2714830/>.
- 80 Dussault G, Kawar R, Castro Lopes S, & Campbell J. "Building the primary health care workforce of the 21st century - Background paper to the Global Conference on Primary Health Care: From Alma-Ata Towards Universal Health Coverage and the Sustainable Development Goals." 2018. Available at: https://www.who.int/docs/default-source/primary-health-care-conference/workforce.pdf?sfvrsn=487cec19_2.
- 81 Schoen J, Mallett JW, Grossman-Kahn R, Brentani A, Kaselitz E, & Heisler M. "Perspectives and experiences of community health workers in Brazilian primary care centers using m-health tools in home visits with community members." September 2017. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-017-0245-9>.
- 82 Bodenheimer T, Ghorob A, Willard-Grace R, & Grumbach K. "The 10 building blocks of high-performing primary care." March/April 2014. Available at: <http://www.annfamned.org/content/12/2/166.full>.
- 83 World Health Organization. "Nursing and midwifery services – strategic directions 2011-2015." 2010. Available at: https://apps.who.int/iris/bitstream/handle/10665/70526/WHO_HRH_HPN_10.1_eng.pdf?sequence=1.
- 84 Schoen J, Mallett JW, Grossman-Kahn R, Brentani A, Kaselitz E, & Heisler M. "Perspectives and experiences of community health workers in Brazilian primary care centers using m-health tools in home visits with community members." September 2017. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-017-0245-9>.
- 85 Dussault G, Kawar R, Castro Lopes S, & Campbell J. "Building the primary health care workforce of the 21st century - Background paper to the Global Conference on Primary Health Care: From Alma-Ata Towards Universal Health Coverage and the Sustainable Development Goals." 2018. Available at: https://www.who.int/docs/default-source/primary-health-care-conference/workforce.pdf?sfvrsn=487cec19_2.
- 86 Tsolekile LP, Puoane T, Schneider H, Levitt NS, & Steyn K. "The roles of community health workers in management of noncommunicable diseases in an urban township." November 2014. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4565048/>.
- 87 Sturke R, Vorkoper S, Duncan K, Levintova M, & Mark Parascondola. "Addressing NCDs through research and capacity building in LMICs: lessons learned from tobacco control." August 2016. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4992672/>.
- 88 Newman PM, Franke MF, Arrieta J, Carrasco H, Elliott P, Flores H, Friedman A, Graham S, Martinez L, Palazuelos L, Savage K, Tymeson H, & Palazuelos D. "Community health workers improve disease control and medication adherence among patients with diabetes and/or hypertension in Chiapas, Mexico: an observational stepped-wedge study." February 2018. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5841495/>.
- 89 Javanparast S, Windle A, Freeman T, Baum F. "Community health worker programs to improve healthcare access and equity: are they only relevant to low- and middle-income countries?" July 2018. Available at: http://www.ijhpm.com/article_3512_041b099498ff46b3655a45303711f323.pdf.
- 90 Balicer RD, & Afek A. "Digital health nation: Israel's global big data innovation hub." May 2017. Available at: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)30876-0/fulltext#back-bib6](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30876-0/fulltext#back-bib6).
- 91 Schoen J, Mallett JW, Grossman-Kahn R, Brentani A, Kaselitz E, & Heisler M. "Perspectives and experiences of community health workers in Brazilian primary care centers using m-health tools in home visits with community members." September 2017. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-017-0245-9>.
- 92 Latulippe K, Hamel C, & Giroux D. "Social health inequalities and eHealth: a literature review with qualitative synthesis of theoretical and empirical studies." April 2017. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5427250/>.
- 93 Weiss D, Rydland H, Oversveen E, Jenson MR, Solhaug S, & Krokstad S. "Innovative technologies and social inequalities in health: A scoping review of the literature." April 2018. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5882163/pdf/pone.0195447.pdf>.
- 94 Balicer RD, & Afek A. "Digital health nation: Israel's global big data innovation hub." May 2017. Available at: [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(17\)30876-0/fulltext#back-bib6](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(17)30876-0/fulltext#back-bib6).
- 95 Koh D. "Ping An good doctor launches commercial operation of one-minute clinics in China." In Mobi Health News. 7 January 2019. Available at: <https://www.mobihealthnews.com/news/asia-pacific/ping-good-doctor-launches-commercial-operation-one-minute-clinics-china>.
- 96 Reveil AD, Wang D, Hamers R, Wood R, Reiss P, Van Sighem A, Johnson M, Ruiz L, Alvarez-Uria G, Sierra-Madero J, Montaner J, Lane HC, & Larder BA. "The application of artificial intelligence to predict response to different HIV therapies, without a genotype: new models for therapy optimisation in resource-limited settings." July 2017. Available at: <https://www.hivrdi.org/pdf/IAS-2017-Paris-RDI-Poster.pdf>.
- 97 Vidal-Alaball J, Royo Fibla D, Zapata MA, Marin-Gomez FX, & Solans Fernandez O. "Artificial Intelligence for the Detection of Diabetic Retinopathy in Primary Care: Protocol for Algorithm Development." February 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/30707105>.
- 98 Varia A. "The promise of digital health in the fight against noncommunicable diseases." In Vital. 6 September 2018. Available at: <https://www.intrahealth.org/vital/promise-digital-health-fight-against-noncommunicable-diseases>.
- 99 Schoen J, Mallett JW, Grossman-Kahn R, Brentani A, Kaselitz E, & Heisler M. "Perspectives and experiences of community health workers in Brazilian primary care centers using m-health tools in home visits with community members." September 2017. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-017-0245-9>.
- 100 Vota W. "How digital health solutions can reduce noncommunicable diseases." 4 July 2019. In ICTworks. Available at: <https://www.ictworks.org/digital-health-non-communicable-diseases/#.XUBBUugzaUI>.
- 101 Frehywot S, Vovides Y, Talib Z, Mikhail N, Ross H, Wohltjen H, Bedada S, Korhumel K, Koumare AK, & Scott J. "E-learning in medical education in resource constrained low- and middle-income countries." February 2013. Available at: <https://human-resources-health.biomedcentral.com/articles/10.1186/1478-4491-11-4>.
- 102 The American Academy of Pediatrics. "The American Academy of Pediatrics & global immunizations." Available at: https://www.sabin.org/sites/sabin.org/files/maldonado_aap.pdf.

- 103 The American Academy of Pediatrics. "The American Academy of Pediatrics & global immunizations." Available at: https://www.sabin.org/sites/sabin.org/files/maldonado_aap.pdf.
- 104 World Health Organization. "Child and adolescent mental health." Accessed August 2019. Available at: https://www.who.int/mental_health/maternal-child/child_adolescent/en/.
- 105 American Academy of Pediatrics. "International Resources." Accessed August 2019. Available at: <https://internationalresources.aap.org/>.
- 106 AstraZeneca. "AstraZeneca Healthy Heart Africa Overview Document." Accessed August 2019. Available at: <https://www.astrazeneca.com/content/dam/az/PDF/2018/HHA%20Updated%20Overview%20for%20AZ%20Global.pdf>.
- 107 Ogola EN, Okello FO, Herr JL, Macgregor-Skinner E, Mulvaney A, & Yonga G. "Healthy Heart Africa-Kenya: A 12-Month Prospective Evaluation of Program Impact on Health Care Providers' Knowledge and Treatment of Hypertension." March 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/31036303>.
- 108 Ogola EN, Okello FO, Herr JL, Macgregor-Skinner E, Mulvaney A, & Yonga G. "Healthy Heart Africa-Kenya: A 12-Month Prospective Evaluation of Program Impact on Health Care Providers' Knowledge and Treatment of Hypertension." March 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/31036303>.
- 109 Ogola EN, Okello FO, Herr JL, Macgregor-Skinner E, Mulvaney A, & Yonga G. "Healthy Heart Africa-Kenya: A 12-Month Prospective Evaluation of Program Impact on Health Care Providers' Knowledge and Treatment of Hypertension." March 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/31036303>.
- 110 AstraZeneca data on file. Total Program Numbers Since Start - as of 31st March 2016.
- 111 AstraZeneca data on file. Total Program Numbers Since Start - as of 31st March 2016.
- 112 AstraZeneca data on file. Total Program Numbers Since Start - as of 31st March 2016.
- 113 AstraZeneca data on file. Total Program Numbers Since Start - as of 31st March 2016.
- 114 Ogola EN, Okello FO, Herr JL, Macgregor-Skinner E, Mulvaney A, & Yonga G. "Healthy Heart Africa-Kenya: A 12-Month Prospective Evaluation of Program Impact on Health Care Providers' Knowledge and Treatment of Hypertension." March 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/31036303>.
- 115 Ogola EN, Okello FO, Herr JL, Macgregor-Skinner E, Mulvaney A, & Yonga G. "Healthy Heart Africa-Kenya: A 12-Month Prospective Evaluation of Program Impact on Health Care Providers' Knowledge and Treatment of Hypertension." March 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/31036303>.
- 116 Ogola EN, Okello FO, Herr JL, Macgregor-Skinner E, Mulvaney A, & Yonga G. "Healthy Heart Africa-Kenya: A 12-Month Prospective Evaluation of Program Impact on Health Care Providers' Knowledge and Treatment of Hypertension." March 2019. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/31036303>.
- 117 AstraZeneca data on file. Total Programme Numbers Since Start - as of 31st May 2019
- 118 Abt Associates. "HealthRise: Improving Care for People Living with Cardiovascular Disease, Diabetes." April 2018. Accessed July 2019. Available at: <https://www.abtassociates.com/sites/default/files/2018-06/HealthRise%20April%202018.pdf>.
- 119 Abt Associates. "HealthRise: An Approach to Help People Survive Treatable Chronic Diseases." 2018. Accessed July 2019. Available at: <https://www.abtassociates.com/projects/healthrise-approach-to-help-people-survive-treatable-chronic-diseases>.
- 120 Abt Associates. "Indian Government Honors HealthRise App with Innovation Award." 20 July 2018. Accessed July 2019. Available at: <https://www.abtassociates.com/who-we-are/news/feature-stories/indian-government-honors-healthrise-app-with-innovation-award>.
- 121 World Dental Federation. "A Great Win for Portugal: Ministry of Health Brings Dentists into Primary Health Centres." 7 November 2018. Accessed July 2019. Available at: <https://www.fdiworlddental.org/news/20181107/a-great-win-for-portugal-ministry-of-health-brings-dentists-into-primary-health>.
- 122 International Association of Physicians in Aids Care. "Multidisciplinary care teams – Report of an IAPAC consultation in Addis Ababa, Ethiopia – December 4, 2011." December 2011. Available at: http://www.iapac.org/uploads/MCTL_Addis_Ababa_Consultation_Report-04Dec11.pdf.
- 123 Novartis. "Novartis Foundation and Partners Launch Innovative Hypertension Program in Vietnam." 17 May 2017. Accessed July 2019. Available at: <https://novartis.gcs-web.com/novartis-foundation-launch-hypertension-program-in-vietnam>.
- 124 Novartis. "Fighting High Blood Pressure in Vietnam." 17 May 2016. Accessed July 2019. Available at: <https://www.novartis.com/news/fighting-high-blood-pressure-vietnam>.
- 125 The Novartis Foundation. "Communities for Healthy Hearts." 2019. Accessed July 2019. Available at: <https://www.novartisfoundation.org/our-work/enhancing-heart-health-low-income-communities/communities-healthy-hearts>.
- 126 IFPMA. "Health Partnerships Director: Communities for Healthy Hearts in Vietnam." 2012. Accessed July 2019. Available at: <http://partnerships.ifpma.org/partnership/communities-for-healthy-hearts-in-vietnam>
- 127 Kumar A. "Tackling High Blood Pressure in Vietnam." In the Guardian. 17 May 2018. Available at: <https://www.theguardian.com/healthcare-network/gallery/2018/may/17/high-blood-pressure-vietnam-world-hypertension-day>.
- 128 PATH. "Communities for Healthy Hearts: Improving Hypertension Management and Control in Vietnam." 2019. Accessed on 13 August 2019. <https://www.path.org/resources/communities-for-healthy-hearts-improving-hypertension-management-and-control-in-vietnam/>
- 129 Global Diabetic Retinopathy Advocacy Initiative. "Integrated care for diabetes and eye health: A global compendium of good practice." Melbourne, Australia, 2018. Available at: <https://www.iapb.org/resources/a-global-compendium-on-good-practice-integrated-care-for-diabetes-and-eye-health/>.
- 130 Sherin A. "National Diabetes action Plan of Pakistan: Needs and challenges." January 2015. Available at: <https://www.kmu.kmu.edu.pk/article/view/15399>.
- 131 Stroke Rehabilitation Center. "About Us & Services." Accessed July 2019. Available at: <http://strokeuganda.org/>.
- 132 Stroke Foundation Uganda. "Who We Are & What We Do." Accessed July 2019. Available at: <http://strokefoundationuganda.org/>
- 133 World Health Organization. "WHO Guideline – recommendations on digital interventions for health system strengthening." 2019. Available at: <https://apps.who.int/iris/bitstream/handle/10665/311941/9789241550505-eng.pdf?ua=1>.
- 134 Sanofi. "The power of diagnosis." Accessed July 2019. Available at: <https://www.sanofi.com/en/about-us/the-power-of-a-diagnosis/testimony-04>.
- 135 Sanofi. "Tackling the Mental Health Care Gap in Myanmar." 10 October 2017. Accessed July 2019. Available at: <https://www.sanofi.com/en/media-room/articles/2017/tackling-the-mental-health-care-gap-in-myanmar>.
- 136 Sanofi. "Corporate Social Responsibility: Access to Health Programs 2018." 2018. Accessed July 2019. Available at: [https://www.sanofi.com/-/media/Project/One-Sanofi-Web/Websites/Global/Sanofi-COM/Home/common/docs/download-center/ATH-programs-2019.pdf?la=en&hash=A6210D2B4FD7F281CB0307488E257D2884787430%20\(consulted%20on%2017%20July%202019\)](https://www.sanofi.com/-/media/Project/One-Sanofi-Web/Websites/Global/Sanofi-COM/Home/common/docs/download-center/ATH-programs-2019.pdf?la=en&hash=A6210D2B4FD7F281CB0307488E257D2884787430%20(consulted%20on%2017%20July%202019)).
- 137 Access Accelerated. "Sanofi Mental Health Program: Fast-Fight Against Stigma." 2018. Accessed July 2019. Available at: <https://accessaccelerated.org/initiative/sanofi-mental-health-program-fast-fight-stigma-myanmar/>.
- 138 Gye KM. "A letter from Yangon, Myanmar." February 2019. Available at: [https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366\(19\)30009-4/fulltext](https://www.thelancet.com/journals/lanpsy/article/PIIS2215-0366(19)30009-4/fulltext).
- 139 American College of Cardiology. "American College of Cardiology Program to Support Cardiovascular Disease Prevention in China." 19 January 2016. Accessed on 17 July 2019. Available at: <https://www.acc.org/about-acc/press-releases/2016/01/19/10/35/american-college-of-cardiology-program-to-support-cardiovascular-disease-prevention-in-china>.
- 140 American College of Cardiology. "Global Education Program on Heart Disease Prevention Expands to 10 Countries." 29 September 2016. Accessed on 17 July 2019. Available at: <https://www.acc.org/latest-in-cardiology/articles/2016/09/28/16/53/acc-global-education-program-on-heart-disease-prevention>
- 141 Pfizer. "2016 Annual Review." 2017. Accessed on 17 July 2019. Available at: https://www.pfizer.com/files/investors/financial_reports/annual_reports/2016/partnering-to-tackle-non-communicable-diseases-ncds/index.html.
- 142 Ko GT, So WY, Tong PC, Le Coguic F, Kerr D, Lyubomirsky G, Tamesis B, Wollthers T, Nan J, Chan J. "From Design to Implementation - the Joint Asia Diabetes Evaluation (JADE) Program: A Descriptive Report of an Electronic Web-Based Diabetes Management Program." May 2010. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/20465815>.
- 143 Yin J, Kong APS, & Chan JCN. "Prevention and Care Programs Addressing the Growing Prevalence of Diabetes in China." December 2016. Available at: <http://dx.doi.org/10.1007/s11892-016-0821-8>.
- 144 The George Institute for Global Health. "A George Institute Factsheet. SMARThealth Extend – Indonesia and North India." November 2017. Available at: <https://www.georgeinstitute.org/sites/default/files/documents/smarthealth-extend-factsheet.pdf>.
- 145 The George Institute for Global Health. "SMART Health Extend." Accessed August 2019. Available at: <https://www.georgeinstitute.org/projects/smart-health-extend>.

- 146 Access Accelerated. "SMARTHEALTH EXTEND." Accessed August 2019. Available at: <https://accessaccelerated.org/initiative/smarthealth-extend/>.
- 147 The George Institute for Global Health. "SMARThealth Extend launched in Indonesia to tackle growing cardiovascular risk." Accessed August 2019. Available at: <https://www.georgeinstitute.org/news/smarthealth-extend-launched-in-indonesia-to-tackle-growing-cardiovascular-risk>.
- 148 Patel A, Praveen D, Maharani A, Oceandy D, Pilad Q, Kohli MPS, Sujarworo S, & Tampubolon G. "Effect of a multifaceted mobile technology enabled primary care intervention on cardiovascular disease risk management in rural Indonesia: a quasi-experimental study." August 2019. Available at: [https://www.research.manchester.ac.uk/portal/en/publications/effect-of-a-multifaceted-mobile-technology-enabled-primary-care-intervention-on-cardiovascular-disease-risk-management-in-rural-indonesia-a-quasiexperimental-study\(845257f2-4430-4f6d-a106-da312b93d490\).html](https://www.research.manchester.ac.uk/portal/en/publications/effect-of-a-multifaceted-mobile-technology-enabled-primary-care-intervention-on-cardiovascular-disease-risk-management-in-rural-indonesia-a-quasiexperimental-study(845257f2-4430-4f6d-a106-da312b93d490).html).
- 149 National Health and Medical Research Council. "\$7 million for international collaborative health research." Accessed August 2019. Available at: <https://www.nhmrc.gov.au/about-us/news-centre/7-million-international-collaborative-health-research>.



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