# Strengthening Health System Resilience through Telehealth & Data Innovations: What We've Learned from COVIDaction Resilient Health Systems

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Cover image: A Child Health Worker conducts a breath count test using the Smarthealth app to assess a sick child for pneumonia (Photo Credit: Living Goods)

# Introduction

The COVID-19 pandemic has highlighted the need for strong and resilient health systems that can respond to emerging crises, while maintaining essential health services and quality of care. Indeed, as the World Health Organisation has found, over 90% of countries surveyed experienced some disruption to essential health services, as a result of the pandemic.

This paper seeks to share key principles around how telehealth and data innovations can be used to support more resilient health systems. Findings are based on the learnings of the COVIDaction Resilient Health Systems (RHS) program, which tested a new way of rapidly supporting innovators to strengthen health systems, in response to the pandemic.

Our findings have demonstrated that unlocking resilience through innovation is a collective effort. Consequently, we hope that the findings here are of interest to a range of actors operating within health ecosystems, including innovators, policymakers and funders of health innovation.

# What is COVIDaction RHS?

COVIDaction Resilient Health Systems (RHS) is a UK Foreign Commonwealth & Development Office (FCDO) funded program that was designed to explore the role of technology and innovation in supporting countries to build resilient health systems as they respond to the COVID-19 crisis. The initiative tested a new way of quickly getting funding to technology innovators with the potential to help address health system challenges and contribute to increased health system resilience in response to the pandemic.

A resilient health system is defined as one that has the ability to predict and identify shocks, absorb and respond to shocks in a timely manner, and adapt and transform to meet new needs while maintaining its essential functions and services. It is a system that can prepare for and effectively respond to crises, and that is working towards improved performance in both bad times and good, particularly with respect to its public health functions. Often some adaptation and transformation of service delivery may be required.

From mid-2020 through mid-2021, nine innovators received funding and technical assistance through the COVIDaction RHS program. The program sought to leverage technology and innovation to change the delivery models of health services and enable

prevention, health promotion, health education, surveillance, and service delivery. Innovations focussed on two key areas - telehealth and data.

## Telehealth innovations

Are innovations which provide access to health services via digital and telecommunications technologies. COVIDaction RHS supported innovators who used telehealth innovations to extend the reach of health services and commodities, as well as health information, to communities and households that lacked access to these services. This included telehealth innovations that helped patients to better understand, monitor and manage their own health.

## Data innovations

Are innovations which improve the collection, quality, availability and use of data. RHS supported data innovations that improved the quality and efficiency of data collection, and enhanced interoperability and integration of existing information systems. These solutions sought to support improved quality of care and to 'join-up' data, so that it could be used more effectively by decision makers and healthcare professionals. RHS also supported innovations that helped increase the availability of community data, to better support intelligence and surveillance of diseases, as well as confidence in COVID vaccines. These innovations aimed to empower decision makers to more effectively identify and react to early warning signals within their health systems.

# Findings: Four Ways Telehealth and Data Innovations can Increase Health System Resilience


Diagram: Four approaches for resilience in health systems

## 1. Improved Access & Continuity

Even before the pandemic, many health systems - especially in low- and middle-income countries - struggled to reach vulnerable and disadvantaged populations that face significant financial, geographic, or social barriers to accessing care. With the emergence of COVID-19, these barriers were exacerbated by lockdowns, travel restrictions, and overcrowding of health facilities. This, combined with the erosion of public confidence and trust in the health system, further constrained access to and continuity of essential health services, from maternity care, to routine vaccination, to access to treatment for chronic conditions and communicable diseases such as HIV and tuberculosis.

## How can innovation enable access to and continuity of essential health services?

Telehealth innovations that adapt models of service delivery can help overcome access barriers and ensure continuity of essential health services - including while health systems are experiencing shocks. Across the RHS portfolio, we observed two key ways in which innovators achieved this while supporting vulnerable and disadvantaged populations including last-mile populations, blighted urban communities, refugees, and beyond.

### Point of access

Innovation and technologies can facilitate a shift in the locus of health service delivery from brick-and-mortar facilities to households and communities, moving services closer to where people can easily access them. This can entail remote or virtual access to care via phone or telemedicine applications that extend the reach of services into the hands of individuals - especially those that live in remote areas or face other barriers to access. Low-tech and low- or no-cost innovations, such as toll-free call centres through which individuals can utilise a direct line to a health provider, have proved highly valuable in the context of the COVID-19 pandemic, especially during lockdowns. Other innovators have experimented with higher-tech health applications that remotely connect individuals to health providers via their smartphones.

Sometimes, however, the physical, rather than virtual, point of health service delivery also needs to shift. Within RHS, we also observed innovations that focused on improved provision of services within remote or vulnerable communities, leveraging other health system actors such as digitally-enabled pharmacists and community health workers to act as the point of care.

### Process innovation

In addition to shifting the point of access for health services - whether virtually or physically - innovators can also support and test creative process innovations to further enhance access to and continuity of care. Combining telehealth innovations with processes such as remote triage and emergency vehicle dispatch can help to identify those in urgent need of care and enable them to access in-person services. When partnered with facilities such as clinics, hospitals, or pharmacies, telehealth services can also support users to find quality in-person care and even help to manage bi-directional referrals.

## Case Study: Wheels for Life

RHS worked with Wheels for Life to address critical transport and access barriers for vulnerable pregnant women in Kenya, shifting the point of access. Since its launch in April 2020, Wheels for Life has provided teleconsultation and emergency transport services to over 58,000 women, demonstrating its potential to help fill this critical gap in the health system and change the point of access for care. During their time with COVIDaction, Wheels for Life also began to experiment with engaging women at earlier stages of pregnancy, rather than at the point of emergency. In doing so, they found even more potential to offer health information via their call centre and act as an entrypoint to the health system, connecting pregnant women to early antenatal services to further enable access and continuity of care.

Tending to a patient in a Wheels for Life ambulance (Photo Credit: Wheels for Life)

## Case Study: Digital Prevention, Care & Treatment (D-PCT) platform

RHS supported a team at the Infectious Diseases Institute (IDI) at Makerere University in Uganda to transform the delivery of HIV and tuberculosis services. Their platform, Digital Prevention, Care & Treatment (D-PCT), helps to ease congestion and overcrowding on health facilities - problems that were exacerbated as a result of the pandemic. The platform provides vulnerable HIV and TB patients with improved and

safe access to services, including the ability to schedule access to clinical support and directly access health information via a computer-operated call centre leveraging Interactive Voice Response technology. Through working with COVIDaction RHS, IDI were able to build a stock management module into the platform, which supports patients to request their medication is delivered to local pharmacies enrolled with the solution, further reducing overcrowding in healthcare facilities.

A randomised controlled trial of the platform showed that D-PCT had several positive impacts on its users, including better adherence to appointments, improved utilisation of offered health information, and most notably, an improvement in overall quality of life. Since working with RHS, D-PCT has reached approximately 4,000 people living with HIV.

A pharmacist dispensing HIV drugs at one of the private pharmacies in Kampala
(Photo Credit: Infectious Diseases Institute at Makerere University)

## 2) Democratisation of Healthcare

In many countries, populations - especially those in rural or remote areas - do not have access to readily available health information and are ill-informed or unprepared to deal with health issues. With the emergence of the COVID-19 pandemic, the need for an

effective way to deliver health information to the population became even more urgent - both to inform the public and curb the spread of misinformation. Beyond the provision of health information, individuals - especially those with chronic health issues - need a way to self-manage their conditions and support their health, even when access to health services is limited.

## How can innovation support the democratisation of health care?

Beyond simply increasing access to health services, innovative technologies can empower individuals with information and tools that allow them to take responsibility for their own health, helping to democratise health care. Through RHS, we observed two key ways in which innovators are promoting the democratisation of health care: first, through disseminating health information to populations; and second, by enabling self-management of health through digital health education and tools.

### Health information

mHealth and telehealth technologies offer the opportunity to disseminate health information to the population in timely, readily accessible ways. mHealth platforms that leverage low-tech SMS messaging and toll-free hotlines can help to reach lower-income, remote populations that may not have access to smartphones. More complex smartphone applications can blend health information provision with education and telehealth. These platforms and applications empower their users with health knowledge–from facility contact details, to health tips, to the locations of testing and treatment sites,  to child vaccination schedules, to information on disease symptoms and presentation. In the context of COVID-19, access to such information has been critical for empowering the public to lower infection rates and prevent deaths.

### Self-management of health

Beyond the provision of health information, mHealth and telehealth technologies can also provide tools that empower people to successfully manage their own conditions, increasing health literacy and improving health behaviours. Some mHealth platforms–including those that function on basic phones–offer tools for self-screening for certain diseases or conditions. Others combine sets of virtual and digital tools for individuals to use in managing their health and conditions, such as telemedicine, interactive voice response tools, and treatment adherence and appointment reminders. More advanced platforms may also utilise technologies such as chatbots powered by artificial intelligence and machine learning. These virtual means of support can make a critical difference in empowering people to manage their own health, especially those with chronic conditions or diseases like HIV who are especially vulnerable in the pandemic context.

## Case Study: Source Code

During its engagement with RHS, Source Code transformed their Pensa *660# platform into a primary source of health information for citizens of Mozambique, especially rural and bottom-of-the-pyramid populations, and enabled the collection of targeted data for Mozambique's government. Pensa is a multi-channel and bi-directional mHealth platform that is available free-of-cost on all telecom operators and accessible to people living in rural areas and with low tech phones. It provides health information such as facility contact details, maternal and child health information including vaccination schedules, and information on disease symptoms and presentation, empowering users with health knowledge. Alongside access to information, it can also offer self-screening, providing patients with greater opportunities to understand and manage their own health.

Recently, Source Code utilised Pensa to conduct a vaccine hesitancy survey, designed to support the Ministry of Health's decision-making around vaccine rollout. In the future, Source Code plans to continue delivering these services to the government and Mozambique's citizens, playing a key role in combating the pandemic and helping to connect people to essential health services.

The Source Code team at their headquarters in Maputo (Photo Credit: Source Code)

## Case Study: mDoc

RHS also supported mDoc Healthcare, a web- and mobile-based digital solution that offers holistic support and enables self-care for people living with chronic disease in Nigeria. mDoc creates a virtual ecosystem of support by connecting users to a multidisciplinary team of practitioners via SMS and telehealth services; offering access to tele-education and health information via a chatbot powered by artificial intelligence and machine learning; maintaining a comprehensive electronic health record; managing bi-directional referrals and leveraging; its partnerships with health

clinics, hospitals, and pharmacies to help users find quality in-person health care. In combining these tools, mDoc Healthcare enables individuals to successfully manage their own health and conditions. In the context of COVID-19, mDoc now also offers platforms to empower people with knowledge, hotlines, and a directory for testing and treatment sites, helping to prevent deaths and lower infection rates.

Members reviewing their personalised action plan on the mDoc platform (Photo Credit: mDoc)

## 3) Enhanced Health Workforce Efficiency & Capacity

Throughout the COVID-19 pandemic, we've seen how health systems can be quickly overwhelmed. During an acute crisis, high patient volumes and facility overcrowding can prevent health workers from providing routine care or responding to other needs. Since before the pandemic, health workers have often faced a "double burden" of data collection, reporting, and other administrative tasks that limit their time to provide health services. In some countries, health workers spend nearly half their time on data-related tasks, despite critical health workforce shortages.

## How can innovation support enhanced efficiency and capacity of the health workforce?

In addition to providing direct services to beneficiary populations, telehealth and data technologies are often multi-faceted or include innovations that can improve health workforce capacity to efficiently and effectively deliver high-quality health services, even in times of crisis.

### Demand management

In the previous sections, we described how telehealth technologies and process innovations can help to shift the point of service and ensure access to and continuity of care. These innovations also have cross-cutting effects on health providers: by shifting the first point of contact away from facilities that may be overcrowded or overwhelmed, they contribute to a process of virtual triage and demand management, lessening the burden on facility-based services.

### Task shifting

We've also seen how telehealth and digital technologies can help to shift the physical point of service from facilities to households and communities, leveraging other health system actors such as trusted pharmacists and community health workers. This "task shifting"- or the redistribution of specific tasks from highly qualified health workers to health workers with shorter training and fewer qualifications - can help make more efficient use of human resources for health available in communities and ensure provision of essential health services.

Task shifting, especially through community health workers or volunteers, has been ongoing for many years - but digital technologies are now helping to support these health workers and better connect them to the formal health system. Local pharmacists equipped with telehealth technology, for example, can help to facilitate a virtual first point of contact between community members and primary care physicians. Digital tools can help community health workers to conduct high-quality health assessments, connect them to resources, facilitate bi-directional referrals with health facilities, and ensure that the data they collect is effectively integrated into national health information systems.

### Capacity development

Related to task shifting, many innovators focus directly on health workers and other health system actors as their end users, combining technology with capacity development approaches. In addition to the task-shifting support described above, telehealth providers often offer training or e-learning modules to participating health providers that aim to

capacitate them to deliver high-quality and evidence-based telemedicine, including skills such as listening and patient empathy.

## Time efficiency

All of the above concepts linked to telehealth technologies and innovations - from demand management for in-person services, to task shifting, to capacity development approaches - have the potential to contribute to improved efficiency of the health workforce. Across the RHS portfolio, we also saw the potential of data-related innovations to help improve efficiency. Administrative tasks related to data collection and reporting are often burdensome on health workers, but innovations that streamline and digitise the reporting process can unlock health workers' time, allowing them to focus on delivering health services.

### Case Study: mCARE and Digital Hospital

mCare and Digital Hospital, a digital health project based in Bangladesh designed to transform pharmacies into health hubs where local pharmacists can virtually connect their clients with primary care and specialist doctors, close to home and free of cost. In doing so, mCare and Digital Hospital are shifting demand away from facilities that may be overcrowded and overwhelmed. The platform also offers capacity development through an e-learning application for pharmacists. To its patients, it offers a mobile phone based information system that enables patients to receive SMS reminders and prescriptions. The partnership plans to scale the platform to greater numbers of both rural and urban pharmacies.


An orientation on mCare and Digital Hospital for pharmacy owners (Photo Credit: Concern Worldwide)

## Case Study: Smart Paper Technology

RHS supported the Shifo Foundation and Medical Teams International's implementation of Smart Paper Technology. The hybrid paper-digital solution scans and processes smart paper forms - simplified versions of existing paper forms that are automatically digitised at scanning stations. The system generates individual health records using unique identifiers and integrates with Uganda's national health information systems. The benefits of the Smart Paper solution include improved quality of data and electronic health records, and improved time efficiency, as health workers have more time to dedicate to delivering essential health services to patients, rather than focusing on administrative tasks.

A health worker plotting the graphs with key performance indicators automatically generated by SPT System (Photo Credit: Shifo Foundation)

## 4) Generation of Data & Evidence

Many countries face challenges in measuring the performance of their health systems, whether from a lack of data, poor data quality, or fragmented data that prevent health system managers and decision-makers from obtaining a comprehensive picture of their health system. We know that you can't improve what you can't measure. Without reliable, high-quality data, efforts to identify gaps and take action for improvement may not be prioritised to where they can have the most value.

## How can innovation support improved generation of data and evidence to support decision-making?

By improving data collection, system interoperability, and generating targeted evidence, telehealth and data innovations equip decision-makers and health system managers with the information they need to support informed decision-making, prioritisation, and action for improvement.

### Improved data collection

Technology and innovation can help to streamline and improve data collection, whether by training health workers to collect data digitally through smartphone applications, streamlining and digitising facility-based reporting processes, or collecting patient-level data via telehealth applications and creating comprehensive electronic medical records. This can have a positive impact on patient care and health workers' time and efficiency and can result in higher-quality data, ensuring that routine data are available to facility and health system managers to enable effective performance management and identify areas for improvement.

### System interoperability

Health information systems are often fragmented, with different components or systems owned by various institutions or actors, which makes it difficult for health system managers and decision-makers to access and use the data they need. Data and telehealth innovators can help to address this by integrating into and promoting interoperability between existing health management and information systems and their own digital platforms and technologies. Even innovations that are focused on direct service delivery via telehealth are often linked into national health management and information systems to generate high-quality data.

### Targeted evidence generation

Data innovators have great potential to help governments and other health system actors to generate targeted data and evidence that can help inform decision-making and planning - including in times of crisis. During the COVID-19 pandemic, we've seen how innovators have used their mHealth platforms and innovative surveying technologies to generate timely evidence on issues such as public trust in the health system, vaccine confidence and uptake, and collection and reporting on COVID-19 symptoms. When designed in collaboration with decision-makers who will use the data to inform policy and planning, these targeted data collection efforts can be a powerful tool for responding to crises and strengthening the health system over time.

## Case Study: Living Goods

With support from RHS, Living Goods' Smart Health application improved the capacity of Kenyan community health workers to deliver essential health services and supports the national community health digitization agenda by enabling community health workers to conduct digital health assessments, use SMS messaging, and conduct follow-ups and relevant referrals. The Smart Health application can help to ensure that they can continue to safely work remotely or with adjusted in-person protocols. It also supports notonly improved community-level data collection and disease surveillance, but also the timely integration of data into Kenya's health information system.

Living Goods is promoting system interoperability by working with the Kenyan government to integrate the Smart Health application into the national electronic Community Health Information System.

A CHW in Kenya enters data into her smart phone using a guided assessment on the Smart Health app to diagnose a sick child (Photo Credit: Christian Bobst)

## Case Study: Vaccine Confidence Project (ASSURE)

Assessing Signals and SUpporting REsilience (ASSURE), is a health system risk monitoring and evaluation system, developed by the Vaccine Confidence Project, designed to provide health decision makers with the information they need to monitor changes in public confidence in health systems or interventions, and make proactive decisions. ASSURE contains tools that collect structured and unstructured data (including subnational weekly surveys), as well as analysis tools for identifying and presenting trends and insights.

In partnership with RHS, Vaccine Confidence Project embarked on a proof of concept, starting in Nigeria, to deliver analysis tools for policymakers that will help them to identify early warning signs relating to public confidence in health systems. This has included testing tools that precisely geo-map instances of healthcare misinformation, as well as tools for forecasting immunisation rates. The Vaccine Confidence Project intends to scale the approach more widely within Africa.

# 5 tips for innovators on how best to support technology innovations for resilient health systems

Unlocking health system resilience through innovation is a collective effort, and requires different actors, such as innovators, investors, and policymakers, to play a range of roles. Over their time working with us, RHS COVIDaction innovators shared the following lessons and recommendations for other innovators or supporters of innovation, interested in developing and implementing innovations in support of health system resilience.

## 1) Start with local needs, priorities and problems.

This means conducting research with end-users, such as patients or health service providers, asking non-leading questions, and understanding their needs. Design decisions should be informed by 'real' user needs, rather than 'assumed' user needs.

It also means understanding the needs, priorities and constraints of health system policymakers and funders and ensuring innovations align with policy priorities and respond to demands and gaps in the broader health system. This means conducting analysis into the underlying causes behind problems within local health systems and finding solutions which tackle those problems in unique context-specific ways.

*"One of the things that the COVIDaction Resilient Health Systems team taught me is to look at a problem like it's a leaf on a tree. Follow the branches down until you get to the root cause, and then solve it from the roots up."*

Dr. Jemimah Kariuki, Wheels for Life.

As several of our RHS Innovators found, in the context of COVID-19 it meant identifying what gaps in provision would emerge as resources and capacity were diverted towards fighting the pandemic, and delivering solutions to address these gaps.

## 2) Think about integration early on while recognising scale is a longer-term endeavour

This means recognising that while piloting and scaling takes time and iteration, there is a need, even at an early stage, to engage with health system stakeholders and understand how best a solution might integrate within an existing context of processes, systems and policies. Engaging stakeholders early on allows innovators to understand needs and constraints and avoid unnecessary work, including simplifying or streamlining an innovation so that it can be integrated into existing systems.

The Shifo Foundation demonstrated this while implementing a new 'Smart Paper Technology' solution into health clinics in Uganda, where they discovered the initial solution would not work, and needed to be adapted to align with the existing system.

*"We understood that the best solution is the one that is closest to the existing system and utilises the strengths of that existing system."*

Rustam Nabi, Director of the Shifo Foundation

## 3) Prioritise reliable, sustainable funding and business models

This means identifying sustainable business models and sources of funding for your innovation and avoiding a dependency on any unreliable and infrequent sources of funding.

It can also mean acknowledging the limited fiscal space within existing health systems for new innovations and delivering something that works in this context.

*"When you bring a solution you have to make it cost-effective…it has to be super affordable so that the government can sustain it by itself. So many health systems are donor-funded, but what happens when that donation stops? These systems need to stand up by themselves."*

Rustam Nabi, Director of the Shifo Foundation

## 4) Focus on the cultural shifts, not just the technical solution

This means identifying what else needs to change in a system, beyond the technology itself, for a given solution to work, including processes, mindsets and incentives. To this end, the COVIDaction RHS team developed behavioural design tools to support innovators in identifying behavioural barriers for their innovation and potential solutions.

Innovators like mCare and Digital Hospital recognised the need for behaviour change in order for patients to get used to the idea of visiting pharmacy health hubs. To support this, they provided training to key staff so that they developed the same empathy and listening skills that patients would expect to receive from health sector professionals.

## 5) Measure health and system impacts of technology and innovation

This means developing a monitoring framework, generating data and evidence that helps you to learn what works (and doesn't work), being able to adapt, as well as make a convincing investment case to health system stakeholders.

While changes to health systems do not come quickly and can be expensive (and time consuming) to evaluate, consider adopting a Theory of Change approach in order to identify different levels of activities, outputs and outcomes that might together lead to broader health system outcomes and impacts. In the shorter term, identify and monitor nearer term intermediate system outcomes - such as outcomes related to strengthening relationships, processes, capacity and performance within the health system.

# Call to action

If you are interested in learning more about the work of COVIDaction Resilient Health Systems, or want to collaborate and share learning on data and telehealth innovation, please get in touch!

Please contact us at hello@frontiertechhub.org.

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