Pillars of strength
How embedded research supports resilient health systems in Mozambique
It was a Thursday evening when the skies darkened, the winds picked up and Cyclone Idai made landfall in Mozambique. The winds that hit the districts of Beira and Búzi on 14 March 2019 swept through the district at speeds of up to 230 km/h. They wrenched mature coconut trees up by the roots and threw them around.

Heavy rain lashed down, adding to the chaos. According to the World Meteorological Organization, “months’ worth of rain fell in a matter of hours”. The ground was already saturated from previous wet weather, which compounded the problem.

After the cyclone came the floods.

As the water rose the effect was catastrophic – homes were destroyed, crops were wiped out and families were displaced. Hundreds of people lost their lives.

The health sector jumped into action, clearing out and cleaning up health facilities while caring for those who were affected and doing what it could to prevent potential disease outbreaks.

Watch "Cyclone Idai makes landfall" at https://youtu.be/v_7F-foswfg
Chapter 1: First responders
While Cyclone Idai hit the international headlines, Mozambique has long had to respond to environmental disruption. Idai is not the worst cyclone to have afflicted Mozambique. That dubious honour goes to Cyclone Eline in 2000.

The health sector is a critical first responder at times of crisis – dealing with the emergency phase and the longer-term health impacts that can be triggered by emergencies. The health system, and the people who staff it, showed incredible resilience during Idai and in the months following the disaster.

Watch "First responders" at https://youtu.be/eHNf8k574gg

"Just before the cyclone, I moved all our books and records to prevent them being destroyed."

Mrs Joana João, MCH Nurse, Bura Health Facility, Búzi
A resilient system is one that can make sense of the challenges being faced and act strategically. Environmental emergencies, economic crashes, abrupt political transitions, conflict and war, the mass movement of people, disease outbreaks and other unanticipated shocks – these are things that can strike at any time and in any context. The health system needs to be ready.

Health workers, the people who manage them and the researchers who work alongside them in Sofala province, and the districts of Beira and Búzi, were on the frontline of the health system during Idai. Despite being cut off from the capital – with impassable roads and a wrecked telecommunications system – managers sprang into action, organizing and coordinating health workers and their communities.

Watch "Resilience" at https://youtu.be/TanAWAZIALg

Their stories provide lessons on resilience. They explain how the creation of a culture of learning through embedded implementation research – research undertaken in close collaboration with policy-makers, health workers and communities on practical challenges that they are facing – can strengthen systems and facilitate more effective and timely responses, not just in times of crisis, but also in response to the day-to-day challenges of providing services in under-resourced and capacity-stretched settings.
Chapter 2: The health system
When Mozambique became independent from Portugal in 1975, there were only 30 doctors in the country. The new government created a system that was held up as a model of good practice. It focused on making health care free, expanding services to all and strengthening preventative care.

But, from 1977–1992, Mozambique experienced civil war that undermined the infrastructure, personnel and financing of the system. The war took a heavy toll. Attacks on the health system and health workers were a feature of the conflict. Post-conflict, Mozambique was one of the most aid-dependent countries in the world, with high rates of HIV, tuberculosis and malaria, as well as poverty.

From this starting point, the government has built the modern system that exists today.

“One of the aspects of a strong health system is the existence of a clear structure that's able to implement the strategic vision,” explained Dr Quinhas Fernandes of the Ministry of Health. “There are also some weaknesses, and in my opinion, I think the biggest one is that we have insufficient numbers of human resources for health within the country. Health workers cover only around 60%-70% of the population.”

Dr Quinhas described a framework of six pillars to paint a picture of how the health system, including the Ministry of Health, is structured and organized. Each of these pillars corresponds to the health system building blocks identified by the World Health Organization: human resources, information and research, service delivery, medicines and technologies, financing, and governance. These pillars support the provision of primary health care, which is care that is provided close to where people live and that meets their needs.

In addition to the pillars, health systems also comprise power dynamics, management structures, knowledge, communication and information sharing and values.
SIX PILLARS OF THE MOZAMBIQUE HEALTH SYSTEM

Governance
management and accountability

Finances
funding availability and allocation

Service delivery
accessibility, affordability and acceptability

Human resources
recruitment, retention, development and deployment

Information systems
data quality, analysis, dissemination and use

Medicines & supplies
accessibility, quality, efficacy and cost-effectiveness
As Provincial Chief of the Public Health Department for Sofala, it’s Dr Graciana Pita’s job to implement government policy at provincial level.

Dr Graciana manages the health facilities, providing technical support and supervision, monitoring progress and supporting change. It’s a big job with many challenges especially in districts recovering from a cyclone.

Watch "Health systems challenges" at https://youtu.be/bmRLroBc690
That there are too few health care workers echoes throughout the stories told in Beira and Búzi districts. There are also weaknesses in the other pillars of the health system that hinder progress. The routine data collected at facilities is of variable quality. This affects facility decision-making and also hampers health system governance higher up the management chain. Until recently, staff struggled to understand and use data to solve problems in service delivery. As a result, they couldn’t always forecast what medicines, materials and other resources were needed to properly implement policies.

In light of these challenges, the Ministry of Health teamed up with Health Alliance International, Beira Operations Research Centre (CIOB) and the Mozambique National Institute of Health to devise an embedded research project. It supports nurses and their supervisors to collect and use data, enhances their management skills, structures and relationships, and fosters local innovation and decision-making.

While it is locally known as the "Doris Duke" or "Duke" project after the Doris Duke Charitable Foundation, which funds it along with the Ministry of Health, its formal name is the Integrated District Evidence to Action (IDEAs) programme.
Chapter 3: Embedded research
“The problem is that frontline health care workers are producers of data, but not users. In the IDEAs programme, data is shared with the producers, and they can make their own decisions and plan for the future.”

This is the very succinct explanation of the programme given by Dr Sergio Chicumbe, the National Director for Health Surveys and Observation at the Mozambique National Institute of Health.

Watch "Collecting data" at https://youtu.be/ZKjV18Xwv_0

The IDEAs programme strengthens the health system’s resilience by increasing staff’s comfort with data, building supportive teams, fostering ownership and responsibility and empowering health workers so that they can act independently. It uses embedded research processes to create evidence that is led by local stakeholders and can be fed into daily practice as well as providing lessons for a wider audience.

While there are many health issues that need attention in Mozambique, the IDEAs programme focuses on maternal and child health.

Dr Quinhas described the impact of maternal and child deaths on society:

“I know perfectly what it means for a typical family that has three to four kids to lose a mother. Normally, a mother’s death in the Mozambique context is an omen of death for the children that remain. The woman is a pillar that keeps the family stable. To me, it is hard to accept that a woman that does everything she can to sustain a pregnancy, at the end of nine months, can give birth and lose the baby.”
“There are a lot of services that have to be offered by the Maternal and Child Health Programme. It’s key to the success or the survival of a population, and because there are too few maternal and child health nurses, this is one of our biggest challenges,” explained Dr Graciana.

Dr João Luis Manuel of CIOB is a partner on the ground in Beira. His offices are situated within the Ponta-Gêa Hospital. Dr João Manuel’s eyes gleam at the subject of data. “We want to transform the evidence that is produced locally into action to improve services and performance”, he emphasizes.

**Good data put to good use lies at the heart of this programme.**

It all begins with Dr João Manuel’s team at CIOB. They are responsible for conducting data quality assessments at the beginning of the research cycle. They assess whether the data that the facilities collect are consistently inputted, how complete they are and whether there are discrepancies between written and electronic records.

The IDEAs programme trains health workers in research, improving their ability to analyse data. Managers are encouraged to review maternal, newborn and child health data to identify priority problems and their causes. Using this analysis, frontline workers create micro-interventions and action plans to prompt change. These are implemented and monitored.
Watch "From data to action" at https://youtu.be/zhnzfQ1RDH4

Strengthening management and supervision is also central to the programme, and District Performance Review and Enhancement Meetings (DPREMs) are a chance for facilities to share their plans with managers and policy-makers and get inputs from their peers. This is followed up by regular supervision, twice a year, to ensure accountability and to support facilities that need extra help.

The embedded research has certainly made a difference to data quality. At the beginning of the process, the reliability of the data was at 56.3%, but, by the end of four years, the routine data matched audited data 87.5% of the time.

The benefits have reverberated throughout the health system in terms of strategic planning, appreciation of data and its utility, stronger systems of communication and more supportive and regular supervision.

Mrs Muanda Pinho, Provincial Maternal and Child Health (MCH) Supervisor for Sofala province, can see the impact in her day-to-day work:

“"The IDEAs programme is important because it brings implementation to the facility level. It helps nurses to have a vision about what's happening at their health facility, and they're able to develop a plan to implement it. In these districts, we're able to reduce neonatal and maternal ill-health, and we're improving the treatment for the challenges that we see."
Mrs Anatércia Estevão Chaendepe and Mrs Joana João have known each other for a long time now. They are MCH nurses at Barada and Bura health care centres respectively.

They have been involved in the research programme for many years, using the skills that they have developed in data analysis and strategic planning to improve maternal and child health. Before the research-driven IDEAs program, they did collect data, but in the absence of strategies to change practice, problems lingered. “We didn't talk about data before the IDEAs programme the way that we're talking about it in the data review meetings. We didn't talk about it, and we didn't make an action plan,” Joana explained.

Watch “Implementing action plans” at https://youtu.be/buy3oDTpiF0
Not only was this bad for their patients, but they felt a sense of frustration at the lack of movement and progression. Anatércia felt a sense of transformation through the embedded research:

“In the beginning of the data review meetings, I didn't understand the importance. I just went to present what I was doing. But over time I was able to... take advantage of collecting the experiences of others to combine it with my experiences and do beautiful work. I felt good because I feel like, since the beginning of the meetings, my data keeps improving and my work keeps improving a lot.”

She was also struck by how useful feedback from supervisors was in keeping her on track and supporting her when things go awry. Supervisors were putting themselves in her shoes. “They don't just sit there and tell us what to do,” says Joana. “They see patients to feel what we feel. If there is something that isn't good, they organize themselves and then they come back.”

Watch "Reviewing the data" at https://youtu.be/-zc3LKxbpdc

The skills and systems developed during the embedded research process were invaluable when Idai hit.
Chapter 4: After the cyclone
Responding to Cyclone Idai required strategic planning and the management of health staff who were spread out around the district. The health care workers in Búzi District are the responsibility of Dr Assane Abdala. He works from the main district hospital and was back in post right after the cyclone to coordinate efforts. His office is a large tent typically associated with conflict settings or refugee camps. These tents are still in use months after the disaster because of damage to hospital buildings.

He explained how strong management was key to the response:

“During the emergency there was a need for the management team to go to all the health facilities so that we could do the follow up. When we moved around the health facilities, we identified those that needed a lot of help, and we communicated this to the Provincial Directorate of Health. They informed the other partners what the needs were.”
Staff in the health system were agile in planning and execution, reacting and adapting to the evolving situation.

Directly after the cyclone, the health system was dealing with emergency admissions while trying to maintain regular services. Many health facilities were destroyed, making it difficult for patients to reach services and for staff to cater to their needs. Infrastructure was damaged. “All the roads were blocked, there was no communication, there was no network, there was no electricity,” explained Dr Assane.

Health staff used boats along the swollen river to transport both patients and letters to the higher-level provincial hospital services.

Watch "Working with partners" at https://youtu.be/ZUuMLQLZig8

“The data is important because it allows us to evaluate how we work in the future.”

Mrs Faustina da Graça Azarías, District MCH Supervisor, Büzi
While dealing with what was immediately in front of them, managers were also thinking of the future health hazards that might befall communities. The destruction caused by the cyclone was only the first part of the problem. The floods and subsequent lack of clean drinking water threatened to cause an outbreak of cholera.

Using data to guide these decisions was of paramount importance. Mrs Faustina da Graça Azarías works as a Maternal, Newborn and Child Health Nurse Supervisor in Búzi. She rushed to health facilities to try and save equipment and data collection logbooks before they were ruined by the floods. In an unpredictable moment, she was sure that data would be important in planning for the future.

Watch "Rescuing the data" at https://youtu.be/6lQbbYngszo

Dr Graciana said that at district level:

“We wanted to avoid another catastrophe like an epidemic because we knew that during this cyclone there was bad sanitation and there was no [clean drinking] water. That's associated with cholera outbreaks. So, we had to be there. If we weren't there, probably there would have been a lot of people that would have been sick. ... More than 6,700 people got cholera, but we had very few deaths.”

The districts of Beira and Búzi – along with Dondo, Nhamatanda which were also very affected by the cyclone – put in place an unprecedented cholera vaccination campaign to reach the most vulnerable. It reached more than 800,000 people in one week, thanks in part to the reliability of the data that the teams had been collecting, and saved many lives.
Indeed, figures from the World Health Organization show a cholera case fatality rate of around 0.01% in the aftermath of Cyclone Idai. Compared to 1998, when there was a major cholera outbreak in Beira that affected more than 40,000 and had a fatality rate of 3.2%, the response in this challenging situation was a significant improvement.

**New cholera cases reported each day in Sofala**

![Mass vaccination campaign](image)

Between 3 and 9 April 2019, the Ministry of Health and partners provided cholera vaccinations to more than 800,000 individuals older than 1 year of age.

Many local clinical staff found themselves cut off from district managers, with roads impassible and mobile networks down. In the absence of communication from their managers, they nevertheless acted swiftly and determinedly.

Rural health centres, like the ones where Anatércia and Joana work, were particularly hard hit. Some patients should have been referred to more sophisticated health facilities and specialized care, but this wasn’t possible. In the first few days they were caring for pregnant women, delivering babies, and helping the injured in extremely challenging circumstances. Essential medical supplies and equipment had been destroyed. Trying to keep a sterile environment was an ongoing battle, particularly as they had no electricity and the health centres were flooded.

The health care staff remained in their posts, improvising and innovating to deliver essential services. They were planning, adjusting and showing remarkable leadership. They drew on the skills and personal qualities that had been honed at the frontline of the health system over many years, and that had been reinforced by the IDEAs programme.

The Beira and Búzi District health systems have developed resilience, which enables them to continue to provide services that respond to ongoing and day-to-day challenges. Their work with researchers to embed and formalize evidence use is a part of this resilience.
Chapter 5: 
Embedded research supports resilience
During the months after Idai, 2000 displaced people made their way to Búzi District. Often they were homeless, in need of medical support and suffering trauma - a considerable influx of people with complex needs.

The psychological effects of the cyclone across the districts are pronounced. Even today, some of the mothers at the health facility talk fearfully about the cyclone, and when they feel the wind rising, they begin to worry that another is on its way.

The health system - storm-lashed as it was - rose to the challenge of caring for the newcomers. Just as it rose to the challenge after independence, during the war and in the face of other environmental shocks.

Health systems regularly face disruptions at different levels. The more able they are to function in the face of adversity the more resilient they are. In Beira and Búzi, individuals and the institutions that they are part of showed resilience during Idai in responding to the unexpected. They were able to identify and make sense of the problems they were facing, to put in place strategies to respond. They had the agency to act on their own initiative and drew in resources to put those plans into action.

During the cyclone, health care staff were working without access to their supervisors and managers. But at all levels, they rose to the leadership challenge. The mutually supportive and collegial working relationships between nurses - and between nurses and their managers - that had been generated through the embedded research programme supported independent decision-making. The way that Anatércia and Joana continued to provide services while out of contact with the district management system is a good example of this.

Watch "In the face of adversity" at https://youtu.be/WBoxZ-EoCnw
Health care workers are no strangers to multi-tasking. However, in responding to Cyclone Idai, staff were not only considering the challenge that was directly in front of them but also planning for the future. There was an understanding that data should drive decisions. “We were able to keep and maintain the Health Information System instruments safely, as these are the basis for us to make decisions about our work through data analysis,” explained Anatércia.
In the post-Cyclone period, government and outside donors have supported Búzi and Beira districts to rebuild facilities and replace damaged equipment. But, health facilities have also harnessed local resources and social capital to make improvements. Anatércia recounted:

“As a group, we organized to pick up the dismantled tin roofs that were blown off by the cyclone and worked together to put them back on the health facility. ... We did everything as a group to purchase the tin roof material and hired someone to fix the roof. Unfortunately, when it rains, some water still comes in.”

Learning from the response to the cyclone has changed the composition of the health information and research that is gathered in Sofala province. The Mozambique National Institute of Health and CIOB are working to strengthen epidemiological surveillance.

While the IDEAs programme does provide funding and equipment to deliver action plans, the ability of staff to execute these plans is still hampered by an overall lack of resources. This is something recognized by leaders, such as Dr Quinhas, within the Ministry of Health:

“The health system is showing clear signs of resilience. There is a high level of coordination... but more importantly, I see the characteristics of health workers, and that makes a huge difference. The concept of resilience is broad but, at the end of the day, it has to come down to people and the everyday things that they do. ... But we have a long way to go to have a perfect health system. There has to be serious investment to make it robust, to resist shocks.”
Chapter 6: Looking to the future
“Practically all years if there aren’t floods, there are droughts. If there aren’t droughts, there are cyclones. ... Over the years, these situations create an opportunity for the system to prepare better. Every time there is a natural event, the system identifies lessons and learns how to respond better in the future,” concluded Dr Quinhas.

The IDEAs programme is working with health staff to gain new knowledge and create processes that support the health system across all its pillars. It’s supporting the delivery of the strategic vision for maternal and child health set out by policy-makers at the national level and building local capacities for the longer term.
“What really excites me about the IDEAs programme, is the improvement of the system and the understanding that they leave us with the knowledge. Some projects come and they leave and then we don't have any knowledge. But this training... it strengthens the health facility and it gives me a lot of courage and hope,” said Dr Graciana.

As the health workers in the project adopt new ways of working to overcome common maternal, newborn and child health challenges, their learning is being captured by researchers and fed into future government decision-making. Their adaptations are influencing broader transformation in policy and practice.

There are other, less visible, changes that are equally important.

The project is strengthening relationships and the bonds that link the people within the health system. It harnesses the qualities that many health care workers draw on to deliver their work in difficult circumstances. While we rarely think of values and emotions as being the fuel that drives health systems resilience in times of trouble, they are incredibly important.

For Joana the power of feelings was clear. When asked what qualities and skills one needs to be resilient in a crisis she said:

“I think it's courage, it's love of the people around you... and love for the work as well. It's more or less that.”

Watch "Contributing to reduced neonatal and maternal mortality" at https://youtu.be/ZUImkJCUTnc
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