

Innovations for Universal Health Coverage: A South-South Collaboration to Transform Health Systems in Africa and India

Innovations for Universal Health Coverage Collaboration Report

Public Health Foundation of India, Amref Health Africa,
and Institute of Development Studies



Photos by PHFI and Amref Health Africa



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Can technological innovations enable low and middle-income country (LMIC) health systems in expanding access to effective and affordable health services, for vulnerable populations?



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INNOVATIONS FOR UNIVERSAL HEALTH COVERAGE COLLABORATION

PUBLIC HEALTH FOUNDATION OF INDIA

Priya Balasubramaniam

Neethi Rao, Independent Consultant

Gina Sharma

Pranav Maraganty

TN Sathyanarayana

Special thanks to rapporteurs Neelima and Prashanti, Institute of Public Health, Bangalore

AMREF HEALTH AFRICA

Desta Lakew

Frasia Karua

INSTITUTE OF DEVELOPMENT STUDIES

Gerald Bloom

Ayako Ebata

Karine Gatellier

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Section 1 Introduction

The Public Health Foundation of India (PHFI), Amref Health Africa and the Institute of Development Studies (IDS) have agreed to collaborate in an effort to explore ways that technological innovations can contribute to government strategies for making progress towards universal health coverage (UHC). This means substantially increasing access by those whose basic health care needs are not being met. This report presents the outcome of a meeting held in Bengaluru, India. At this meeting, people with direct experience of different aspects of the development, piloting and taking to scale of technological innovations in India and a number of African countries explored the factors that influence this process.

Many low- and middle-income countries (LMICs) are experiencing rapid interconnected changes that are affecting both health and health systems (Bloom and Wolcott 2013). These include economic growth and integration into global markets, urbanisation, population ageing, and a growing burden of chronic non-communicable diseases and environmental changes that affect health. These changes have been accompanied by changing relationships between governments, for-profit actors, non-governmental organisations (NGOs), and citizen groups. During the post-colonial period, strategies for health system development focused almost entirely on government's role in financing and providing health services. Country health systems have since evolved and have been classified by WHO to consist of six core components or "building blocks" that include: (i) service delivery; (ii) health workforce; (iii) health information systems; (iv) access to essential medicines; (v) financing; and (vi) leadership/governance (WHO, 2010). However, while health systems have progressed in terms of scope and mandate, not all countries have been able to achieve equitable, efficient and affordable health outcomes for all. The limited capacity of many government health services to meet popular expectations and population health needs, due to inadequate resources, poor infrastructure and weak governance, have resulted in the emergence of complex, pluralistic health systems. In these health systems, health care services, medicines and medical advice and information are provided by a variety of non-state actors in terms of their level of training, their mandate (profit or not-for-profit) and their relationship to the regulatory system, as well as by the government health service (Mackintosh et al. 2016). To bridge supply and demand side gaps in health service access, costs and delivery, several low-middle-income countries are responding with radical health innovations with potential to improve the lives of millions that are emerging from a new breed of social innovators. These technology-led models of healthcare increasingly involve low-cost, high quality, socially linked interventions enabling diverse populations to better access and utilise health services. Working with limited resources to meet huge unmet needs, unconventional interventions are attempting to bridge health services and systems level gaps.

At the same time, innovations may have little impact without strengthened public healthcare systems to eventually deliver them at scale. Most countries have made a commitment to make rapid progress towards UHC (WHO 2018, Bristol 2014)). Achieving UHC requires connecting the dots between innovation and delivery where governments need to find ways to engage effectively with all the above actors to ensure that they meet this commitment (Ahmed et al. 2013).

The focus of this report is on the role of government and other stakeholders in ensuring that new technologies and healthcare models are translated into improved access to health services, especially by those with limited access to existing services. Recent developments in information and communications technologies (ICT), diagnostics and therapeutics are creating new opportunities for achieving rapid progress in expanding access to safe, effective, and affordable health services. However, they are also creating new challenges for governments to ensure that these opportunities are seized. A number of small-scale pilots have demonstrated the potential of new technologies to transform health systems, but very few have resulted in major changes at scale (Wilson et al. 2014). This reflects the many factors that influence the translation of specific technological innovations into the large-scale organisational and regulatory changes needed for this kind of transformation (Bloom et al. 2017).

Health system transformation is complex involving amongst other things:

- 1) bundling together discrete services that include diagnostics, evidence-based advice and access to drugs and referral;
- 2) creation of partnerships between different types of organisations such as public and private service providers, drug suppliers, phone operators, IT platforms, and so forth;
- 3) formulation of business models that combine markets, philanthropy, and government funding;
- 4) privacy and government capacity to analyse big data;
- 5) strengthening the regulation of health care, drugs and information technology to ensure that innovations meet the needs of all, including the poor.

Working together with the private sector, philanthropic donors and civil society, governments can strengthen innovation ecosystems and build entrepreneurship capacity to support this kind of transformation.

In a context of rapid change, each actor can have only a partial view of the overall situation. The construction of the kinds of partnership that facilitate large-scale application of new technologies, with sustainable business models and consistent with a UHC strategy requires a lot of experimentation and learning. There are few fora available to facilitate exchanges of information and learning between the actors that need to play a role in transforming the health system.

There is relatively little information available on the health innovation ecosystem in LMICs, despite their growing importance as sources of global innovation. A recent publication by the World Health Organization (WHO 2014) has highlighted the potential role of advanced technology in enabling the achievement of UHC in African countries. India has become a global centre for low-cost health technology innovation, fostering local health innovation hubs as well as attracting the research and development departments of multinational companies that produce drugs and diagnostic devices. Although there is a lot of anecdotal evidence of the growing importance of India, China, Indonesia and Vietnam amongst countries with rapidly growing information technology sectors countries as sources of health-related innovation, there is little systematic information on the types of innovations that have emerged and on the challenges to be addressed in applying them at scale. Nor is there much information on what has been learned about how governments can stimulate innovation, support the adoption of these innovations at scale and create regulatory arrangements to reduce the risk of undesirable outcomes.

In order to bridge this knowledge gap, the Public Health Foundation of India (PHFI), Amref Health Africa, and the Institute of Development Studies (IDS) established the Innovations for Universal Health Coverage Collaboration with the aim of identifying practical approaches for accelerating the integration of technological innovations into strategies for making progress towards the achievement of UHC. They launched this initiative at an event entitled 'Innovations for Universal Health Coverage' in Bengaluru, India, in June 2018, in collaboration with the National Institution for Transforming India (NITI) Aayog and Health Systems Global. The event brought together a wide range of stakeholders in the health innovation ecosystems of India and Africa. Its aim was to scope out the situation and identify priorities for supporting more effective and efficient ways of ensuring that innovations contribute to rapid increases in access to safe, effective, and affordable health services. This report documents the curation process of this event (Section 2), presents the picture that has emerged (Section 3), and discusses the way forward (Section 4).

Section 2 - Organisation of the conclave

There were 150 participants at the conclave, mostly from India and several African countries. They included 33 highly regarded leaders in different aspects of the health innovation ecosystems in India and Africa (see Table 1 in Section 5). The participants included people from organisations with a wide range of perspectives including technology innovators, entrepreneurs from large corporations and small-scale start-up companies, funders of innovation, government departments, research organisations, NGOs, and grass-roots organisations. The conclave was organised with the following aims:

- to build common understandings of the potential for health system transformation and the challenges to be addressed;
- to identify realistic strategies for accelerating the emergence and diffusion of innovations;
- to identify the responsibilities of government and other stakeholder for ensuring that innovations contribute to UHC;
- to agree on future activities for mutual learning.

The conclave was organised as brainstorming sessions on six thematic areas important to the development of appropriate innovations and their adoption to improve the delivery of health services at scale. Each session began with a discussion with a panel of experts, who were asked to avoid lengthy presentations and facilitate discussions around two themes (see Table 2 in Section 5). The thematic areas are outlined below:

1. **Building an enabling environment for catalysing technology-led innovation:** This session focused on how governments, in partnership with civil society and the private sector, can support the development of pro-poor technological innovations and taking them to scale. It explored investment in research and development, support for new kinds of partnership for the delivery of health services and co-construction of regulatory systems.

2. **Stimulating innovations:** This panel explored strategies innovators have taken to finance research and development, and the testing of prototypes. It also explored the influence of financing strategies on the types of innovation that are developed and also how they can potentially contribute to a strategy for making progress towards UHC.

3. **Taking innovations to scale:** The focus of this panel was on the constraints to taking an innovation to scale and on strategies for overcoming these constraints. It explored the innovative

partnerships that have emerged involving different types of organisations as well as the role of government in facilitating or constraining this process.

4. Disruptive models of health-care access and delivery: This session explored innovations that have the potential to challenge traditional ways of organising the provision of health services in public and private sectors and have demonstrated a capacity to be taken to scale. These included new models of primary health-care delivery, demand-side responses to problems with quality of care and innovative approaches for reaching neglected populations at an affordable cost. The discussion focused on lessons from small-scale experiments, challenges identified while taking these innovations to scale, and the changing role of government in integrating these new models into existing health systems along with different ways to regulate these newer actors in health markets.

5. The role of research in social innovations: Digital health has the potential to transform access to effective and affordable health services, but it also could reinforce existing inequalities. The focus of this session was on the role of research in supporting innovation and in formulating and implementing strategies for taking innovations to scale. The panel explored the strengths and weaknesses of current approaches to health systems research by health researchers and business schools to identify the kinds of evidence that would be most useful to governments and other stakeholders in the health innovation ecosystem. The experts also discussed how different kinds of research (technical, health systems, social science, and so forth) can help prepare for the new challenges likely to arise as traditional health systems are disrupted.

6. Business models around innovation: This panel discussed different kinds of social innovation business models, replicability and costs. It also debated the factors that make a public-private partnership (PPP) successful, why health PPPs are often unsuccessful in LMICs, and how increases in government funding for UHC can take these business models into account.

A separate Deep Dive Session for participating innovators was also held on business building, partnerships and investment opportunities based on takeaways from the conclave. Discussions involved how different health innovators could operate in the health system space, as well as the reach to realise scale economies, take proper account of positive and negative spillovers, and design efficiencies to improve health service delivery and uptake.

PHFI, Amref Health Africa and IDS facilitated most of the brainstorming sessions, made notes on the panel discussions and produced this manuscript.

Section 3 - Summary of the discussions

The discussions were rich, reflecting the expertise and wide experience of the panellists and other participants, and they collectively built a picture of the current situation in India and Africa.

3.1 Overview

The first session focused on strategies for rapid adoption of innovative technologies in the health system of a low- or middle-income country. Dr Srinath Reddy, of PHFI proposed the acronym ASSURED: 'innovations that are Affordable, Scalable, Sustainable, Universal, Rapid, Excellent, and Distinctive.' Other panellists stressed that innovators should remember that 'social returns on investments' need to be considered along with financial returns. As one participant put it: the 'model is sustainable only when the doctor feels good about the innovation, the patient gets treated, and families and communities experience wellbeing.' Several panellists emphasised the need for innovators to take into account the realities of low-resource settings such as health worker shortages, lack of electricity, poor governance processes, and other factors that can affect utility and sustainability.

Discussants considered the role of innovative technologies in disrupting health care systems by replacing complicated, expensive products and services with simple, affordable ones. Panellists pointed out that not all disruptive technologies are innovations, and not all innovations are technology driven, but also include system improvements and business model innovations. A disruptive technology, or technological enabler, is a new technology that unexpectedly displaces an established technology, but only if it is accompanied by an innovative business model that enables the successful uptake of that technological intervention. The enabler is a generally cheaper, simpler, smaller, and frequently more convenient to use product or process. Many disruptive interventions like mobile phone or m-health driven initiatives have been embraced by the least profitable and often the poorest populations as well as wealthier as they improve health system efficiency and lower costs.

Disruptive innovations, especially in LMICs, tend to improve a product or service in ways that the market does not expect by being lower priced, improve system efficiencies or they are designed for a different set of consumers. All disruptive or new healthcare models/innovations threaten traditional health models. Consumers across all socioeconomic groups invariably embrace innovations because they represent value savings, convenience, access, quality, or a combination of these.

Discussants explored characteristics of disruptive technologies. It was agreed that it has to provide products and services that are more affordable, and, in the end, better quality. This is more likely to be the case, if the end-users are engaged in development through a process of human-centred design. Retail clinics and low-cost diagnostics for primary health care, for example, are potentially disruptive innovations because they operate outside conventional physician-oriented offices and traditional public health clinics, challenging existing business models of primary care. However, these primary care clinics will need to hone their service, quality, and convenience over time and expand their package of services to become truly transformational.

Innovations that respond directly to service gaps are more likely to be scaled up more quickly. An African participant pointed out the need for greater sharing of regionally and locally developed innovations for addressing epidemics, such as Ebola, that could be used the next time a similar epidemic happens. These include innovations in new vaccines, personal protective equipment, tracking outbreaks, point of care diagnostics tests and innovative biodefense technologies. If plans can aggregate and incorporate newer cost-saving solutions, they are more likely to be accepted; if they do not, the solution, be it hardware, software or process improvement, along with its business model, can fold up and slide into obscurity. In practice, very few innovations have had the kind of impact described above and much of the discussion explored lessons about how to accelerate the development of potentially disruptive innovations and how to overcome constraints to rapid take-up of these innovations.

3.2 Government stewardship of innovation

Panellists agreed that central and local governments need to play an important role in the formulation and implementation of strategies for stimulating innovations for accelerating progress towards UHC. There are no 'off-the-shelf' models for them to adopt but, rather, there is a need for experimentation and learning about effective approaches for strengthening innovation ecosystems and entrepreneurship and ensuring that they contribute to making progress towards UHC.

Dr. Patricia Odero, Regional Director, Africa – Duke Global Health Innovation Center outlined the multiple hats that governments wear as payers, setters of policy and health service providers. She emphasised the need to find mechanisms to turn these functions into a virtuous cycle instead of conflicting roles. Governments need to adapt their approach to promote rapid technological innovation. Government regulation of health care and its allocation of public funds for basic health services can either aid or hinder innovation. Regulatory mechanisms for health systems in both India and Africa are evolving. Governments need to establish more formal regulatory guidelines in

order to ensure quality of care and accountability in both public and private sectors. Appropriate stewardship of health innovations involves the encouragement of markets to develop and disseminate goods and services that have desirable social impacts. Governments also need to be aware of potential problems that can be associated with major technological developments and the creation of new types of partnerships with innovative business models. For example, a conflict of interest could arise if producers and distributors of diagnostic technologies and/or drugs also provide the services that use these products.

Innovators need to understand the patchwork of regulations that can affect a particular innovation, and how and by whom those rules are enacted, modified, and applied. It is also important that government officials have access to information and evidence on health system innovations to enable them to make informed decisions on how to regulate this space as well as consider the type of innovations that can be adopted at scale. The Government of India has recently set-up a health technology assessment (HTA) programme to determine the value of new and existing health technologies and advise on government procurement by state and central levels. Such initiatives hold a lot of promise, even though the linkages between HTA and procurement are yet to be developed.

Governments were called upon to help facilitate diffusion of innovations across sectors such as agriculture, nutrition, sanitation and health, in an era of intersectoral problems and solutions. Innovators asked why there were no multidisciplinary avenues within the government when a number of ministries and departments, such as those for science and technology, rural development, small and medium enterprise, and social justice, had a role to play along with the Ministry of Health and Family Welfare in India.

Innovative technologies can be adopted to accelerate achievement of UHC goals. Producers of such technologies can partner with governments to secure grants or concessions and expand access to care, while governments can work with innovators to ensure consistent supply of innovative technologies and ensure compliance with safety standards.

3.3 Blended Financing for Health Innovations

All stakeholders emphasised the importance of finance. This was especially the case for the relatively small start-up companies. There are funding challenges at all stages of innovation and each require a different approach. For example, once an innovation has passed the proof of concept stage, different actors have a role to play in graduating into the market and/or public sector procurement stage.

In some cases, scale can be achieved through bulk purchasing agreements. One example is government support for scaling-up of vaccine manufacturing in India. One discussant recommended developing public-private partnerships, through which private actors could secure funding from government or other funding bodies to develop their products and bring them to market. Similar purchasing agreements could also be created once the technology is developed. Such public-private partnerships are becoming increasingly popular. Examples include: the Biotechnology Industry Research Assistance Council (BIRAC), the Atal Innovation Mission housed at the National Institution for Transforming India (NITI) Aayog, the Centre for Cellular And Molecular Platforms (C-CAMP), and NGOs like the Tata and Wellcome Trusts and the DBT Alliance - all of whom fund, accelerate and incubate technology-led healthcare innovations at various levels. Several people referred to multi-donor trust funds, set up by the World Bank, which allow national governments to take risks while supporting the development and diffusion of innovations. Advance market commitments may also be used to stimulate innovations, committing resources to support services that address priority areas of need.

Additionally, partnerships between innovators, a blended spectrum of funders, and procurement agencies can finance innovations. Many African countries are experiencing increased investment in early as well as more mature-stage start-ups by private equity investors and large multilateral agencies to foster locally driven innovation solutions.

Importantly, entrepreneurs need to traverse the challenges of early-stage development and funding to be able to become de-risked for investment by venture capitalists and/or government procurement. Discussion included the need to foster entrepreneurial skillsets and solution development to be able to be investment-ready. Panellist Mr. Arvind Chari of Eight Road Ventures lamented the amount of risk he faced investing in companies coming from the Indian innovation ecosystem, as it is still nascent. A gap between early-stage innovations, which have received grant funding, and investment-ready ventures was identified. This gap is an opportunity for growth and development in the ecosystem as venture money is ready and interested to be investing in solutions coming from India and African markets.

Innovators can use funding sources, such as BIRAC or other government schemes (e.g. Technical Development Goal by the Indian government), for product development, and collaborate with grass-roots organisations and NGOs to advocate for procurement of innovative services. Once the innovation is launched, innovators need to consider pricing strategies that reflect the value of the product to the patients/consumer, including subsidising poor patients through profits from richer consumers. It is important for government-supported innovators to concur on a common

strategy to use technology-based innovations and healthcare models to prioritise access to poorer populations that need them the most. Expansion strategies also need to address the nature of health-care products where consumers (i.e. patients) do not possess information about the product as much as suppliers (information asymmetry).

3.4 Role of research

There was general recognition of the degree to which the development of innovations, their adoption at scale, and the creation of institutional arrangements that encourage the provision of wide access to safe, effective and affordable health services, requires a learning approach. Research can play an important role in analysing the application of innovative technologies and disseminating lessons learned. However, this will need to involve a wide range of expertise including health systems research, engineering, design, business administration and public policy, for example. New approaches will be needed to create research partnerships that combine these disciplines and avoid fragmentation engendered by different professional backgrounds. Governments and donors need to invest in creating a long-term ecosystem that promotes research and researchers of many different kinds.

While panellists emphasised that multi-sectoral research was needed to determine whether an innovation delivered/transformed healthcare delivery, a key challenge was the lack of institutional capacity to undertake research that determines what works and what doesn't among the plethora of new ideas/innovations that are being developed in India, Africa and other low-middle-income countries undergoing health system transitions.

Governments and other purchasers of innovations can use research to determine their value and develop mechanisms for scaling-up useful ones. While India, South Africa and other countries are developing capacity to conduct health technology assessments, simultaneously there is a need for

multiple kinds of data to support such analyses. Think tanks and research institutes also need to address the qualitative outcomes of innovation and implications for society that innovators are unlikely to address (e.g. has a particular innovation contributed to poverty reduction?). Independent think tanks may also help raise awareness about the merits and demerits of particular technologies.

Innovators are hungry for research involving big data analysis to identify patients' demands, and embedded research that uncover the successes and failures of the process of innovation, scale-up and consumer use. Embedded research and robust monitoring and evaluation programmes that reveal what works and why on the ground are essential for innovators, funders, governments, and citizens. A collaborative platform and database of innovations and innovators should be created to facilitate South-South partnerships, identify competitors, and help enable expansion into new markets.

Governments can play an important role in participating and fostering innovation exchange platforms like these, which could enable policy makers to:

- a) amalgamate existing health technologies;
- b) classify the types of innovations (e.g. biomedical vs. service related vs. process led innovations);
- c) work with diverse stakeholders, including civil society, to embed and bundle health technologies to better serve existing health system gaps in primary and secondary care;
- d) monitor impact of innovations and pilots for scale and;
- e) structure more inclusive regulatory frameworks that are predictable, context-dependent, nimble and fair in considering issues like data privacy, data asymmetry and patient rights.

A considerable amount of health technology innovation is driven by access to high-quality data. Technological gains, however, should not come at the expense of patient privacy, which is a fundamental and inalienable right. Regulation should not try to balance innovation and privacy, but instead promote appropriate innovation that is based on respect for privacy and user control. Privacy engenders trust, and is, therefore, key to unlocking meaningful innovation. Any thoughtful regulation that enhances trust will also redirect innovation toward privacy-protecting practices.

Researchers participating in the event also pointed out that the needs of end users can vary widely among states in India or countries in Africa and therefore research should be contextual and the results of such research should be used mindfully. Research should also be protected from succumbing to buzzwords or 'sensations' in the health-care market or global donor community and instead focus on the local contexts where the research is conducted. Comprehensive, contextually rooted data sets will allow differential priority-setting and local action for UHC.

Issues around privacy, data integrity and research ownership were also raised and acknowledged as tricky problems, especially where private entities were concerned.

3.5 Challenges to innovation

Medical innovation can be a highly contested area of decision-making, where clinical evidence, technical attributes of the technology and data on cost-effectiveness only partially influence implementation. Often, innovators focus on product development and are preoccupied with sustaining or scaling their businesses or technologies. Diffusion of these products, however, is affected also by broader contexts, such as stakeholders' interests, the political climate, and public expectations. Inadequate awareness of these issues can inhibit adoption of these products, particularly if they fail to address other barriers to accessing health care, develop community-specific marketing and distribution strategies, or integrate monitoring and evaluation. These challenges can be addressed by linking innovators to other stakeholders that are involved in transforming a national health system.

Only some technological innovations accomplish their intended use, as originally meant by the designer, and others 'could drift' into alternative applications (WHO 2010). Integration of innovation into national health schemes, such as rural health mobile technology, digitized health records collection and biometric mapping, could facilitate resource redistribution (human, financial, and infrastructure), broaden access to health care and increase efficiencies. One example in India is the potential for incorporating low-cost health technology innovations into the ambitious Ayushman Bharat, or National Health Protection Scheme (NHPS). The NHPS aims to cover over 100 million vulnerable families (approximately 500 million beneficiaries) on the Socio-Economic Caste Census (SECC) database and provide health coverage up to INR 500,000 (approx. US\$7,104) per family per year. Public-private partnerships (PPPs) can help accelerate adoption of innovative technologies. For example, ReMeDi is a telemedicine based e-health solution for screening, primary diagnosis and triaging for rural health involving digitised health records and biometric mapping. iKure is a cloud-based healthcare delivery platform that has created an integrated network of rural health centres through its hub-and-spoke clinics connected by a Wireless Health Incident Monitoring System technology that helps track its trained health workers through the smartphones they use. Both these companies work extensively with local state governments in India. Similarly, the partnership between Seven Seas Technologies and the Ministry of Health in Kenya has contributed to scaling-up innovations coming from small and medium enterprises (SMEs). Amref Enterprise LEAP and mJalli tools are being used in partnership with governments in Kenya and South Africa to train health workers while collecting data from mobile phones.

The innovation 'ecosystems' in India and African countries are relatively young and require continuous and collaborative support from many stakeholders, including the government, the private sector, foundations and civil society. Conclave participants pointed to a number of areas that national and local governments, in particular, need to address in order to accelerate innovation for UHC. These include:

- Review policies to drive market competition, such as requiring three quotes for procurements. A novel solution cannot be purchased by government if it does not have two other comparable products/services to meet the three quote requirement; reimbursements; price caps;
- reduce the bureaucratic burden of effective partnership;
- evaluate and directly purchase innovations with social impact;
- provide and ensure high-quality data that innovators require for product development;
- develop quality standards for health-care goods and services;
- provide political support for innovators as an important contributor for UHC;
- promote accountability and patient rights;
- accelerate innovation through facilitating innovation finance and tackle corruption.

These points were also discussed in the context of effective partnerships. All of these items need further investigation as to the exact mechanisms to achieve these objectives

Some of the barriers many newer models of technology-driven primary/secondary healthcare delivery face include the ability to be accepted and to distinguish themselves from traditional health service providers in both public and private sectors. Challenges include consumer perceptions about health-care products, lack of health-care professionals, and financial sustainability. Implementation is the wicked problem of scaling innovations and requires support from a variety of actors. Start-up companies especially tend to be disconnected from the ground realities with poor understanding of regulatory mechanisms and market competition.

Process innovations have their own set of challenges. Convincing the public sector that innovative models are not only viable but help bridge important capacity gaps in health-care provision can be an uphill battle. The ability to be part of an aggregated and integrated care model envisioned by the state is important for purchasing or contracting of services from these process innovators. These challenges may be overcome by building onto an already-existing local system of health care and/or needs. For instance, dementia care services demanded by senior citizens were matched with competent workforce and sensors to support them constantly.

The role of embedding health innovations (both low-cost technology and new models) in primary care settings was keenly discussed. Shortage of health-care workers and limited capacity of local health systems were mentioned as a major hindrance to UHC. As a result, innovators from Africa and India stressed the need to innovate and invest more robustly in primary health-care delivery. Areas like low-cost diagnostic care, technology-linked and -led drug supply and vaccine transportation chains, franchisee-based urban primary care clinics, and primary health centres, run by allied health professionals using telemedicine were discussed as examples. In India, for instance, NHPS can incorporate newer technologies and innovative models in the design and implementation in the national scheme.

Innovators and technology investors reflected on how successful assessments and pilots could lead to broad procurement in both regions, and more nimble funding of procurement cycles. Time is of essence in the lifecycle of an innovation in its bid to hit the market. A very long duration between different stages in the innovation lifecycle (such as, Proof of Concept, Health Technology Assessments and Business Model Assessment, Procurement) could kill younger companies. There is a critical need to make this process smoother, transparent, and faster across country settings. This is also true regarding various grant or financial assistance cycles involved.

Innovations frequently face regulatory and certification challenges. For some diagnostic devices, for example, there are no labs available in India to test their performance. This significantly increases development, testing and certification timeframes along with costs, hugely reducing a health innovation's ability to be affordable or competitive. This aspect in health technologies needs to be addressed from both an industry and government perspective if we are to seriously encourage indigenous technologies.

While funding was recognised as one of the biggest challenges to scaling-up of innovations, it can be mitigated by developing a partnership that includes different kinds of funders. Small-scale start-up companies face special challenges in financing different stages of innovation, starting from product development to procurement. Therefore, start-up companies may face higher transaction costs in securing all necessary funding than large companies. Section 3.3 describes some innovative partnerships that small-scale start-ups have developed for financing innovation.

Partnerships, although indispensable, can be complicated by disparate rules and practices governing participating stakeholders, differing innovation capacities among implementing partners, and resistance to adopting innovative technologies by some health care professionals, medical bodies, and governments. If successful, partnerships can allow innovators to access entities in charge of product procurement (e.g. local governments, NGOs, global manufacturers). Panellists repeatedly pointed out that innovators need to understand much more than just their own innovation. Each step in the process of innovation brings its own layer of complexity. Successful innovators actively engage the community and tailor their innovations to the world-view of the end user.

Section 4 - Ways forward

4.1 Some considerations in moving forward

The discussions emphasised the need to take into account three issues: (1) multi-stakeholder partnerships involving diverse disciplines and sectors; (2) demand-focused innovations that address and meet existing health-care needs on the ground; and (3) changes in government regulations regarding innovative health-care models and technologies. Table 3 in Section 5 outlines the details of panel discussions categorised under these three themes.

The importance of diverse partnerships and cross-sector communication was seen to be crucial in addressing opportunities and challenges in transforming health systems. One big contribution of the event was to bring together stakeholders who play different roles in scaling-up innovations for UHC. These included investors, innovators, managers, policymakers and end-users of health-related innovations. Because most innovations addressed at the event were technology-based, participants came from various technical backgrounds, including engineering, medicine, business, technology, and health. The event participants normally had little interaction with each other and they welcomed the interactions facilitated by the event. Such communication needs to be sustained and maintained, and participants expressed their hope that national governments would foster communication platforms to meet this need.

Panel discussions identified opportunities and challenges for partnerships that can contribute to various aspects of innovation: scaling-up, identifying needs of the communities and patients, seeking funding opportunities, monitoring the success and failure of innovations and pilots, and evaluating the impact of low-cost health innovations in improving public health outcomes.

Partnerships that include NGOs and grassroots organisations can help innovators become familiar with community-level needs. This, in turn, can help them develop innovations that are widely demanded and more easily scaled-up. A partnership between innovators and these grass-roots organisations can contribute to UHC. On the other hand, research institutions have the skillsets to evaluate innovations in relation to health impact, making progress towards UHC, and long-term business viability. Such information can help innovators, NGOs, and policymakers to make faster progress towards UHC.

Governments face challenges in adapting their approach to promote rapid technological innovation. Government regulation of health care and its allocation of public funds for basic health services can either aid or hinder innovation and it can influence whether it meets the needs of the majority or only the better-off. It is important for innovators to understand the extensive network of regulations that may affect a particular innovation, and how and by whom those rules are enacted, modified, and applied. It is also important that government officials have access to information and evidence on health system innovations to enable them to make informed decisions on how to regulate this space as well as consider the type of innovations that can be adopted at scale.

Finally, panel discussants recognised opportunities and the importance of mutual learning between India and African nations. Health systems in India and Africa are different from those in more mature economies. While the current UHC agendas tend to be set by donors, these agendas are unlikely to be sustainable or successful in the Indian and African contexts. In both contexts, process-oriented innovations were seen to be as important as technology innovations. This points to the importance of logistics, infrastructure, and user experiences in achieving UHC. In addition, it was noted that innovations from Indian and African markets can feed into developed economies, as well. Innovations in low-resource settings are by necessity designed for value – the consideration of quality over cost –, which is not necessarily the case in more developed and expensive health systems like the United States (US). The US healthcare system has only recently started to shift towards value-based care as costs skyrocket and nearly one in four federal dollars is spent on healthcare. Elegant and affordable innovations developed in India and Africa could have a large market to serve in the US and beyond. Multinational companies (e.g. GE, Philips, etc.) may have these platforms for learning across countries as they operate in multiple settings.

4.2 Addressing challenges

The two-day event initiated a discussion about the potential of technological and organisational innovations to contribute to the transformation of health systems and attainment of UHC in India and Africa. The exchanges of information and insights from people working in very different types of organisations provided a unique opportunity to build a picture of recent developments and some of the challenges to overcome. It became clear that most participants have in-depth, but partial, views of the overall situation. For example, many technology innovators had relatively little knowledge of the health system, while health system experts had only a limited grasp of the technological possibilities. This illustrated the need for broader partnerships and ongoing opportunities for the kind of exchanges the conclave began. This could contribute significantly to the co-construction of

supportive institutional arrangements. PHFI, Amref Health Africa and IDS through the Innovations for UHC Collaboration agreed to serve as facilitators for future such dialogues, and play a role in the monitoring, evaluation and assessment of innovations across regions. The Innovations for UHC Collaboration could facilitate the much needed bridging between policy makers and multiple stakeholders across the innovation and health system spectrum.

In Africa, regional healthcare federations, as well as the Africa Healthcare Federation, bring together private sector actors, allowing them to speak with one voice. These platforms engage on a regular basis with the public sector, NGOs, and other healthcare stakeholders. Given the unique nature of the “south-south” collaboration via the innovation conclave, there may be an opportunity to have this platform as a standalone one that brings together broader multi-stakeholder geographic collaboration focused on new models of health service delivery and access, systems strengthening and UHC.

One topic that will benefit from ongoing consultations is the need for national and state governments to play an active role in supporting the emergence and diffusion of innovations and creating an appropriate regulatory framework. The panel discussions identified a number of issues that need to be addressed by national governments (see Section 5, Table 3), but we did not discuss the details of how governments are going to achieve these. For example, panel discussions proposed that national governments find ways to facilitate the inclusion of innovative products and models of service delivery in their procurement strategies. However, it did not clarify how the government should judge what innovations are ‘successful’, how often such an evaluation needs to happen, and what consequences this may have on, for instance, people’s livelihoods, corruption, or the innovation ecosystem (i.e. the efficiency of the system). This underlines the need for future conclaves that explore specific topics in more detail.

Likewise, there was little discussion of the roles of other actors. For instance, producing high-quality data, protecting it, and making it available for innovators was discussed as the government’s role. However, private actors possess a wealth of information based on their monitoring and evaluation, and market research. Which data is considered a public good, and which a private good, was not sufficiently discussed during the event. Similarly, the role of data sharing and access, and how various forms of health data could be made available to all stakeholders (patients, implementers, innovators and the government) was another area that could have been better explored. Discussions of this issue will be crucial in developing policies that enable health system innovations while protecting personal data of patients and health-care workers.

Some participants pointed out that there should be more discussion of gender in the health innovation space. Women play a prominent role - formally and informally - in the way health services are delivered and accessed in many countries, often forming the bulwark of community-driven health care. Discussions emphasised that the impact of gender roles within the context of society or an organisation can lead to big differences in the opportunities that men and women have to contribute to the innovation process. When designing health solutions, women's voices must be included in human-centred design for health solutions, and engaging end-users in the development of innovations. It is not only the right thing to do from a gender equity standpoint, but it is the financially smart thing to do to ensure the innovation designed meets the needs of 100% of the end-users, not just the portion that are men. This will mean better product-market fit and ultimately increased revenues. As innovation ecosystems are developed, providing women access and opportunities to enter into the field is critical to develop a robust start-up economy.

Because health systems are complex and many actors play a role in transforming them, conversations initiated at this two-day event can help link technology innovators that are entering the health markets in India and African countries to regulators and research institutions. It is unclear what innovations have been successful at the local level, under what conditions these innovations can be scaled-up, what are inhibiting factors, and how all relevant players, including - but not limited to - government institutions, can work together to achieve UHC.

The meeting participants identified a number of actions that can be taken to accelerate the emergence and adoption of innovations to increase access to safe, effective, and affordable health care. They include:

- Create mechanisms for ongoing consultations between different actors in the health innovation ecosystem to stimulate the flow of information, foster the formation of partnerships as well as a learning approach for the co-construction of appropriate institutional arrangements. Participation should be extended to include government officials with responsibility for making progress towards UHC and for health security, including disease emergence and antimicrobial resistance. Future meetings should focus more narrowly on specific issues to enable in-depth exploration.

- Work with institutions in India, such as the Department of Health Research and National Health Systems Resource Centre (NHSRC) with their work on Health Technology Assessments, in:
 - o identifying innovations (products, processes, technologies);
 - o connecting private sector innovators to the National Healthcare Innovation Portal (<http://www.nhinp.org/>) which was established by the NHSRC and National Health Mission, Ministry of Health, Government of India;
 - o evaluating the social value and impact of health innovations and developing linkages to enable uptake into state health programmes.
- Provide assistance to institutions like NITI Aayog in bringing together sectoral partners for embedding health innovations in proposed national health schemes and in the design of primary health- care services in urban and rural geographies.
- Strengthen sources of information on promising innovations for use by other actors in the innovation ecosystem. This could build on existing databases with this kind of information.
- Support efforts by governments to strengthen their capacity to accelerate development and diffusion of innovations with the potential to improve access to safe, effective, and affordable services, and to create a regulatory framework to reduce the risk of undesirable outcomes from innovation. This will involve consultation with all relevant stakeholders. There are no off-the-shelf models to adopt so a learning approach will be needed.
- Support research and development of new technological solutions and of ways to take proven innovations to scale. This could involve financial arrangements for sharing the risks of this kind of experimentation.
- Currently too much emphasis is placed on screening programmes without a lot of attention on how to follow-up with a management plan for patients screened at-risk. The Innovations for UHC Collaboration can enable a dialogue on how health technologies can contribute to furthering care continuums with multiple stakeholders within health systems.
- Support the establishment of research consortia that bring together a range of expertise including technology, business, health systems research and social sciences to contribute to the assessment of innovations and the integration of appropriate innovations into strategies for accelerating progress towards UHC. These partnerships may involve working with government and private companies.
- Organise meetings for mutual learning and potential partnerships between India and Africa involving key stakeholders from participating countries that include government officials, public health system leaders, innovators and large companies in the health innovation space.

- Some specific comments related to the role of health technologies in India's Ayushman Bharat Health Scheme and investment in primary health care through the Health and Wellness centres include:
 - o In embedding local technologies in the newly announced Wellness Centres, and in hospitals for Aayushman Bharat, a comprehensive bottom-up approach is required (identified by looking at the top causes of mortality and morbidity and systems level access gaps). The approach would involve a needs-gaps assessment followed by a comprehensive search for locally or regionally driven technologies that address these need gaps and then understand what other elements would be required to make these technologies successful (such as training, monitoring, etc.). Initial pilots could be conducted with sectoral partnerships to evaluate these technologies and determine their success. One suggestion is to create a "challenge list" of the top need-gaps, and ask innovators to submit products and technologies that have demonstrated success (through initial clinical and benchtop testing) in addressing these needs.
 - o Another way in which technologies can be effectively deployed at the primary healthcare level in Wellness Centres is to take an integrated systems approach. This would involve identifying a suite of technologies that can in combination address key health challenges at this level. The creation of a technology-based integrated health platform (with training, deployment and ongoing monitoring) could be implemented as a pilot in high-impact districts before national roll-out.

4.3 Next steps and agreed actions

1. Present a review of the conclusions and ways forward to key stakeholders in India and Africa;
2. Since the conference, the Innovation for UHC collaboration has facilitated a discussion of the conclusions and ways forward at a Satellite Session organised by the Private Sector Working Group at the Health Systems Global Symposium in Liverpool in October 2018;
3. Organise a multi-stakeholder meeting at a side session of the Africa Health Agenda International Conference (AHAIC) in Kigali in March 2019 and an Asia Innovations Stakeholder Summit in April 2019
4. Formulate a concrete action plan on how the Innovations for UHC Collaboration (between PHFI, IDS, and Amref Health Africa) can play a role in domestic country settings and seek funding to implement it. (e.g. monitoring and evaluation of pilots, working with regulatory bodies, as sister states in being able to assess and procure innovations for health service access and delivery).

Section 5 Appendix

Table 1 List of panel speakers

Session title	Panel speakers	Africa	India
Inaugural session	Shri. (Dr.) Vinod K. Paul, (Member) National Institute for Transforming India (NITI) Aayog, Government of India - <i>Conference Chair</i>		X
	Nalinkanth Golagunta (CEO, General Electric India)		X
	K. Srinath Reddy (President, Public Health Foundation of India)		X
	Desta Lakew (Director Partnerships, Amref Health Africa)	X	
	Githinji Gitahi (CEO, Amref Health Africa)	X	
	Shri. Alok Kumar, Advisor Health, National Institute for Transforming India (NITI) Aayog, Government of India		
	Madan Krishnan (Vice President and Managing Director, Medtronic)		X
Enabling environment	Alok Kumar (Advisor Health, NITI Aayog)		X
	Patricia Odera (Regional Director, Africa – Duke Global Health Innovation Center and Innovations in Healthcare)	X	
	Frasia Karua (General Manager, Amref Enterprises Limited)	X	
	Arun Venkatesan (Chief Technology Officer, VILGRO Innovations Foundation)		X
	K. Srinath Reddy (President, Public Health Foundation of India)		X
Stimulating innovation for UHC	Ms. Desta Lakew, Director Partnerships - Amref Health Africa	X	
	Michael Macharia (Founder and CEO, Seven Seas Technologies)	X	
	Meshack Mbinda (Lead, Research and Development, Amref Enterprise)	X	
	Dr Charles Immanuel Akhimien (Co-founder MOBicure, Nigeria)	X	
	Sameer Savarkar (CEO, Neurosynaptic Communication Telemedicine)		X
	Sirshendu Mukherjee (Mission Director, Biotechnology Industry Research Assistance Council)		X
	Sujay Santra (CEO, iKure Techsoft)		X
Disruptive innovation	Session Moderator: Priya Balasubramaniam (Senior Public Health Scientist, PHFI)		X
	Farid Fezoua (President and CEO, General Electric Healthcare Africa)	X	
	Andile Tihoaele (Founder, Inforcom)	X	
	Naresh Malhotra (Founder and CEO, Family Doctor Chain)		X
	Anant Kumar (Founder and CEO, Life Circle Health Services)		X
	Ajay Nair (Managing Director, Mera Doctor and Paycillin)		

Table 1 Cont'd.

Session title	Panel speakers	Africa	India
Taking innovations to scale	Session Moderator : Mr. Ravi Kaushik, Country Business Director, Medtronics		
	Trymore Chawurua (Deputy Director, Ministry of Health and Child Care, Zimbabwe)	x	x
	A. Kowsalya (Consultant, Department of Neuro Ophthalmology and Vision Centre Clinical Incharge Aravind Eye Care System, Madurai)		x
	Tapan Mukherjee (Senior Health Advisor, Kolkata Municipal Corporation)		x
	Taslimarif Saiyed (CEO and Director, Centre for Cellular and Molecular Platforms)		X
	Sandra Butler (Senior Manager, Global Business Strategy CAMTech)	X	X
The role of research in social innovations	Session Moderator: Dr. Gerald Bloom, Institute of Development Studies, Sussex	x	x
	Dr Kranti Vora (Additional Professor, IIPH Gandhinagar)		x
	Sarang Deo (Associate Professor, Indian School of Business; Executive Director, Max Institute of Healthcare Management)		x
	Eddine Sarroukh (Head of Research, Philips Research Africa)	x	
	Raj Jutley (Founder and Chairman, Pan Africa Heart Foundation)	x	
	Judith Maye (Integrated Health Services Lead, IBM)	x	
Business models around innovation	Session Moderator: Satya Prakash Dash (Director Impact Lab, PATH)		x
	Guhesh Ramanathan (Founder and CEO, Excubater)		x
	Siraj Dhanani (Founder and CEO, Inn Accel Technologies)		x
	Arvind Chari (Partner, Eight Roads Ventures)		x
	Donika Dimovska (Senior Program Director, Innovation Results for Development)		

Deep dive session speakers

- Dileep Magsuli (Chief Technology Officer, GE Healthcare)
- Mohammad Ameer (Senior Consultant, Healthcare Technologies, National Health Systems Resource Centre, Ministry of Health and Family Welfare, Government of India)
- Aleck Dhliwayo (Information Systems Manager, Population Services International, Zimbabwe)
- Somen Saha (Assistant Professor, Indian Institute of Public Health, Gandhinagar, PHFI)
- Dheeman Vaidya (Director, Medtronic, India)
- Dr Neethi Rao (Honorary Associate, Institute of Public Health, Bengaluru)
- Pranav Maranganty (Head, Health Technology, PHFI)

Table 2 Curation method for the Innovation for UHC

Session	Session title and questions to be addressed by the participants	Q.
Day 1		
Session 1	<i>Building an enabling environment</i>	
	What is the role of government in supporting pro-poor health system transformation?	2,4
	Are there examples of effective collaboration between government, civil society, and the private sector in supporting innovation for UHC?	2,4
Session 2	<i>Stimulating innovations</i>	
	How can different types of funders accelerate health system innovation?	2,3,4
	Who is responsible for ensuring that innovations meet the needs of the poor?	3,4
Session 3	<i>Taking innovations to scale</i>	
	Why have so few innovations changed access to health services by the poor at scale?	1,4
	What factors can contribute to success?	1,4
Session 4	<i>Disruptive models</i>	
	What innovations have the greatest potential for health system transformation?	1,4
	What challenges do governments face in ensuring that disruptive innovations contribute to UHC?	1,3,4
Day 2		
Session 1	<i>The role of research</i>	
	What kinds of research are needed to support an acceleration of innovation for UHC?	2,3,4
	How can the fragmentation of research activities be overcome?	1,3,4
Session 2	<i>Business models</i>	
	What are the most likely ways that innovations for UHC can be financed at scale?	1,4
	What new kinds of partnership are emerging to deliver access to health services at scale?	2,3,4

Table 3 Outputs of the Innovation for UHC event

Cross-cutting themes	Opportunity/ challenge
1. Partnerships among governments, funders, for-profit organisations, NGOs, and citizen groups	
To disseminate the innovations: For instance, national governments can purchase successful innovation in scale and incorporate the innovation into national health systems transformation schemes.	Opportunity
To understand community needs: Partnerships allow innovators to identify already-existing mechanisms and innovations in a particular local context. This allows the innovators to feed into them, which likely respond to existing needs and therefore be successful. E.g. cost reduction of diagnostic tools that are widely utilised by CHWs is more likely to succeed than introducing toolkits that local CHWs do not have experiences, or needs, utilising.	Opportunity
For funding: Different kinds of funders (national and international governments, private equity funds with social impact quota) in a partnership can fund different stages of innovation (e.g. product development, product procurement) at different risk levels. Likewise, such a partnership can address issues specific to start-up companies who face different funding challenges from large multinational companies.	Opportunity
For monitoring and evaluation: Partnership including research organisations can enable innovators, funders, and governments to monitor the progress of health systems transformation and learn from past experiences.	Opportunity
For public health: Partnership can help incorporate public health interventions to private access to health through innovations. E.g. low-cost eye treatment that combines curative and preventive aspects helped reduce burdens of repetitive health care for both patients and health systems in India.	Opportunity
To address health systems constraints: Shortage of medical personnel can prevent diffusion of innovations and may be addressed through a partnership with medical schools.	Opportunity/ challenge
The effective working of partnerships can be constrained by bureaucratic burdens, lack of policy support, and corruption.	Challenge
2. Demand-based innovation development	
To accelerate innovation up-take: Innovations that respond to existing needs are likely to be disseminated widely and quickly.	Opportunity
To understand correct business models: Pricing needs to consider how patients perceive product quality based on prices. Expansion strategies need to address the nature of health-care products where consumers (i.e. patients) do not possess information about the product as much as suppliers (information asymmetry).	Opportunity/ challenge

Cont'd.

Table 3 Cont'd.

Cross-cutting themes	Opportunity/ challenge
3. Change in government regulations and roles: Government as a facilitator of innovations, not innovator	
Drive competition in the market.	Challenge
Purchase successful social innovations and scale them up.	Challenge
Provide, protect and ensure the quality of data that accelerate innovation.	Challenge
Set quality standards for health-care products; set long-term care models.	Challenge
Provide political support for innovations for UHC.	Challenge
Modify regulatory arrangement to accelerate innovation.	Challenge
Enable financiers of innovation to invest in health innovation.	Challenge
Tackle corruption within government systems.	Challenge





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