

Jembi Health Systems

Annual Report

2021/22

Head Office | Cape Town

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Abbreviations

AIDS	Acquired Immunodeficiency Syndrome	MoH	Ministry of Health
ANC	Antenatal Care	MoHP	Ministry of Health and Population
BHPSA	Better Health Programme South Africa	MPI	Master Patient Index
BSIS	Blood Safety Information System	MVP	Minimum Viable Product
CCDHI	Collaborating Centre for Digital Health Innovation	NACC	National AIDS Control Commission of Cameroon
CDC	United States Centers for Disease Control and Prevention	NBTS	National Blood Transfusion Service
CDR	Central Data Repository	NCD	Non-Communicable Diseases
CHW	Community Health Worker	NDoH	National Department of Health
Data.FI	Data for Implementation	NHLS	National Health Laboratory Service
DHIS2	District Health Information System, version 2	NIDS	National Indicator Data Set
DISI	Data Integration Strategies and Implementation	OHSC	Office of Health Standards Compliance
DSI	Department of Science and Innovation	OPC	OpenMRS PEPFAR Collaborative
e-IMD	Electronic Performance Measurement Tool	OPD	Outpatient Department
EMR	Electronic Medical Record	PCR	Polymerase Chain Reaction
FHIR	Fast Healthcare Interoperability Resources	PNC	Postnatal Care
GIC	Global Informatics Collaborative	PEPFAR	US President's Emergency Plan for AIDS Relief
GIZ	German Agency for International Cooperation	PHDC	Provincial Health Data Centre
GSM	Global System for Mobile Communications	PMTCT	Prevention of Mother-To-Child Transmission
HIE	Health Information Exchange	RTG	NACC Regional Technical Group
HISP	Health Information Systems Programme (South Africa)	SAMRC	South African Medical Research Council
HIS	Health Information Systems	SI-M&A	Monitoring and Evaluation Information System (Mozambique)
HIV	Human Immunodeficiency Virus	SIS-MA	National Health Information System for Monitoring and Evaluation (Mozambique)
HIV CBS	HIV Case-Based Surveillance	SOP	Standard Operating Procedure
ICT	Information and Communications Technology	SRP	Smart Register Platform
IP	Implementing Partner	UAT	User Acceptance Testing
M&E	Monitoring and Evaluation	UCSF	University of California San Francisco
MNCH	Maternal, Newborn, and Child Health	UCT	University of Cape Town
		UHC	Universal Health Coverage
		USAID	United States Agency for International Development

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Letter from the Chief Executive Officer



The 2021–2022 financial year was a particularly difficult period with the ongoing global COVID-19 pandemic disrupting many global programmes. Despite these challenges, Jembi has continued to implement its vision and mission. It also increased the number of its core indicators amidst increasing demand for digital health services and solutions.

During this period, Jembi continued implementing the two five-year awards with the CDC in Mozambique and South Africa. Annual income increased to ZAR 123.4 million during the FY 2022 financial year (an increase of 42%). Expenditure increased to ZAR 121.7 million during this period (an increase of 40%). The number of staff working at Jembi at the end of the period was 114 staff.

Jembi also continued the process of consolidating activities around its two main programmes. The Mozambique programme operates mainly in Mozambique with the majority of programmes and technical staff based in Maputo and some of the other provinces, supported by management staff based in Maputo and South Africa. The HQ Programmes Division operates projects in South Africa and a number of other African countries funded by

CDC HQ in the USA. HQ Programmes staff are based mainly in South Africa with some staff based regionally in Cameroon, Ethiopia and other African countries. The programme is also supported by several contractors in South Africa and other countries. Projects are being conducted in several African countries, including Cameroon, Ethiopia and Rwanda. Jembi has core competencies in programme management, digital health, informatics, health information systems, software and product development, and system integration. Some of the core technologies we support include health information exchange, standards, system integration, mobile health and electronic medical record software.

Jembi's Corporate Services Division provides financial, legal, human resources, grant administration and ICT support to Jembi's programmes and technical divisions. The Finance team achieved another unqualified audit during this financial year as a result of its strong financial management record. The ICT team continued to provide additional support to the programmes in specialised areas related to the deployment and implementation of ICT hardware and services. The HR team continued to support the

2022

↑ Income rose by 42%
to ZAR 123.4 million

↑ Expenditure rose by 40%
to ZAR 121.7 million

2021

↓ Income reduced by 50%
to ZAR 86.6 million

↓ Expenditure reduced by 49%
to ZAR 87 million

2020

↑ Income rose by 75%
to ZAR 172.2 million

↑ Expenditure rose by 75%
to ZAR 171.1 million



The Finance team achieved another unqualified audit during this financial year as a result of its strong financial management record.

divisions and also developed a number of new policies for Jembi to strengthen the management of its human capital.

During this financial period, Jembi's Mozambique Programme continued work on the five-year grant from CDC, and its longstanding partnership with CDC Mozambique. This included several projects supporting key health information systems in Mozambique, including the national implementation of a medical record system for HIV patient and treatment management, based on OpenMRS. The programme also conducted several additional projects with UN agencies and other international organisations and funders.

Jembi's HQ Programmes Division consolidated its operations over this period. The activities included work on the five-year Technical Assistance Programme with the CDC HQ. Jembi's work on this project is developing and implementing innovative

new data integration projects in African countries and digital public goods for standards-based health information exchange and patient identity management funded by PEPFAR. The HQ Programmes Division also continued projects with PATH Digital Square and the Better Health Programme South Africa funded by the British Foreign and Commonwealth Development Office through Mott Macdonald.

Other activities supported the development of information systems for the Western Cape Provincial Health Data Centre, including for COVID-19 case management in the Western Cape province.

It has been challenging to lead Jembi over this period but rewarding to see the organisation grow and implement great projects and programmes. I expect Jembi to continue growing in strength in future years alongside the increased global interest in digital health and health data science.

With best wishes,

Dr Christopher Seebregts, Founder and Chief Executive Officer

2019

- ↑ Income rose by 48% to ZAR 98,6 million
- ↑ Expenditure rose by 46% to ZAR 98 million

2018

- ↑ Income rose by 11% to ZAR 66.6 million
- ↑ Expenditure rose by 15% to ZAR 67.2 million

2017

- ↑ Income rose by 61% to ZAR 60.2 million
- ↑ Expenditure rose by 59% to ZAR 58.5 million

Chairman's Report

In 2021 and early 2022, the world began to recover from the COVID-19 pandemic and to adjust to a post-COVID reality. In addition to transitioning to a post-COVID world, Jembi also had to restructure itself to accommodate two large projects that started during this period. Given the difficult environment globally, Jembi was fortunate to secure significant funding awards from the United States Centre for Disease Control and Prevention (CDC) for a new funding cycle of its South African and Mozambique programmes. Jembi has risen to these challenges and has effectively restructured and consolidated its operations to accommodate the new and existing programmes in its portfolio.

Reflecting on Jembi's activities over the past year it is evident that, under the leadership of its visionary and dynamic CEO, Dr Chris Seebregts, Jembi has adapted to the new challenges and opportunities for digital health and continued to advance the Jembi vision of "A world in which health systems and information advance global health". Challenges presented by the COVID pandemic have clearly demonstrated the dependencies on digital health to treat and prevent infectious diseases ravaging the African continent and other low-resource countries. Jembi is particularly focused on developing innovative health software applications and enabling interoperability between siloed health information systems

– this remains among the highest priorities to realise the full potential of digital health. This includes working on electronic health record systems, health information exchanges and data integration. Jembi has developed novel technology in these areas and contributed significantly to international communities developing open-source digital public goods and increasing their adoption in low-resource environments.

Jembi is also working with partners such as the Centre for Artificial Intelligence Research on new and emerging technologies, such as machine learning and artificial intelligence, and how these technologies can be used to further enable and unlock the potential of digital health applications and systems in Africa. There has been an increase in the application of ML and AI to public health and Jembi's innovative approach to digital health equips it to participate in this new reality with its strong and established base in Programmes, Technology and Corporate Services.

I would like to thank the members of the Jembi Board for their support and contribution during this period: Dr Dayne Morkel (Deputy Board Chair), Dr Chris Seebregts (CEO), Dr Quentin Williams, Mr Andy Gray, Prof. Steve Reid and Dr Ziyanda Vundle, as well as Jembi's division and programme directors, Dr Alessandro Campione, Mr Wayne Naidoo and Mrs Jonnea Smith. This team brings a wealth of



experience in public health, computer science, information systems, finance, governance and administration. Jembi also continues to recruit new Board members to inject new energy and increase diversity in the Jembi Board.

I also want to acknowledge and thank the many funders and donors who have contributed to Jembi's success and without whom this important work could not be undertaken. We have received substantial contributions from the United States Government agencies (PEPFAR, CDC and USAID), international donor agencies, private philanthropies, foundations, and corporate sources, to whom we are indebted. As a company, Jembi is in a strong position with a positive balance sheet and many opportunities aligned with its vision and mission.

We look forward to the next phase of Jembi's journey with existing and new funders and partners. I am happy to present to you Jembi's 2021/2022 Annual Report.

With kind regards,

Deshen Moodley

Dr Deshen Moodley
Jembi Board Chairman

Associate Professor, Department of Computer Science, University of Cape Town ; Co-Director, South African National Centre for Artificial Intelligence Research

1

Programmes

HQ Programmes Division

Overview

Over the 2021/22 financial period, the HQ Programmes Division comprised 30 projects.

These ranged from core interoperability platform development and related community support services, funded primarily through our Digital Square grants, to bespoke platform development and hardware infrastructure innovation projects. Jembi also continues to support core health system strengthening initiatives at national scale in several African countries.

In South Africa we supported research studies in partnership with leading local and international research institutions. In one such project we designed advanced mobile health interventions to improve engagement in postpartum HIV care in South Africa. Jembi has also partnered with CDC on the Technical Assistance Platform with the aim of harmonising the significant investment of PEPFAR in digital health. This project supports the

development and implementation of sustainable HIS to enable advances in case-based surveillance, patient care coordination and programme monitoring. It is also providing a foundational resource centre through a Sandbox platform that is being developed by Jembi to advance strategic CDC digital health investments, globally.

During this funding period, Jembi has also completed four different projects in partnership with the PATH Digital Square initiative funded by USAID. These projects provide advanced information systems based on health information exchange, e.g. InstantOpenHIE as well as selected use cases, e.g. a COVID-19 data exchange and case management platform. The Better Health Project South Africa was also conducted over this period, including a number of projects supporting selected clusters

within the South African National Department of Health and parastatal agencies. Jembi also began working with John Snow, Inc on the Country Health Information Systems and Data Use (CHISU) programme and with Palladium on the Data.FI project, both funded by USAID. Jembi continued its work on the HealthConnect project, funded by the South African Department of Science and Innovation (DSI) and Elma Foundation as well as the SAMRC–Jembi Collaborating Centre for Digital Health Innovation (CCDHI).



Wayne Naidoo, Technical Director

Better Health Programme South Africa

The UK's Better Health Programme (BHP), is a global health system strengthening programme led by the UK Foreign, Commonwealth and Development Office (FCDO) and delivered in South Africa by Mott MacDonald. This programme started in 2020 and was in year two during the period of 1 Jan 2021 to 31 March 2022.

One of the aims of the BHPSA is to address non-communicable diseases (NCDs) and strengthen local health systems in order to improve health, and thereby contribute to inclusive economic growth and poverty reduction.

Jembi's focus in year two included the following goals:

1. Firstly, the rising burden of lifestyle-related or Non-Communicable Diseases (NCDs) with the main focus for this programme being placed on hypertension and diabetes.
2. Secondly, as the lead of the digital health workstream, Jembi provided technical assistance in two focus areas:
 - Strengthened planning for national NCD surveillance systems within the health information system in South Africa in the public health sector.
 - Supported the Office of Health Standards Compliance (OHSC) through planning for the integration of their information systems and capacity building.

Office of Health Standards Compliance

Jembi, with the aid of subcontractors, assisted the OHSC in testing their system's resilience to Business Continuity and Disaster Recovery by analysing their existing policies and plans. These were then assessed through consultation and updated through the OHSC policy processes.

Halo, the OHSC call centre application, was used as a benchmark and reference as Halo is one of the core platforms that needs high availability and continuity. These tests were therefore a good indicator of the recovery capabilities of the OHSC team.

A Skills Audit was performed on all OHSC Staff within the information technology department.

The objectives of this Skills Audit were:

1. Complete an organisational skills and competency assessment for ICT staff;
2. Produce a Workplace Skills Plan (WSP) to address the skills gaps identified for current needs, including potential training providers.

Non-Communicable Diseases

There is a need to obtain accurate and timely non-communicable disease (NCD) data and surveillance data for policy and planning purposes, and for reporting against indicators on these conditions both nationally and globally. Estimates of the burden of NCDs are routinely obtained by collecting indicator data as part of the National Indicator Data Set (NIDS) system. However, several challenges have been experienced with this approach. During year two of this programme, the NDoH and BHPSA partners determined that the current NIDS system needs strengthening, including additional indicators. Desk research

indicated that better techniques may be available to achieve the same outcome of monitoring the burden of disease specifically for Diabetes Mellitus (DM) and hypertension. Based on approaches followed in the Western Cape province, Jembi investigated alternative means of estimating the burden of disease for DM by analysing existing sources of data, such as laboratory, pharmacy and related drug stock management data, and explored how the pioneering data integration model used in the Western Cape province could be applied in other provinces in South Africa. The goal was to complement the existing NIDS system by performing an analysis of aggregated or individual-level de-identified data at

a high level to provide estimates of the burden of disease.

Part of the NCD desk research included investigating the feasibility of using an existing mHealth application to collect hypertension data through CHW outreach programmes. The open source Catch and Match mobile phone application developed and piloted by the Western Cape DoH was adapted to include the collection of hypertension screening data, as a proof of concept for other chronic health conditions. This project is closely aligned with other BHPSA activities to train CHWs in the use of blood pressure monitoring devices during household visits.

HQ Programmes Division

RedCross BSIS South Sudan



As at the end of August 2021 the BSIS software in South Sudan is operational, with donors being registered and blood units being tracked and labelled.

“

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As of Q2 2021, the situation in South Africa remained unpredictable and Jembi's policy of no international travel for staff was still in place due to COVID-19. Therefore, in order for the South Sudan National Blood Transfusion Service (SSNBTS) to move ahead with the implementation and go live as an operational service by the end of December 2021, an alternative plan was agreed to with SS NBTS, SS Red Cross and the Swiss Red Cross. Jembi Health Systems contracted a long-standing partner organisation, Intellisoft, to carry out the implementation tasks with remote online support from the Jembi team, primarily from the Senior Implementer. Intellisoft is based in Kenya, with less restrictions on regional travel.

The Intellisoft team attended two weeks of intensive training sessions on the BSIS software and the implementation process according to ISBT (International Society of Blood Transfusion) guidelines. Two staff members travelled to Juba on 1 August 2021 and over the following two weeks they worked with the in-country team and the Jembi remote team to install some equipment, perform the on-site qualifications and deliver training to South Sudan NBTS staff members. The trip was further extended by a week due to delays, and to ensure that the system was operational post go-live and that the NBTS SS was confident to take over the day-to-day running of the system.

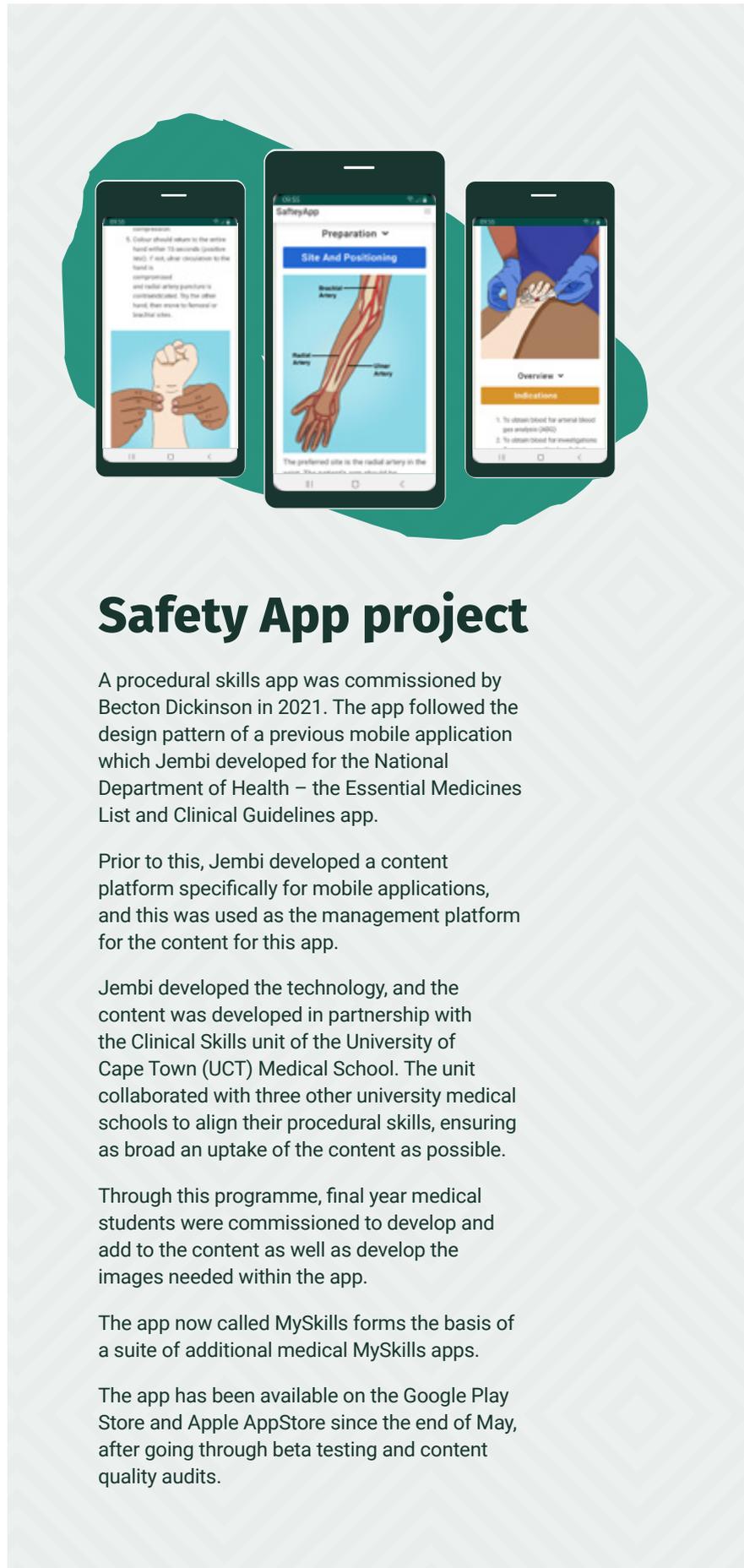
As at the end of August the BSIS software is operational, with donors being registered and blood units being tracked and labelled. One outstanding issue was the LAN connectivity, which appeared to be unstable, and the Jembi team worked with the Red Cross IT support to troubleshoot. The problem was resolved by adding an additional router.

Summary of major tasks and completed deliverables

- ✓ It was agreed by all parties that Jembi would contract with IntelliSoft to send a team from Kenya to carry out the implementation in Juba, South Sudan, with daily online support from the Jembi team. The Senior Implementer attended all training and qualifications sessions via Zoom or Google Hangouts when internet connectivity was available.
- ✓ To coordinate in-country activities, Jembi and IntelliSoft met on a daily basis.
- ✓ All the equipment was assembled and tested:
 - All 3 servers were installed in the server room, and were connected to the local area network.
 - All 9 computers were assembled at their dedicated workstations, and were connected to the local area network.
 - All servers and computers were connected to their dedicated UPSs.
 - Lock cables were used to secure each Intel NUC and monitor.
 - The label printers and A4 printers were configured at their dedicated workstations.
 - The NBTS admins were given training on how to change wax ribbons and labels.
- ✓ The team was taken through the infrastructure checklist to ensure that all the equipment was working as expected.
- ✓ The NBTS admin was taken through the system configuration, and agreed on the required system settings. These are documented in the Configuration Spreadsheet.

HQ Programmes Division

- ✔ Training was completed for the admins, donor clinic and lab management staff.
 - Each trained staff member was given a user manual for their respective department.
 - 3 BSIS administrators were trained in managing the system, and to offer support to other users.
 - 9 users took part in the donor clinic training. Additionally, 2 SSRC employees took part in the training.
 - 6 users took part in the lab management training. Additionally, 2 SSRC employees took part in the training.
 - All the trained users took part in the competency assessment, and only two users from the donor clinic did not achieve the required mark to pass the assessment on the first attempt. These users were then given refresher training on both theory and practical. The 2 users then retook the assessment and fared very well in the second attempt.
 - All users who passed the competency assessment were given certificates.
- ✔ All the staff participated in the Operational Qualification to validate the software and test their workflows and SOPs. This also gave users an opportunity to use the label printers and get to understand the use of DINs throughout the workflow of the blood lifecycle.
- ✔ The system went live with no issues, and the administrators supported this by offering elbow support for the users.
- ✔ As of 22 August, there are more than 40 donors registered on the system.



Safety App project

A procedural skills app was commissioned by Becton Dickinson in 2021. The app followed the design pattern of a previous mobile application which Jembi developed for the National Department of Health – the Essential Medicines List and Clinical Guidelines app.

Prior to this, Jembi developed a content platform specifically for mobile applications, and this was used as the management platform for the content for this app.

Jembi developed the technology, and the content was developed in partnership with the Clinical Skills unit of the University of Cape Town (UCT) Medical School. The unit collaborated with three other university medical schools to align their procedural skills, ensuring as broad an uptake of the content as possible.

Through this programme, final year medical students were commissioned to develop and add to the content as well as develop the images needed within the app.

The app now called MySkills forms the basis of a suite of additional medical MySkills apps.

The app has been available on the Google Play Store and Apple AppStore since the end of May, after going through beta testing and content quality audits.

HQ Programmes Division

CDC Central Initiative Technical Assistance Platform (TAP)

Jembi is a prime awardee under the CDC Central Initiative Technical Assistance Platform (TAP) programme and leads the Data Integration Strategies and Implementation (DISI) component. DISI aims to improve sustainable health information systems to improve patient care and programme monitoring, with an initial use case focusing on HIV case-based surveillance. The programme is set up to provide shared resources, expertise and documentation across the PEPFAR community, along with capacity building initiatives and guidance on policies and governance.

The programme has the following goals:

- 1 Develop and implement sustainable HIS to enable advances in clinical care, patient monitoring, care coordination, programme monitoring and case-based surveillance.
- 2 Develop and support a community of HIS experts and practitioners that share resources, expertise, best practices, documentation and solutions across the PEPFAR community.
- 3 Develop workforce capacity, governance structures, policies and guidance to support HIS.

DISI refers to the practice of centralising and integrating HIV data in a data repository for further reporting, analysis and visualisation. DISI enables healthcare professionals to effectively measure and monitor

the progression and outcome of HIV through CBS sentinel events.

The DISI project aims to provide the following technical assistance to countries:

- ✓ Practical guidance or recommendations for integrating health data from different sources and jurisdictions whilst ensuring availability of data quality (comprehensive, accurate, complete and timely) in a manner that ensures privacy, security and confidentiality for disease, case and programme management to enhance decision-making.
- ✓ Software applications or platforms with relevant documentation that enables:
 - Customisation and deployment, data standardisation, data integration and data use.
- ✓ Country implementation:
 - Leverage DISI artefacts and/or processes to implement or improve data decentralisation for their use case.
- ✓ Processes to monitor and measure potential benefits and risks of implementing DISI:
 - Metrics for projected efficiencies.

The project started on 1 October 2020 and to date Jembi has contributed to the completion of a rapid landscape assessment for five OPC countries, a set of functional and nonfunctional requirements and



The next phase of the project is focused on hardening the DISI MVP to develop a production-ready DISI reference solution.

specifications, the design and development of a DISI Minimum Viable Product (MVP) for data centralisation with an analytics and visualisation component, along with a patient identity toolkit for patient matching, linkage and deduplication. The project also includes the Global Informatics Collaborative (GIC) Sandbox which is a collaborative environment to assist country implementers in creating and hosting digital health solutions using artefacts created by the CDC HQ TAP mechanism.

The next phase of the project is focused on hardening the DISI MVP to develop a production-ready DISI reference solution, integrating the OpenMRS HIV Reference Implementation (OHRI) to the DISI reference solution, and hosting this in the sandbox. Jembi is also engaging with countries to collect requirements and support capacity building and implementation of TAP products and the DISI reference solution, along with support for new use cases around patient care coordination and programme monitoring.

HQ Programmes Division



EMR development in Cameroon

Under the CDC HQ TAP Mechanism, CDC contracted Jembi to Improve the Cameroon EMR Functionality and Strengthen the EMR use at site level to improve clinical practice and available information for programmatic decisions.

The key project goals are as follows:

- 1 Implementation of an integrated Stock Management module within the EMR suite at site level.
- 2 Ongoing technical assistance for implementation partners as well as onsite and remote user support.
- 3 Strengthen Implementation Monitoring through a basic Help Desk solution and SOP.
- 4 Strengthen Implementation Monitoring through an electronic remote monitoring solution.

The primary focus for this reporting period was on the implementation of the Stock Management and Billing modules. The original goal to implement the solution in four sites was reduced to one site due to the stakeholder delays in requirements

gathering. The successful go-live at the pilot site, Etoug Ebe, took place at the end of August 2021. Jembi continues to provide onsite support, mentoring and monitoring at this pilot site.

The remote monitoring solution was de-scoped in order to accommodate the Stock Management Implementation.

Jembi carried out a detailed analysis and evaluation of help desk solutions with a final recommendation of the solution called Gitlab Help Desk. Jembi requested a technical workshop in order to provide technical support to configure the Gitlab help desk, but the stakeholders were repeatedly not available to attend. Jembi provided documentation for the installation, as well as user and admin guides, and this activity was marked as completed.

Jembi continues to provide technical assistance to improve technical planning and implementation coordination between CDC Implementing Partners, the National AIDS Control Committee (NACC) and MoH as well as providing technical assistance to implementing partners and live sites via the in-country Jembi staff.

Top row: Stock Management refresher training at Etoug Ebe; Middle right: Site supervision in the East Region with a joint team from MoH, NACC, RTG and Jembi; Above: Site supervision in the East Region. SOPs placed with clear visibility for staff.

Jembi has developed the clinical modules of the Electronic Medical Record. The focus for this period moved to the implementation of the Stock Management System to control inventory levels, orders, and receipt of stock workflows, reduce stock-outs and minimise the incidence of expired stock.

MoH confirmed Etoug Ebe Baptist Hospital in Yaounde as the stock management pilot site for the HIV Care and Treatment Department.

The Stock Management Implementation focussed on the following modules:

- ✓ Billing and cashier.
- ✓ Stock Management.
- ✓ Stock requisition.
- ✓ Pharmacy workflow.

HQ Programmes Division



HIE Policy and Standards: HIE Workshop

“Recommended Standards for HIE for Digital Health Systems in Ethiopia”

Jembi led the adaptation and localisation of the Africa CDC’s continental Policy and Standards for Health Information Exchange (HIE) for use in Ethiopia, to produce a draft set of recommendations.

A “Recommended Standards for HIE for Digital Health Systems in Ethiopia” draft document was drafted by a working group from Jembi Health Systems with the support of the University of

Gondar and Compelling Works. At a workshop that was held in Ethiopia in Adama on 7 and 8 September 2021 the first draft was reviewed by a group of experts representatives from the Ethiopia Ministry of Health (MoH); Ethiopia, Public Health Institute (EPIH); United States Centers for Disease Control and Prevention (CDC); Capacity Building and Mentorship Programme (CBMP) Partnership Universities, International Center for AIDS Care and Treatment Programmes (ICAP) and Jon Snow Inc (JSI). In groups, the experts discussed and commented on each session of the recommended standards.

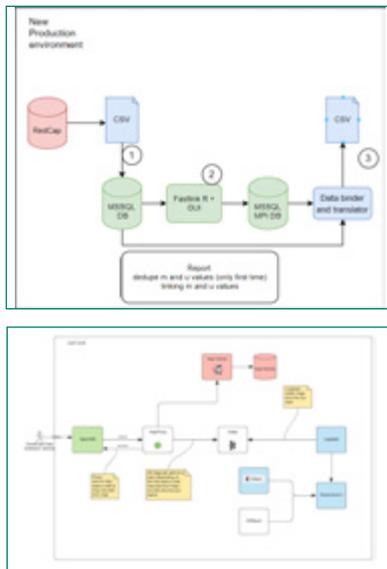
14L workshop: The Digital Health Informatics for Leadership for Non-Informatics Professionals (I4L) training

The Digital Health Informatics for Leaders (I4L) session aimed to provide executives, leaders, and decision makers with an understanding of the three core capabilities required to be an Informatics Savvy Organisation, as well as an overview of the critical elements required to ensure successful digital health projects. The training course was a one-and-a-half-hour virtual training session delivered via Zoom with interactive activities. Jembi, along with some collaborating partners, delivered the training on 27 August 2021. Different executives from various Ethiopian organisations attended the training.

The training session was opened with a welcoming address from Mr. Naod Wendrad, the Director of the Policy, Planning Monitoring and Evaluation Directorate (PPMED), followed by opening remarks by the State Minister of the Ministry of Health, Mrs. Alemtsehay Paulos. The presenters for each topic were domain experts from Jembi Health Systems, the University of Gondar, Compelling Works, CDC HQ, and CDC Ethiopia. The training drew a lot of interest and was joined by at least 46 people who attended the training session, in addition to the 8 staff members from CDC and the Jembi project team.

HQ Programmes Division

CDC TAP Programme in Ethiopia (continued)



Above: A diagram showing the data flow for the revised version of the patient matching tool.

Client Registry

Jembi developed an interim patient matching tool for use in Ethiopia (specifically for recency patient data captured in RedCAP). This was demonstrated in July 2021 with further amendments required to satisfy security issues raised at the EPHI. This amended version was made available towards the end of 2021 and the focus has been on training in-country staff on the installation and usage of the tool. Implementation work is ongoing with the aim for the tool being implemented in the second quarter of 2022.

An initial MVP hosted in Amazon Web Services Cape Town region was demonstrated in July 2021 showing a complete data flow from the Ethiopian Electronic Medical Record (EMR) system through the CDR system and an initial report. Report development continued based on specifications devised between the Jembi analyst team and the ICAP HIS team. The project continued past the initial contract end date of September 2021 as a no-cost extension and then transitioned under the Ethiopia TAP award from January 2022. During January, February and March 2022, the final UAT process was undertaken and online training provided to the ICAP implementation team with further training planned for April/May 2022.

CARES Funding COVID-19 Crisis Response

Under the CDC-funded Coronavirus Aid, Relief, and Economic Security Act (CARES Act) project, Jembi is working with several partners to support accelerated planning and operational readiness for COVID-19 preparedness and response, as well as developing tools and strategies, providing technical assistance and programme support, and ensuring ongoing communication and coordination among public health agencies and partners. This project aims to adapt and leverage the work done in the CDC Technical Assistance Programme (TAP) and Data Integration Strategies and Implementation (DISI) component to support accelerated planning and operational readiness for COVID-19 preparedness and responses.

Jembi's role in the project is to:

- ✔ Support a rapid landscape assessment.
- ✔ Develop generic National Data Repository (NDR) Requirements.
- ✔ Develop strategies for patient identity management to uniquely identify patients across systems within a country.
- ✔ Customise, refine and implement a generic National Data Repository (NDR) to support national COVID-19 surveillance, analytics and visualisation at the country level.

To date, Jembi has worked on the landscape assessment process through development of an assessment questionnaire, maturity model scoring and initial set of requirements and specifications, and contributed to a conference abstract

and presentation at the HELINA 2021 event, covering the CARES Act work. The development of a COVID-19 conceptual data integration architecture aligned with the TAP/DISI work has been completed to guide implementation of the CARES Act artefacts in-country, and ensure ongoing alignment with the latest TAP/DISI analysis and architecture. Jembi has also been engaged on a set of project proposal ideas based on the outputs of the desk review and assessment, and ongoing engagement with the country points of contact.

In the next phase of work, Jembi will validate data flow and interoperability requirements for COVID-19 workflows, and extend and adapt the DISI reference solution to support ingestion and transformation of COVID-19 surveillance data, management of centralised COVID-19 surveillance data, and visualisation of COVID-19 surveillance data in data visualisation tools.

HQ Programmes Division

CDC South Africa Health Information Systems Programme

Jembi is working with Health Information Systems Programme South Africa (HISP-SA) on the CDC-funded project to provide Technical Assistance (TA), supporting the Health Information Systems (HIS) of the South African Government to improve patient-level data systems. Jembi's role on the project is to support the development of appropriate digital applications and services which improve health services for patients and health workers, and is working with UCT-CIDER on the key objective to assess TIER readiness for broader adoption.

In particular, Jembi's focus is on TIER.Net adaptive maintenance to ensure alignment to NDoH systems (HPRS and NHLS) and security, under the following activities:

- ✓ Improve security and robustness of HPRS-TIER-SPV-NHLS linkage and conduct testing.
- ✓ Upgrade and refine automatic download of new versions and upload of dispatches and modified data.
- ✓ Adaptive maintenance of interoperability.
- ✓ Support with technical assistance, coordination, engagement and oversight activities.



Above: The original design and installation side-by-side to the redesigned version.

Connectivity Box

The original Connectivity boxes were developed for the RAD project funded by USAID to provide in-clinic mobile phone hotspots and charging, as well as a central immunisation data repository. The box was supplied with energy either from mains or from solar, and had internal rechargeable battery capacity to maintain the system for an excess of 15 hours with neither solar nor mains energy.

This additional project to the RAD implementation, funded by the Bill and Melinda Gates Foundation (BMGF) enabled Jembi to integrate on-line GSM capabilities directly into the connectivity box and to redesign the initial solution based on lessons learnt.

Although the original boxes were robust and lasted in excess of three years in harsh conditions, an opportunity to redesign is always a chance to implement changes and optimise the design.

For the BMGF project, the whole of the energy provision section was redesigned and optimised, as well as the physical layout of the components. The new design made use of industrial grade mounting fixtures that were integrated into all the components to make assembly and maintenance simpler and more cost effective.

In addition to the connectivity box, the Starter pack was redesigned and optimised with a number of small yet important updates. The paper map of the clinics was also updated and redesigned to be more intuitive and

to include known landmarks to identify proximity to the clinics.

A central data repository was developed (Journey Central). These connectivity boxes connected via GSM mobile technology to the internet and regularly uploaded all transactions and events to the Journey Central server, where reports could be generated and distributed to stakeholders.

Instead of simple white panels, these boxes had local imagery printed onto the front facing panels to add attractiveness to the usually mundane, technological grey or white finish.

Internally, as can be seen in the second image, the components are racked using a commercially available DIN railing system normally found in switching units and control units. The components were fitted to these rails using adapter plates custom-made for the job. Included in this layout is a GSM mobile router as well as a networking router, GSM omnidirectional high gain antenna, Li-ion batteries and a more robust power management system. The new design catered for a network router, external WiFi access points powered over ethernet cabling, where the old box made use of the mini PC WiFi transceivers. The new design allows the WiFi access points to be placed at distances in excess of 50 metres from the box – extending the reach of the mobile devices.

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Regional Action through Data (RAD)

Jembi continued to support the successful RAD project that was implemented near the end of 2018 on the border between Kenya and Uganda with Broadreach Healthcare and IGAD partners. The project aimed to develop an immunisation tracking solution for cross-border populations who did not necessarily want to be identified, but would accept a solution that benefits the health of their children. Jembi developed Journey – a solution that uses tap-and-pay memory card technology to store a child's immunisation history electronically on a plastic card, without the need of identifying the child or the caregiver.

Journey was implemented in four clinics and the staff trained to maintain and operate the technology.

In October 2021, the programme came to an end with over 15,000 cards issued to caregivers and over 150,000 immunisation events recorded over the three-year implementation period. An additional 10,000 cards were also ordered, which would allow the programme

to continue well past its project end with the local support of the technology.

In December 2021, Wayne Naidoo and Martin Weiss attended a project close-out congress in Mombasa, Kenya. At the congress, partners could provide feedback, success stories and challenges to the consortium. Two of the main success stories of the RAD project was the Journey solution and a data sharing policy led by Duke University. The data sharing policy provides a mechanism whereby ministries in neighbouring countries can share health-related information within a governance framework. The policy had been accepted by both Kenyan and Ugandan departments of health.

The Journey solution consisted of a set of mobile phones which were capable of reading the tap-and-pay memory cards, and an in-clinic connectivity box. The box provided a WiFi hotspot and charging stations for the mobile phones, and a central data repository for all immunisation events. It was

powered interchangeably by mains and solar energy, with an internal set of batteries able to sustain up to 15 hours of no external energy.

The original installations did not have connectivity to the outside world and in June 2021, Jembi developed a bolt-on solution as a GSM upgrade kit to connect these boxes to the internet. As part of upskilling and getting local support, the upgrade kits were shipped in component form to an intern based in Uganda who assembled, programmed and tested the units with remote training from Jembi.

Due to extended shipping delays during COVID-19, the components only reached the intern in late November. The intern still assembled and tested the units, but with no ongoing funds, the units were not able to be installed. Data is still collected manually from these sites (with the use of a mobile phone) and sent to a Journey Central server that produces periodic reports and stores the data on behalf of the project.

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HealthConnect Phase 2

Jembi was funded by the SAMRC to continue supporting the HealthConnect Project from April 2020 to June 2021.

During this period, Jembi maintained the platform and updated features on the NDoH App Store and content management platform for mobile devices.

In addition, six reference mobile apps were targeted for release on the app store, however, in the final analysis, only three apps were selected (two of the mobile apps targeted had expired content on HIV and TB guidelines and had to be removed, and one app was made redundant due to a competing Whatsapp service – MomConnect registration).

The selected apps were:

- ✔ Essential Medicines List (EML) and clinical guidelines for the National Department of Health,
- ✔ The Digital Road to Health Booklet (RtHB), and
- ✔ The RtHB Companion app.

Additional App store functionality included the ability to have multiple sub accounts for mhealth implementers on the app store and segmented mobile data billing for each of these sub accounts – where a sub account could be managed by an organisation independently of the parent company, but where the parent company did receive reports and was able to monitor events of the sub account.



[Click to view the Artemis prototype.](#)

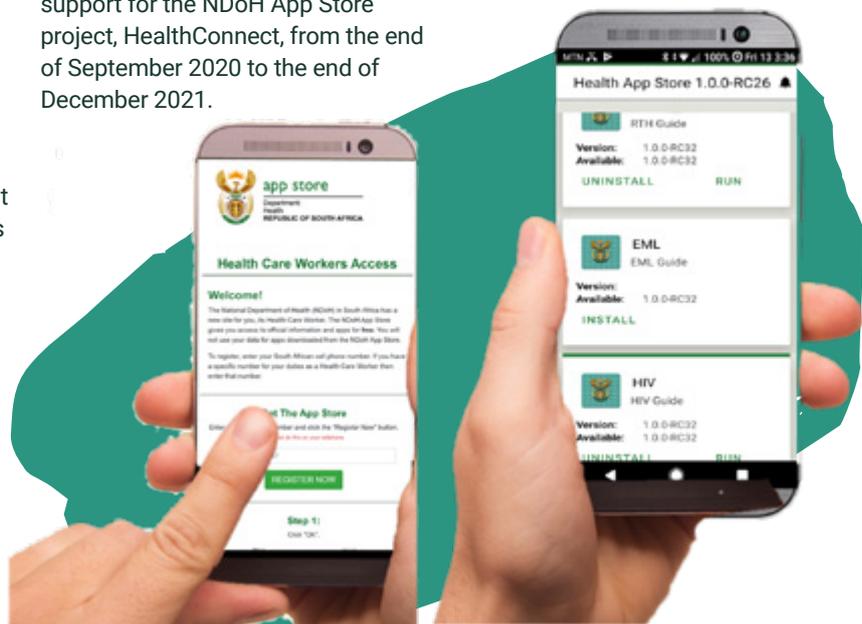
Another management tool that was added included a “Programmes” category. Programmes allowed – at a national level – a programme administrator to group several organisations or projects under one umbrella programme.

Jembi also developed a prototype mHealth project and research portal – Artemis. Artemis intends to bring together mHealth communities of funders, implementers, researchers and developers to share experiences, code and skills. It also provides a central research tool for projects that have a focus on mHealth research and development.

The prototype – which is not publicly available yet – is currently hosted on Notion in the internal Jembi portal.

An mHealth governance structure and an extension to the current National Health Normative Standards Framework for Digital Health (HNSF) was proposed to the National Department of Health. However, due to COVID-19 and the redirection of efforts within the Department, these could not be concluded during this period.

The Elma Foundation continued support for the NDoH App Store project, HealthConnect, from the end of September 2020 to the end of December 2021.



During this period, Jembi concentrated on four objectives:

- 1 ensuring 100% of apps on the NDoH App Store made use of the content management platform;
- 2 that the NDoH App Store with full functionalities is user-tested;
- 3 that the Mobile Health Normative Standards developed were submitted to the NDoH for approval; and
- 4 that developers approved by the NDoH could access and upload to the NDoH App Store using available guidelines.

On all the above, Jembi has made considerable headway – despite the challenging situation engaging with the NDoH due to their resources being mostly focussed on COVID-19 responses and coordination.

The funds allowed Jembi to maintain the current operations platform of the AppStore and the content management system as well as to

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HealthConnect Phase 2 (continued)

extend its integration with the newly developed content management system for mobile. Jembi also updated the Digital Road to Health Booklet and companion app to integrate with the new content platform.

The content management system extends the functionality of the NDoH App Store by allowing content creators to develop content specifically aimed at the mobile community. The platform integrates with the reverse billing services Jembi put in place so that community health worker mobile accounts are not debited with any mobile data used – this all gets billed back to an NDoH AppStore account (and data costs are significantly reduced due to the bulk purchase thereof).

MHealth applications targeted at either patients or public health workers typically have some sort of content that forms part of the app. This may be training material, informative material, updates to new events, etc. The content management system provides a centrally managed

portal where such content can be updated by content creators and automatically retrieved by mobile device applications for either patient or health worker consumption.

All mobile apps that make use of the App Store are able to make use of the content management platform. To demonstrate the capabilities, the Digital Road to Health Booklet companion app was migrated to make use of the content management platform.

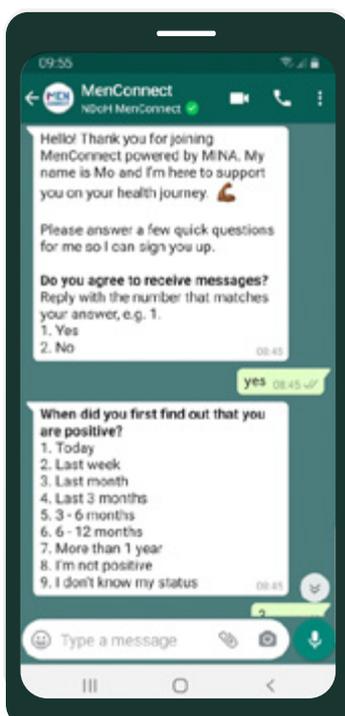
A new mobile application and content platform – MYSkills – was developed by Jembi and the Clinical Skills Department of UCT in collaboration with three other medical schools in South Africa. Clinical procedural skills have been uploaded to the content platform over the past five months. The project, funded by Becton Dickinson, was released in May 2022 on both Android and Apple stores.

In addition to the above, the grant also assisted Jembi in responding to a request from the NDoH to collaborate with MomConnect technology

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A new mobile application and content platform – MYSkills – was developed by Jembi and the Clinical Skills Department of UCT in collaboration with three other medical schools in South Africa.

partners in developing an optimised hosting solution for MomConnect, NurseConnect and MenConnect. The opportunity allowed the partners to present a harmonised approach in supporting eHealth applications, and how mHealth in particular could integrate with the HNSF. Unfortunately the proposal was never implemented due to COVID-19 and the reallocation of resources within the NDoH to other areas of focus.



MenConnect is a mobile platform that provides highly personalised information, advice and reminders for men on their HIV journey. The focus is on awareness, testing, initiation and adherence support, aiming to improve ART initiation and adherence in men living with HIV (MLHIV). The MenConnect platform was developed with funding from Gilead Science Inc. by Praekelt Foundation, with support from Genesis Analytics and Jembi.

Jembi's role on MenConnect has been to develop a data integration and analysis solution, supporting an architecture that supports data exchange and interoperability out-of-the-box. The solution developed included the use of the Open Health Information Mediator (OpenHIM) and District Health Information System 2 (DHIS2) as analytics platforms. The OpenHIM functions as an interoperability and data exchange layer, supporting the mapping and transformation of incoming data from the MenConnect mobile platform, along with the submission of this data to DHIS2, which is used for reporting of treatment and adherence related indicators.



OpenHIM upgrade on MomConnect

At the end of 2021 and the start of 2022, Jembi worked on an upgrade of the OpenHIM production instance supporting the MomConnect programme in South Africa. This included an update of the OpenHIM production instance and mediators that support MomConnect, NurseConnect and MalariaConnect to the latest release of the OpenHIM, which addresses key security vulnerabilities and dependency upgrades. It also ensures compatibility with DHIS2 upgrades implemented to address critical security and fixes implemented by the DHIS2 core team, along with support for new MomConnect opt-out features.

Country Health Information Systems and Data Use (CHISU) Project

Jembi is a core member of the Country Health Information Systems and Data Use (CHISU) project funded by USAID (see: <https://chisuprogram.org/>). CHISU is led by JSI (John Snow, Inc and JSI Research and Training Institute, Inc), with consortium partners RTI International, Vital Strategies, Macro-Eyes and the Global Evaluation and Monitoring Network for Health (GEMNet-Health).

CHISU aims to strengthen country capacity, leadership, and self-reliance to manage and use high-quality health information systems to improve evidence-based decision-making. To date, CHISU has supported a number of activities, including one health system strengthening in Burkina

Faso and scoping exercises in Serbia, Niger and Mali as well as support for the Global Health Security Agenda in the Middle East and North Africa.

During this period, Jembi participated in the development of two proposals with JSI / CHISU in Indonesia and Madagascar. The project in Indonesia included support for the adoption of the OpenHIE architecture and the national health data dictionary as well as adapting to the FHIR standard. In Madagascar, Jembi proposed to conduct digitisation needs assessment scoping for the National Nutrition Office with the aim of digitising its information systems and procuring ICT supplies to support this digitisation.

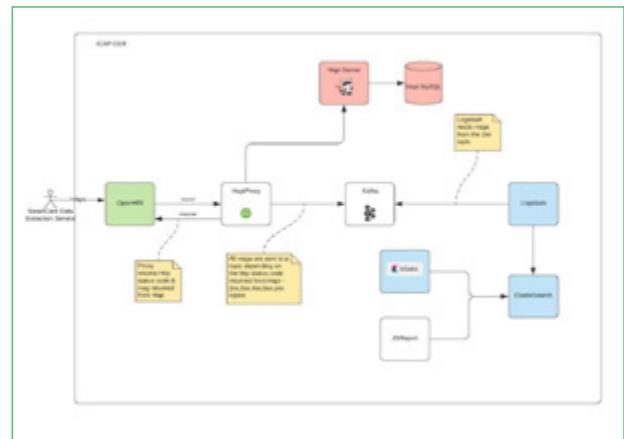
CDR development with ICAP in Ethiopia

Under the ICAP2 project Jembi engaged with ICAP Ethiopia to develop and implement a Central Data Repository (CDR) for Antiretroviral Therapy (ART) monitoring and reporting for the Addis Ababa City Administration Health Bureau (AACAHB).

Collaborative development between Jembi and ICAP teams kicked off with a technical and architectural workshop held on 17 March 2021, where Jembi presented the initial DISI architecture as a proposed solution. The Jembi development team supported the ICAP team with the creation of FHIR profiles for each of the FHIR resources and then worked on creation of the full CDR pipeline.

During the course of development a number of challenges were encountered that necessitated a change in architecture and component choice with the above architecture being adopted.

An initial MVP hosted in Amazon Web Services Cape Town region was demonstrated in July 2021 showing a



complete data flow from the Ethiopian Electronic Medical Record (EMR) system through the CDR system and an initial report. Report development continued based on specifications devised between the Jembi analyst team and the ICAP HIS team. The project continued past the initial contract end date of September 2021 as a no-cost extension and then transitioned under the Ethiopia TAP award from January 2022. During January, February and March 2022, a final UAT process was undertaken and online training provided to ICAP implementation team with further training planned for April/May 2022.

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Digital Square DATIM



Through funding from Cardno and Digital Square, Jembi has continued to support the Data for Accountability, Transparency and Impact Monitoring (DATIM) project, with continued engagement in the Open Health Information Exchange (OpenHIE) international community and support and maintenance of the OpenHIM Interoperability Layer (IOL) solution.

2021/22 Key activities:

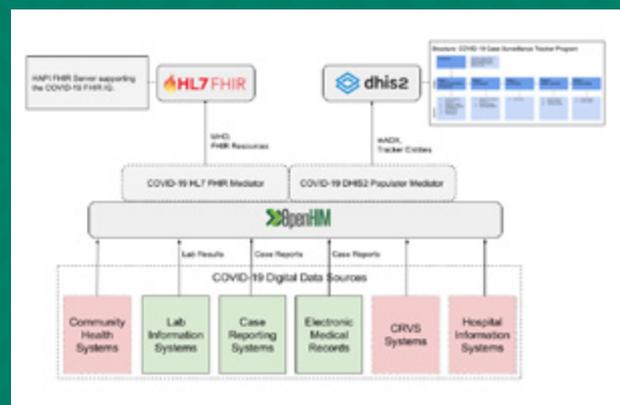
- ✓ Under the banner of Leadership and Advocacy, Jembi continued to engage and lead in the leadership and architecture communities of OpenHIE.
- ✓ Jembi continued work around the broader Community and Reference Tool Curation where it curates the Interoperability Layer (IOL) and Shared Health Record (SHR) communities, and maintains the OpenHIM as an Interoperability Layer reference technology.
- ✓ Collaboration with international teams in providing DATIM Support to the DATIM development project that utilises Jembi's OpenHIM tool.
- ✓ Jembi continued to support the OpenHIE Implementers Network alongside the Regenstrief team.
- ✓ Continued updates and maintenance of the OpenHIM product and documentation.
- ✓ Participation and leadership in the OpenHIE DevOps and Health Financing towards UHC communities.
- ✓ Participation in the OpenHIE Academy community, with the goal of orienting learners to the essential concepts and competencies needed to understand the role of OpenHIE.

COVID-19

Jembi participated in the OpenHIE COVID-19 task force to support community efforts to identify and collate information relating to data standards and exchange relevant to the COVID-19 response, and see how to best adapt and support the use of Jembi-supported tools such as the OpenHIM and Instant OpenHIE to respond to COVID-19.

Through funding from Digital Square, Jembi completed work in June 2021 on a project to adapt and leverage the OpenHIM and Instant OpenHIE to support with COVID-19 data exchange within a health information exchange, promoting the use of open source software and standards to support countries' digital health ecosystems in response to COVID-19.

The scope of work focused on COVID-19 case reporting and submission of lab results, supporting ingestion of case report and lab data, and persistence to both a FHIR data repository and DHIS2, aligned with the World Health



Organization's case report form and use of the HL7 FHIR data exchange standard.

The OpenHIM has been added to various lists highlighting adaptations of global goods to address COVID-19, including Digital Square's COVID-19 Map and Match tool, UNICEF's partnership mapping of relevant digital technologies for the COVID-19 response, and the UNDP Global Centre's COVID-19 Open-Source Digital Toolkit.

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Instant OpenHIE

The Instant OpenHIE project was funded through an investment from Digital Square, with an aim to reduce the costs and skills required for software developers to rapidly deploy a reference OpenHIE architecture, providing a simple way for technical persons to set up a reference Health Information Exchange (HIE) supporting real-world use cases, and allowing users to illustrate how interoperability can work to solve various health challenges.

Instant OpenHIE aims to provide for:

- ✓ Easy demonstrations of key workflows using an HIE based on the OpenHIE architecture.
- ✓ Hands-on and practical training.
- ✓ Reduced costs and skills required for software developers to deploy an OpenHIE architecture for quicker initial solution testing.

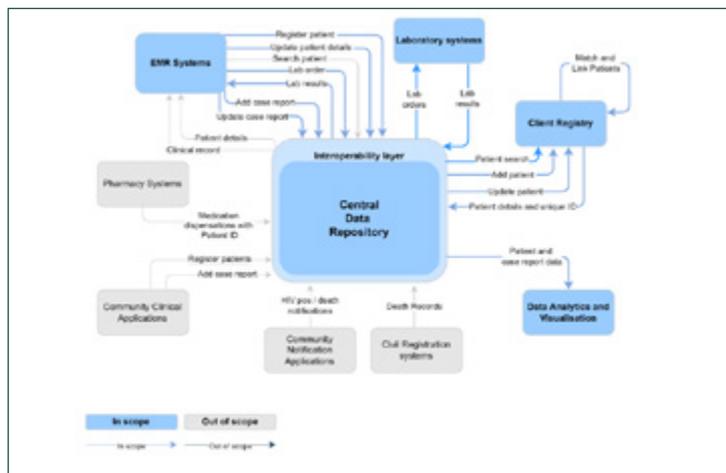
Jembi has partnered with IntraHealth International to work on Phase 1 and Phase 2 of the project. Phase 1 focused on a health workforce use case and development of component packaging, scripting and containerisation to produce a packaged version of the OpenHIE architecture, comprising a set of HIE reference technologies and other appropriate tools. In Phase 2, which was completed at the end of 2021, Instant OpenHIE was extended to include support for a new analytics and reporting use case and relevant workflows and technologies, along with core architecture and packaging refinements, an updated user interface and test harness architecture, and dedicated support for the Instant OpenHIE user community and improved user documentation.

EmptyBoxes project

The EmptyBoxes project is funded through an investment from Digital Square, and focuses on adapting and extending the core Instant OpenHIE solution to support a clinical package, with scripts to set up a containerised set of components and configuration scripts enabling management of clinical data in a Health Information Exchange (HIE).

The project is based on a pilot use case for clinical data exchange between the core Instant OpenHIE platform and CommCare as a point of service mobile application, supporting a set of standards-based clinical data exchange workflows aligned with Integrating the Healthcare Enterprise (IHE) profiles and HL7 FHIR data exchange standards to allow for reuse across other use cases and applications.

Jembi completed work on the project in June 2021, finalising a set of OpenHIM mediators to support the required workflows. Instant OpenHIE was extended to support a Client Registry component and packaging of the workflows, data interfaces and persistence of clinical data, along with user documentation to support general use of the Instant OpenHIE Clinical package.



OpenHIM Strengthening

The increase in digital health in low and middle-income countries has resulted in increasing requirements for interoperability between these systems in order to improve system operation and strengthen data quality. The Open Health Information Mediator – OpenHIM (<http://openhim.org/>) – is a Digital Health Public Good developed and maintained by Jembi Health Systems as an enabler of interoperability in low resource settings.

Jembi received a grant from the Patrick J McGovern Foundation to upgrade, modernise and extend the core technology stack and include a robust entity matching component. This assisted with improving the scalability and maintainability of the software, and enabled Jembi to continue maintaining the software, reach more widely into countries and achieve scale.

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Emmunize Project

GIZ (the German development cooperation) approached Jembi Health Systems to see how they can assist with the development, implementation and roll-out of the enhanced immunisation module for vaccination outreach services.

The enhanced immunisation module is aimed at facilitating easier preparation and implementation of mobile vaccination services, tailoring it to the specific demands of outreach service delivery by providing the following functionality:

- ✔ Generate a list of children due for vaccination in a catchment area.
- ✔ Ensure that the correct amounts of the necessary vaccines needed for an outreach session are packed using an automatically generated list.
- ✔ Identify children who did not receive necessary vaccines so that they can be followed up on to ensure they receive their vaccinations in the future.

GIZ has an innovations fund with the objective of increasing efficiencies through innovation. Innovative ideas that engage with current topics are submitted to GIZ worldwide. The Emmunize concept was selected for funding through the GIZ Innovations Fund in late 2019. Jembi contacted Ona to develop the Emmunize module.

The Emmunize project is a subset of the eRegister project that the Ministry of Health and Population (MoHP) through the Central Monitoring and Evaluation Department (CMED) is implementing with technical support from HISP Malawi and financial support from GIZ.

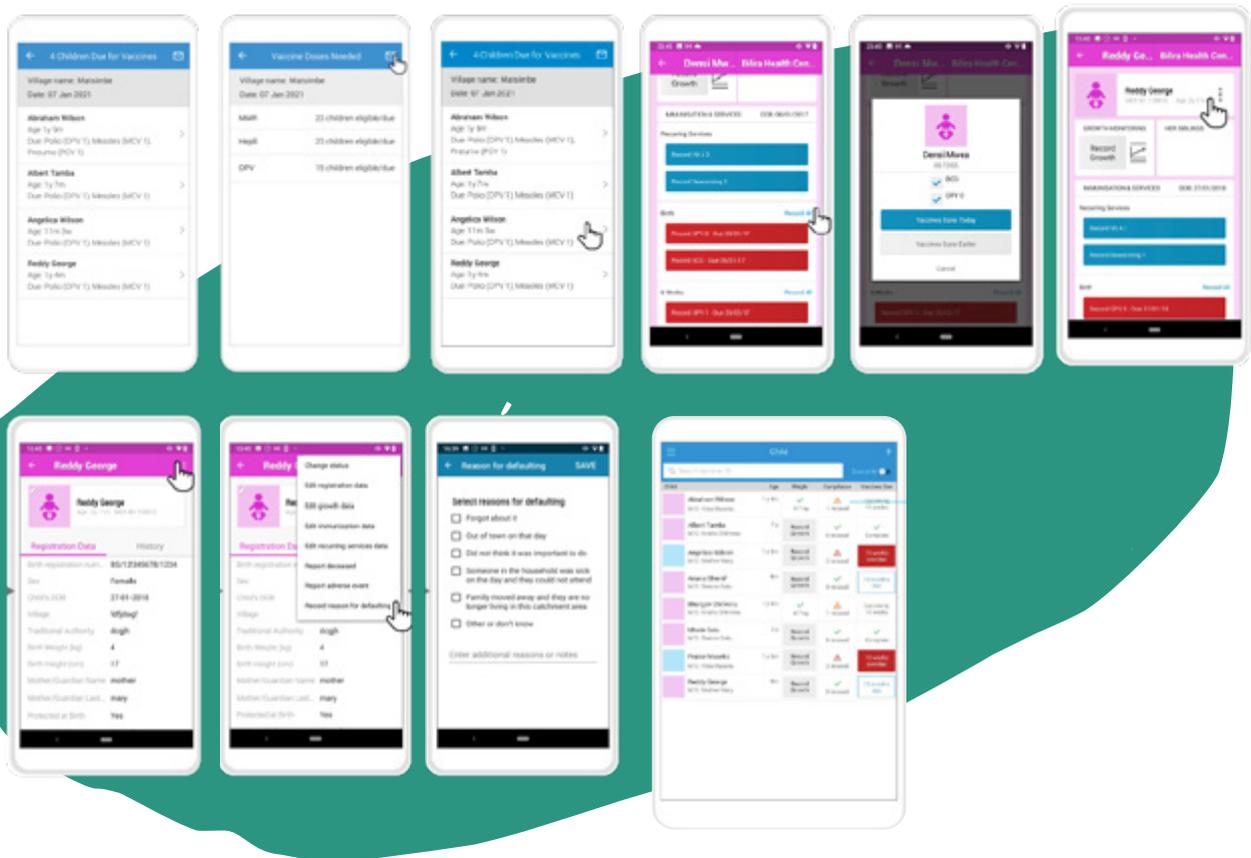
Top left: Clement Nkhoma from HISP making a presentation on Emmunize Malawi. Bottom left: Participants listening attentively to a presentation on Emmunize Malawi. Above: Bilira Senior HSA demonstrating how the tool works.

System Implementation at Bilira Health Center:

- ✔ The final UAT sign-off was delivered on 26 March 2021.
- ✔ ONA conducted the user training on 10 March 2021 with HISP, GIZ and Jembi.
- ✔ HISP trained the users at the health facility on 11, 12 and 15 March and conducted the UAT on 16 March 2021.
- ✔ Training of Trainers Report was shared on 11 March 2021.
- ✔ User Manual was shared by Ona on 23 March 2021.
- ✔ Final Emmunize App delivery – Approved on 26 March 2021. ONA has cut the APK v0.3.0 for production. This was shared with the team by email on 30 March and approved on 31 March 2021. The APK was also posted on the Google Play Store on 1 April 2021. HISP communicated with MoH and stakeholders to plan the implementation at Bilira Health Centre, scheduled for 8 April 2021. The system was then implemented.

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Emmunize App workflow:

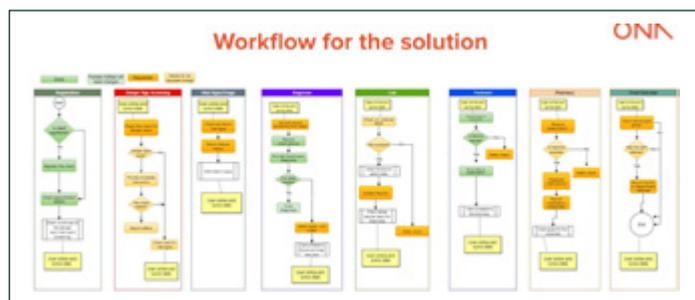


Strengthening Health Systems in Malawi

In February 2019 GIZ contracted Jembi to provide support in the strengthening of health systems related to OPD in health facilities in Malawi by promoting data analysis, interpretation and use through the customisation and implementation of an electronic register system, OpenSRP. Jembi collaborated with GIZ Malawi, the Ministry of Health, ONA and HISP Malawi on this project.

In addition to the installation of the OpenSRP solution, Jembi built a connectivity solution (GSM Connectivity Box) to connect equipment based at a clinic to be able to connect to servers remotely (located at the MoH central data centre or other appropriate hosting service recommended by MoHP) to the clinic.

After the release of ANC, Child Care, Maternity and PNC, the next phase of the project included the release of the new OPD module, as well as Capacity Building on the OpenSRP Platform.

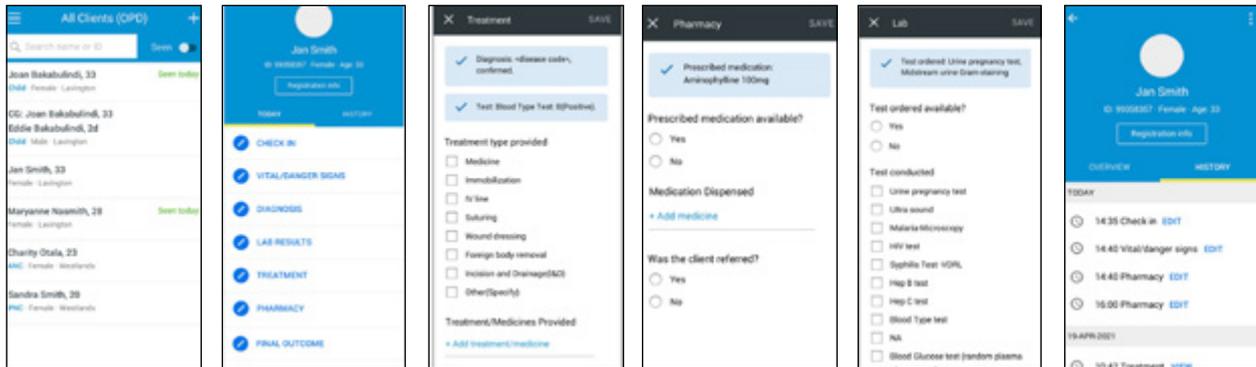


The OPD module focused on:

- ✔ Search function to retrieve patients who have visited the OPD and registration of those that are not found in the system and are visiting the OPD for the first time.
- ✔ Checking in clients to the OPD.
- ✔ Workflow through the OPD which includes vitals and a danger signs check, diagnosis and treatment.
- ✔ Laboratory and pharmacy workflows as integrated in the OPD.
- ✔ Exiting of patients in the OPD through recording of final outcomes, and/or closing the OPD visit.

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Strengthening Health Systems in Malawi (continued)



The OPD functionalities support:

- ✓ OPD workflow in a health facility.
- ✓ Several users at the OPD.
- ✓ Patient handling at several different stations managed by different application users across the OPD.
- ✓ Saving and syncing of records to support decision making at different points in the OPD.

At the end of September 2021, HISP's role transitioned to the new consortium, consisting of management4health (m4h), Compelling Works and CooperSmith. As at the close of the Jembi project in December 2021, the OPD module and the Reports module were being tested in the field with stakeholders including the clinical



Above: OPD UAT Session, Aug 2021.

representatives from the MoH. The new consortium was still in the process of retesting the reports in order to identify if all the issues were resolved.

SAMRC Collaborating Centre for Digital Health Innovation (CCDHI)

Jembi and the South African Medical Research Council continued to support the Collaborating Centre for Digital Health Innovation (CCDHI). This was the final year of a three-year collaboration.

Jembi actively represented the SAMRC in a number of online workshops, panel discussions and presentations on digital health, including:

1 International Federation of Medical and Biomedical Engineers – Clinical Engineering Division – Clinical Engineering and Telehealth's Emerging

Impact Conference (presented and panel discussions).

2 CoMaCH Network – A collaboration between UCT and Cardiff University aimed at Co-Designing Community-based ICTs Interventions for Maternal and Child Health in South Africa.

3 CoCreate SANL – Department of Trade, Netherlands Embassy.

4 CoCreateMYCity – Trade reception virtual panel discussion and networking event by Netherlands Embassy.

5 Stellenbosch and UCT student intern work as well as project thesis reviews.

6 Supported the DSI in Health Innovation and assisted in project evaluation and project proposals.

Over the course of the three-year programme, Jembi worked closely with a number of the SAMRC research units, supporting their proposals in developing pilot projects that relied on digital health technology in delivering research data. Although not all these proposals were successful in being awarded funds, the CCDHI was able

African Health Information Exchange (AHIE)

Jembi continued its work on the AHIE project in South Africa in collaboration with the UCT Centre for Infectious Diseases Epidemiology and Research (CIDER) funded by the Bill and Melinda Gates Foundation. This included work on the Open Integrated Health Platform (OpenIHP).

2021/22 Key activities:

- ✓ Major data entry and forms engine overhaul.
- ✓ Editable line listing reports implementation.
- ✓ Patient radiology data display.
- ✓ Security and audit improvements.
- ✓ Infrastructure and automation implementation.
- ✓ OpenIHP (Open Integrated Health Platform) bug fixes and support.
- ✓ Catch and Match (C&M) support.
- ✓ OpenLHIM (Open Local Health Information Mediator) and TIER (Three Interlinked Electronic Registers) support.

The biggest task for the period in terms of effort was overhauling the data entry and forms engine system. This system allows for the configuration of arbitrary forms for data entry in a variety of contexts. Many

shortcuts were taken over the previous year (2020) to rush functionality to support COVID-19 monitoring and response efforts, since that was obviously extremely time critical. These shortcuts and resulting technical debt needed to be addressed urgently and as soon as the pressure was alleviated. The additional capability was also added to the system in preparation for Maternal and Child Health and Prescription data entry workflows that are planned for the future.

On the reporting side of the application, highly configurable editable line listing reports were added, to allow for monitoring of treatment action lists for TB and COVID-19. These were designed to replace the workflow management that was largely done using Excel documents.

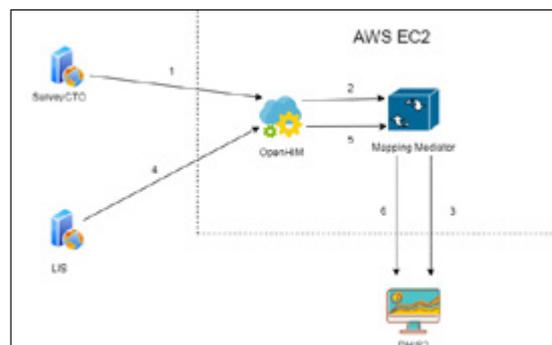
At the start of 2022, the team made significant improvements in internal processes, specifically in the DevOps and automation spaces. A DevOps specialist was hired and started in January, and has taken major steps to improve many of our development processes, both in the best practices and Ways of Working space, as well as in the technical implementation of various forms of automation and automated deployments.

Bug fixes and support are constantly happening for all the applications we are responsible for, including OpenIHP, Catch and Match (C&M), Open Local Health Information Mediator (OpenLHIM) and TIER.Net.

to identify a set of core skills and technologies which most of these proposals lacked. These were outlined and discussed in the Jembi CCDHI Strategy document – a deliverable to the SAMRC as part of the CCDHI award.

In addition to a CCDHI strategy document, a digital health business case was commissioned to assist stakeholders in proposing digital health solutions. The business case was developed in collaboration with HISP South Africa.

Jembi also submitted a strategy and application to SAMRC to continue the CCDHI.



TRACE

During this period, Jembi delivered an end-to-end extract-transform-load (ETL) and reporting system for the TRACE Recency Assay system in the Democratic Republic of Congo. The system consists of an electronic survey system (SurveyCTO) sending data through the OpenHIM and into DHIS2 for aggregate reporting. Laboratory data integration was added as a second phase and the entire system was handed over to the Implementing Partner (ICAP) and in-country technical staff. This was also the first cloud-based native installation of an ETL/Reporting system for Recency with the entire system hosted on AWS (South Africa region).

Mozambique Programme

Overview

During the 2021–2022 financial year, Jembi continued to work closely with the government of Mozambique, the donor community and implementing partners to provide technical assistance to and develop capacity for the health, justice, education and social welfare sectors in information systems, interoperability, monitoring and evaluation, and COVID-19 responses. The Jembi Mozambique portfolio comprises 18 projects funded by 6 donors, including CDC, USAID, the Italian Agency for Development Cooperation, UNICEF, Terre Des Hommes and CARDNO. Jembi Mozambique's institutional partners this year included: The Ministry of Health; the Ministry of Justice, Constitutional and Religious Affairs; the Ministry of Gender, Children and Social Affairs; the Ministry of Education and Human Development; the Eduardo Mondlane University; the World Health Organization; PEPFAR implementing partners; and Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" (IZSAM). An annual budget of over \$US 3 million and, most importantly, a multidisciplinary team of skilled human resources allowed for the satisfactory completion of our annual targets in all provinces of the country.

In order to ensure a safe, secure and healthy environment for our staff in Mozambique, Jembi implemented all COVID-19 measures and their respective revisions communicated by the Government of Mozambique. In addition to the standard measures, Jembi applied important preventive measures according to the specific needs of the organisation. These include: the disinfection of the offices, the purchase of rapid tests, the installation of acrylic desk dividers; support for vaccination of staff and attribution of vaccine certificates in coordination with the Ministry of Health, and the distribution of masks and full body protective equipment to ensure the well-being of staff who were involved in infrastructure installations and expansion activities in the field. These measures allowed Jembi to continue to work with stakeholders and deploy teams to the field.



Dr. Alessandro Campione, the Jembi Programmes Director and Jembi Representative in Mozambique.

The following projects are covered in this report:

1. Electronic Patient Tracking System (EPTS);
2. Help Desk;
3. PEPFAR Systems Documentation;
4. PEPFAR Infrastructure;
5. IT Technicians in the Provinces (ITP);
6. HIS Support to MoH central level;
7. Civil Registration and Vital Statistics (CRVS);
8. Gender-Based Violence (GBV) eIMD system;
9. Voluntary Medical Male Circumcision (VMMC);
10. Capacity Building;
11. Programme Monitoring and Knowledge Management;
12. EducaMoz;
13. UNICEF Child Protection System;
14. Data.FI (Data for Implementation);
15. MINEDH M&E Call Centre;
16. CARDNO Master Trainer; and
17. One Health and Veterinary Sciences.

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Above: The Jembi Mozambique family.

All work plans were successfully completed for the year, which has contributed to the continuation of these projects and additional funding, and has also solidified Jembi's partnership and collaboration with local, regional and international partners.

Jembi Mozambique currently has:



60 staff members



2 offices
in Maputo



1 warehouses
with high quantities of HIS equipment and hardware



7 4x4 vehicles



2 camping trailers



2 motorcycles

1. Electronic Patient Tracking System (EPTS)

The Electronic Patient Tracking System (EPTS) is the main PEPFAR system used to collect data on HIV patients and manage medical records in health facilities, producing quality data for PEPFAR reporting and for MoH Health Management Information systems (HMIS). Jembi has been updating, harmonising and centralising the OpenMRS EPTS platform in collaboration with Friends in Global Health (FGH), the Ministry of Health (MoH), and other PEPFAR clinical partners under CDC coordination and funding. Jembi and FGH have been working collaboratively to ensure that the data collection and reporting of all PEPFAR clinical partners is harmonised, updated, and data are produced through a certified practice to guarantee quality data for quarterly, semi-annual and annual PEPFAR and MoH reports.

Key results:

- ✓ Elaboration of the template in EPTS for the Summary of the Psychosocial support and positive prevention (APSS/PP) activities of the MoH.
- ✓ Gathered the requirements and documentation for the MQ Report (Quality Improvement Report).
- ✓ Completion of all EPTS quarterly releases with their respective documentation.
- ✓ Elaboration of the User Stories for all PEPFAR and MoH indicators.
- ✓ Development of MER Semi-Annual Report completed.
- ✓ Completion of all MoH reports development for quarterly releases.
- ✓ Demo made to MoH, CDC and Partners on 22 September 2021.
- ✓ All quarterly EPTS releases were installed at the MoH.

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2. Help Desk

The Help Desk and Support Service led by Jembi in Mozambique since October 2018 is a central platform and service centre for reporting technical issues related to health information systems and infrastructure supported by PEPFAR. It is a communication service among the different departments of Jembi (BA, developers, implementers, infrastructure and logistics), users, and all clinical and partners of PEPFAR. It solves a wide range of problems through a complex, standardised and organised workflow, with strict roles of confidentiality and security and regular M&E and statistics production for reporting. The Help Desk has a total of 137 users and 37 agents (Support Agents, Lights and System Administrator) from 21 organisations and institutions, including CDC, Jembi, Nweti, EGPAF, JhPiego, FGH, National Institute of Health (INS), ICAP, Ariel, CCS, USAID-ECHO, ECHO Moz, M2M, Ministry of Justice, DIMAGI, World Education, DoD, APHL, Vukoxa and FHI-360.

Key results:

- ✓ During this year, 97% of tickets received were addressed and closed.
- ✓ Change of Help Desk Domain from Jembi to <https://helpdeskmoz.sis.org.mz/>.
- ✓ Training for 9 National Institute of Health focal points in the provinces and for 4 INS and ICAP agents.
- ✓ Training of 34 Help Desk users (e-IMD system).
- ✓ Training of 10 Help Desk support agents.
- ✓ Training of 61 (23 new) staff from PEPFAR Implementing Partners as Help Desk Users.
- ✓ Integration of e-IMD GBV system.
- ✓ New systems added to the Help Desk managed by Jembi include:
 - iDART Mobile;
 - VMMC Demand Creation App;
 - VMMC System;
 - PEPFAR Dashboards;
 - EPTS Mozart data transfer; and
 - SIOS (Health Observation Information System).
- ✓ Help Desk managed by the Jembi team surpassed the 1000 ticket mark since the beginning of the project in October 2018.
- ✓ New systems were integrated as required by CDC.

3. Pefar Systems Documentation

Since October 2020, Jembi has been given the task of supporting the development, update and revision of technical documentation and manuals related to the HIS systems supported by PEPFAR, which include:

- **EPTS:** The Electronic Patient Tracking System, the main PEPFAR system used to collect data on HIV patients and manage medical records in health facilities.
- **iDART:** Software solution designed to support the dispensing of ARV drugs in the public health care sector. It supports pharmacists in their important role of dispensing accurately to an increasing number of patients while being able to engage and assist the patient. Designed for desktop, mobile and web platforms.
- **DREAMS:** The Determined, Resilient, Empowered, AIDS-Free, Mentored and Safe project, better known as DREAMS, is an initiative supported by PEPFAR, BMGF and Girl Effect. DREAMS is a holistic approach to primary HIV infection, involving community and clinical implementation partners (IPs), who implement high-impact interventions to protect girls and adolescent women from HIV infection. The DREAMS Layering Tool (DLT) is a web-based information system, specifically designed and developed for the DREAMS project. Its aim is to allow efficient recording of relevant data about DREAMS, avoid manual data collection tools that can represent an extra burden, and generate electronic reports to respond to programme indicators, reports, and interest lists. These

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reports help locate, measure, coordinate and report on HIV prevention interventions provided by community and clinical partners in Mozambique.

- **GBV (e-IMD):** The gender-based post-violence care assessment and monitoring system seeks to generate indicators that ensure that the care offered to victims of violence is accessible, of high quality and that the infrastructure, equipment and services are available.
- **VMMC:** The Voluntary Medical Male Circumcision system allows for the recording of data from men interested in the VMMC programme, as well as the recording of follow-ups during and after the circumcision process, research of existing data, and development of automated and intelligent reports for monitoring and evaluation data for strategic decisions.

Key results:

- ✓ iDART user manuals (desktop, mobile, iDMED) updated.
- ✓ DREAMS Layering Tool user manual updated and completed as requested.
- ✓ EPTS user manual updated for all quarterly releases.
- ✓ EPTS admin manual completed for all releases.
- ✓ GBV eIMD user manual completed according to all versions; DHIS2 version ongoing.
- ✓ VMMC manual completed.

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Jembi manages over 1,000 pieces of equipment in its Maputo warehouse, using asset management software.

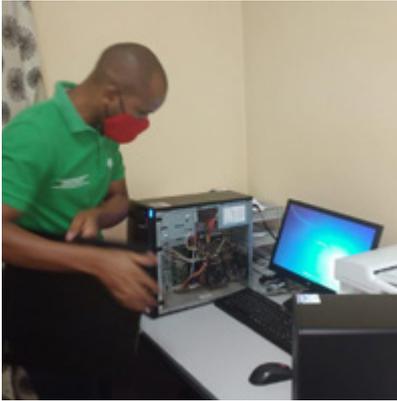
4. PEPFAR Infrastructure

Jembi is responsible for supporting the standardisation, procurement, installation, implementation, maintenance and storage of PEPFAR infrastructure and equipment used for health information systems across Mozambique. The Jembi team defines equipment specifications, carries out all procurement and acquisition processes and readiness assessments in the field, and delivers and installs the equipment along with clinical partners in several provinces of the country. The equipment and materials include servers, desktops, SIS Compact stations, UPS, scanners, barcode scanners, printers, routers, cables, solar panels and any other equipment that may be required for the sustainable and uninterrupted use of health information systems supported by PEPFAR. Jembi manages over 1,000 pieces of equipment in its Maputo warehouse, using asset management software. Jembi staff that worked in the field during the COVID-19 pandemic were given all required PPE and first-aid kits in order to prevent any form of infection on-site.

Key results:

- ✓ Procurement and purchase of over \$US 650,000 of supplies for PEPFAR HIS projects in less than 3 months.
- ✓ Completed the transition of Point of Care equipment to PEPFAR partners and the MoH.
- ✓ Jembi delivered technical equipment to CCS, EGPAF, ICAP and ECHO.
- ✓ Conducted the readiness assessment and installation of technical equipment in 11 Health Facilities of Inhambane Province.

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Center) of the Province of Zambézia, held in the district of Chiure.

- ✓ Technical support at the meeting of the IV Hospital Council in Inhambane Province.

- ✓ Participation in coordination meetings between the health sector and cooperation partners in Gaza.

- ✓ Participation in the integrated supervision meeting in two districts (Mandlakazi and Massingir).

- ✓ Participation in the Data M&E process in the Districts of Morrumbene, Massinga, Panda and Homoine in Inhambane Province.

- ✓ Distribution of 38 new computers, installation of SIMAM and backup of the SIMAM database in the districts of Chibuto, Guijá, Chokwé, Mabalane, Mapai, Chicualacuala, Bilene and Xai-Xai (Provincial Hospital, Xai-Xai City Health Centre and District Depot).

- ✓ Remote support in entering data into the Hospital Data Management Module (MGDH) in four provinces.

- ✓ Participation and technical support in the Provincial Statistics Meeting in Gurué.

5. IT Technicians in the Provinces (ITP)

Through its IT technicians seconded to the Provincial Health Directorates (DPS) of 6 provinces of Mozambique, Jembi has supported the MoH in the maintenance and use of HIS hardware and software as well as health statistics reporting in the provinces and districts. IT technicians to the provinces (ITPs) rendered routine support in the 6 provinces for the entire year with 933 hardware and software maintenance interventions and resolved 100% of the requested technical interventions at the DPS level.

Key results:

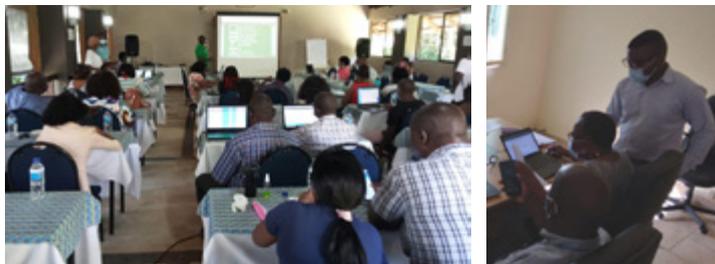
- ✓ 933 maintenance interventions carried out to provincial and district level IT infrastructure and equipment by IT technicians in the provinces, 633 of which were corrective and 300 preventive.
- ✓ 37 technicians trained by Jembi IT technicians in the provinces (ITPs) on the national monitoring

and evaluation system of the health sector (SIS-MA).

- ✓ Quarterly data of 12 vitrines of the District Service for Health, Women and Social Action (SDSMAS) were updated with the support from Jembi ITPs.
- ✓ Supervision and technical support in the training/refreshing of community health workers (APEs) supervisors of the health facilities in the district of Mocuba and Lugela.
- ✓ Participation in the training/induction meeting of new district directors, and district and administrative chief doctors in the district of Mocuba.
- ✓ Support and participation in the SISMA workshop in Gurué.
- ✓ Participation in the provincial meeting of the HIS with all NEDS (District Health Statistics

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Below: Jembi Technical Coordinator and Trainer, Marcelino Mugai, at ICD-10 training in Marracuene with MoH trainees.



6. HIS Support to the MoH

Jembi has been providing direct technical assistance to the Ministry of Health through its three senior technicians seconded to the Department of Health Information (DIS), supporting all national HIS development needs as well as monitoring and evaluation of health statistics efforts. Jembi technicians also provide on-the-job training where required to ensure the sustainability of HIS developed for the country.

Key results:

- ✓ Training in the expansion of the Hospital Data Management Module.
- ✓ Electronic Patient Tracking System installed at the Ministry's Department of Information Technology on a quarterly basis.
- ✓ 100% of technical requests solved by senior developers seconded to the MoH.
- ✓ Data analysis and elaboration of monthly bulletin reports with national health statistics.
- ✓ Jembi senior technicians participated in the MoH National COVID-19 vaccination programme – recording statistical data in SIS-MA for the provinces of Tete and Nampula.
- ✓ Support for COVID-19 vaccination programme supervision and statistical data in the provinces of Tete and Nampula.
- ✓ Jembi supported the elaboration and revision of the National Health Information Policy.
- ✓ Jembi participated and supported the National HIS Meeting attended by high level government officials and technicians specialised in HIS and associated areas.

7. Civil Registration and Vital Statistics (CRVS)

Jembi supports national CRVS initiatives through the Interinstitutional Vital Statistics Working Group (GITEV) and the Ministry of Justice, Constitutional and Religious Affairs (MJCR) and provides technical support in the interoperability between eCRVS (SiRCEV) and the Hospital Data Management Module (MGDH) of the MoH. Jembi in collaboration with the University Eduardo Mondlane attended several high level meetings of GITEV as members to ensure proper coordination and planning of national CRVS strategies in Mozambique. Jembi has also been supporting improvements to SiRCEV functionalities and assisting in the overall maintenance of the system. For the first time in Mozambique, mortality data from the hospital data management is available in the national eCRVS system after Jembi helped develop and successfully pilot the interoperability solution in the Mavalane Hospital of Maputo City. Following the pilot's visits, there was a request for Jembi to continue supporting the expansion of the interoperability solution to seven other provinces of Mozambique.

Key results:

- ✓ Jembi developed the interoperability solution between SiRCEV (electronic CRVS system) of the Ministry of Justice, Constitutional and Religious Affairs (MJCR), and the Hospital Data Management Module of the National M&E system for the health sector SISMA.
- ✓ Jembi supported system updates and improvements in SiRCEV functionalities.

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7. Civil Registration and Vital Statistics (Continued)

Key results:

- ✓ Jembi developed the user guide on the use of the interoperability solution and introduced it into the SiRCEV User Manual.
- ✓ Implementation of the interoperability solution with the MJCR in 16 sites in 4 provinces: Zambézia, Inhambane, Maputo and Manica.
- ✓ Consolidation of International Classification of Diseases (ICD-10) training package with the Ministry of Health and the World Health Organisation.
- ✓ Jembi supported the training of 105 health technicians in ICD-10 in coordination with the MoH and WHO to improve the quality of mortality statistics.
- ✓ Successful pilot of the interoperability solution between SiRCEV and SISMA MGDH at Mavalane Hospital.



8. Gender-Based Violence (GBV) eIMD System

The gender-based post-violence care assessment and monitoring system (GBV) seeks to generate indicators that ensure that the care offered to victims of violence is accessible, of high quality and that the infrastructure, equipment and services are available. This project was recently added to the Jembi portfolio by PEPFAR. During this financial year, Jembi acquired all the existing documentation and information from the system to continue its development and maintenance.

Key results:

- ✓ Jembi conducted a rapid assessment of the existing system to identify possible gaps in the documentation, source code and infrastructure.
- ✓ Jembi technicians were fully trained on the existing system to be able to operate it and, at a later stage, re-engineer the system into a DHIS2 version.
- ✓ Managed and fixed errors and bugs in the first version of the GBV system.
- ✓ Supported two releases of the first version of the GBV system.
- ✓ Elaborated the full work plan for the development and maintenance of the DHIS2 version of the system.
- ✓ Supported the maintenance of the central infrastructure of the GBV e-IMD application at the MoH.

Top: Jembi Senior Implementer and Trainer, Martins Miranda, supporting e-IMD Gender-Based Violence training. *Above:* MoH staff at e-IMD Gender-Based Violence Training supported by Jembi.

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9. Voluntary Medical Male Circumcision (VMMC)

The Government of Mozambique, together with its cooperation partners, has resolutely recognized the role of Voluntary Male Medical Circumcision (VMMC) as a crucial HIV prevention tool. In this context, PEPFAR Mozambique has set large achievable targets, to reach 80% of men aged between 15 and 29 years, which is the group where VMMC is expected to have the greatest impact on reducing HIV transmission.

In order to meet targets, as well as monitor and follow up the services provided to heterosexual men who undergo Voluntary Male Medical Circumcision, the Implementing Partners have developed an electronic system that allow the assessment of the patient and the monitoring of the project's activities.

The VMMC system is currently supported by Jembi, which is responsible for the development, hosting, maintenance and technical support of the VMMC system in

collaboration with PEPFAR CDC HIS and the Ministry of Health (MoH). It is currently under a quarterly release cycle.

Key results:

- ✓ VMMC project charter completed.
- ✓ Analysis and mapping of the system vs requirements.
- ✓ Cloud hosting services completed with Internet Solutions Company.
- ✓ VMMC system migrated from ICAP infrastructure to the Internet Solutions server.
- ✓ User Manual completed.
- ✓ Training materials developed.
- ✓ Training of VMMC users and administrators.



The Implementing Partners have developed an electronic system that allow the assessment of the patient and the monitoring of the project's activities.

- ✓ Conducted a DEMO of the current system to the CDC_VMMC programme and MoH VMMC programme staff.
- ✓ Successfully released the VMMC system version 1.1.0.

10. Capacity Building

Training and recruitment of local staff has been at the centre of Jembi's support to national institutions in Mozambique in partnership with Eduardo Mondlane University, CRDS (Regional Center of Training in Health), and the Ministry of Labour. This is to ensure local ownership and project sustainability. Since 2011, Jembi has trained and supported the training of professionals in the National Health System and several other sectors. A total of 3,264 professionals were trained in various courses such as SISMA, SISH, SISROH, ICD-10, DHIS2 Academy, OpenMRS Academy, Project

Management, Health Statistics, Basic and Advanced Excel, Basic Computer Literacy, English, Solar Panel systems, Help Desk, EPTS / SESP, eIMD GBV and the VMMC system.

As a partner of the Ministry of Labour through the National Institute of Employment and several local universities, Jembi's internship programme hosted 7 interns this year of which 2 were hired as full-time staff, including 3 Junior Developers. Jembi will continue investing in building local capacity to ensure project sustainability and ownership by the

Mozambican people. The Jembi Mozambique team of 60 staff is 95% Mozambican and has been trained in several technical, managerial and administrative areas to keep improving its performance. Part of Jembi's capacity-building activities includes attending conferences and events for information sharing and expanding the network of partners and collaborators. This past year, 10 Jembi staff participated at the Virtual OpenMRS Conference. At the conference, Jembi led an unconferencing session on the OpenMRS Academy Sustainability Strategy.

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10. Capacity Building (continued)



Key results:

- ✓ Jembi/UEM-Moasis has trained 3,000 professionals of the National Health System in Mozambique since 2011.
- ✓ 10 Jembi staff participated in the 2021 OpenMRS Virtual Implementers' Conference:
 - Jembi participated as a leading member of the OpenMRS community and Bronze Sponsor of the conference.
 - Presentation of the OpenMRS Academy Sustainability Strategy conducted in an unconferencing session.
- ✓ 7 Jembi technicians participated at the DHIS2 Virtual Academy on 21–25 June 2021.
- ✓ 54 users of the Voluntary Medical Male Circumcision System (VMMC) from partner Jhpiego and MoH, along with Jembi administrators were trained in the use of the Voluntary Medical Male Circumcision System (VMMC) in October 2021.
- ✓ A total of 150 users of the Help Desk managed by Jembi were trained by Jembi staff as agents and users of the Help Desk platform.
- ✓ A total of 119 technicians, including GBV focal points, partners who support the respective provinces and the people in charge of the statistics core were trained on the eIMD GBV tool.
- ✓ 2 interns completed the following courses: DHIS2 Fundamentals, PHP Level 1, MySQL Level 1, HTML, Scrum Fundamentals and Webmin.
- ✓ 17 MoH (DTIC, DIS), CDC and CCS (PEPFAR implementing partner) technicians trained in GBV eIMD tool.
- ✓ 3 members of the Jembi Mozambique Help Desk completed the Intermediate English course and are now able to communicate with partners through the Help Desk channel.
- ✓ Jembi Staff participated in the OHRI Fundamentals Bootcamp from 7 September to 21 October 2021.
- ✓ 9 technicians from the Central Level participated in the training of trainers on the use of the Real Time Monitoring System (SMTR), in February; 16 technicians trained in the use and maintenance of the Asteristic Call Centre in February 2022, 19 technicians at the Provincial Level and District were trained in the use of the SMTR system.
- ✓ 2 members of the Jembi Mozambique monitoring and evaluation (M&E) team completed a certified Advanced M&E course.
- ✓ Jembi supported the MoH with ICD-10 training in coordination with the WHO and the Ministry of Health in the Provinces of Nampula, Niassa and Inhambane, in the following districts: Nampula, Nacala, Inhambane, Maxixe, Cuamba and Lichinga.

11. Programme management and performance monitoring

The programme management and performance monitoring is carried out by Jembi's Monitoring and Evaluation team, which is responsible for routine performance monitoring, knowledge management, and dissemination of relevant information and compliance with PEPFAR CDC dissemination policies, as well as updating and regularly maintaining the Jembi Mozambique website.

Key results:

- ✓ Full evidence-based performance evaluations carried out.
- ✓ Previous CoAg close-out.
- ✓ Jembi knowledge management protocol updated.
- ✓ All reports elaborated and submitted.
- ✓ Publication of the Jembi newsletters.
- ✓ Monthly Agenda Updates with project coordinators for all projects.
- ✓ M&E dashboard updated for all projects.

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12. EducaMoz

The Terre des Hommes Foundation (Italy) in collaboration with several partners, including Jembi/UEM-mOASIS, carried out the closing of the EducaMoz project, and disseminated the final results and products of the AID 11,518 EducaMoz project – Inclusive Pre-School Education of Quality in Mozambique, co-financed by the Italian Agency for Development Cooperation.

The EducaMoz project, which had as beneficiaries the institutions of the Ministry of Gender, Children and Social Action (MGCAS), had as its main objectives to raise the quality of inclusive preschool education services, improve the professional training of kindergarten teachers and strengthen an innovative information tool system for government monitoring.

In three years, the following results were achieved:

- ✔ 41,300 Children from 0 to 5 years old have access to an inclusive and quality education through the improvement of the pedagogical skills of 1,120 kindergarten teachers.
- ✔ 100 Women improved their professional skills and working conditions through the training and qualification of caregiver mothers within the scope of the pre-school education system in Mozambique.

Jembi-UEM/MOASIS supported the project in strengthening the MGCAS data retrieval and reporting



Clockwise from top: Participants at the EducaMoz Closing Event. Jembi Mozambique Chief of Operations, Marina Chichava being interviewed by Mozambique's National Television TVM at the EducaMoz Programme Closing Event. Italian Cooperation Director, Ministry of Gender, Children and Social Affairs National Director and Terre Des Hommes Director at the EducaMoz Closing Event.

capacity through the expansion of the Monitoring and Evaluation Information System (SI-M&A), which was extended to eight districts of the Province of Sofala, with the training of 333 technicians in the sector. In this sense, the objective was to provide public services with a reliable system and to strengthen advocacy actions in the area of early childhood.

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13. UNICEF Child Protection System

Following a successful bid, Jembi was awarded the project by UNICEF to support the government of Mozambique across sectors in a feasibility study for the establishment of an integrated computerised system for the management of the National Registry for Child Protection, and to support the development of terms of reference for the best technological solution. Jembi conducted the feasibility study in three provinces, namely Maputo Province, Tete and Nampula.

For the assessment, the Jembi team interviewed key staff from several institutions, including: the Ministry of Gender, Children and Social Affairs; the Government National Institute; the National ICT Institute; the National Institute of Communications at the central level; the Supreme Court; the Juvenile Court, Provincial courts, District and Provincial level directorates of the Ministry of Gender, Children and Social Affairs; and pre-schools at the provincial level.

Key results:

- ✔ Assessment protocol developed.
- ✔ Legislative landscape assessment done.
- ✔ Stakeholders mapping done.
- ✔ Software mapping report done.
- ✔ Analysis of requirements for child protection computerised systems done.

14. Data.FI HIV Programme Dashboard

Jembi is collaborating with Palladium in Mozambique under the Data.FI (Data for Implementation) project to develop and implement a dynamic dashboard for the MoH HIV Programme. The Data.FI aims to improve global, regional and national in-depth analyses of HIV epidemiologic and programme data which can be directly applied to expedite the achievement of PEPFAR targets to attain and sustain control of the HIV epidemic. The focus also includes directly supporting host country governments to further enhance existing health information system platforms to inform management responses to well-defined gaps in HIV/AIDS programming.

Key results:

- ✔ System requirements and hardware technical specifications elaborated, reviewed and translated.
- ✔ Extraction and mapping of indicators for five programmatic areas, including Care and Treatment, APSS, PP, ATS, PMTCT.
- ✔ ETL (Extract, Transform and Load) tool reviewed, tested and ready for use.
- ✔ Dashboard developed, demonstrated to the MoH and reviewed for the Care and Treatment programmatic area.
- ✔ The 2021–2022 work plan (Year 2), scope of work and budget are being negotiated with Palladium to complete the training and deployment phase.

15. Unicef-Ministry of Education Real Time Monitoring System

After a successful tender, Jembi was awarded the UNICEF project to support the Ministry of Education and Human Development (MINEDH) and the Global Partnership for Education (GPE), to respond to the COVID-19 pandemic and accelerate the process of recovery from the damage caused by Cyclones Idai and Kenneth by establishing the infrastructure and technology for a real-time monitoring system. MINEDH is coordinating a comprehensive and integrated response with its cooperation partners, aiming to prepare

students and teachers for the safe resumption of classes and, at the same time, renovate classrooms and improve the basic conditions of Water, Sanitation and Hygiene (WASH).

To monitor this process, MINEDH, with the technical support of Jembi Health Systems, is currently implementing a Real Time Monitoring System (SMTR) through the establishment of the call centre at MINEDH, and the installation and configuration/strengthening of network infrastructure.

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Key results:

- ✔ Detailed schedule submission and performing a readiness assessment completed;
- ✔ Elaboration of terms of reference for the installation of electronic security equipment completed.
- ✔ Elaboration of installation proposal (including floor, electrical and network plans, network and electrical descriptions) completed.
- ✔ Elaboration of the network architecture completed.
- ✔ Procurement of material, equipment and installation services, configuration, training and security support completed.
- ✔ Equipment procured, acquired and installed.
- ✔ Installation of biometric control units and fire fighting system completed.
- ✔ Certification of installation and configuration of the biometric control units and fire fighting system completed.
- ✔ Completed electrical installation in all compartments where the equipment will be installed.
- ✔ Network Architecture staging (development of execution codes, simulation and testing of the network architecture).
- ✔ Installation and configuration of servers (Configuration of NAS Storage, VMware, vCenter and vSphere) completed.
- ✔ Completed installation and configuration of network equipment (Router, Switch and Firewall).
- ✔ Service Centre staging completed (development of execution codes, simulation and testing of the Asterisk Call Centre service centre).
- ✔ Installation and configuration of Asterisk Call Centre Solution.
- ✔ Platform architecture document review completed.
- ✔ Review of forms and reports for SMTR completed.
- ✔ Ongoing configuration and installation of the development and testing environment.
- ✔ Development of forms in ODK Web with relational integrated database and Mobile functionality (Android and RapidPro).
- ✔ Development of tool or mechanism to extract data from rapidPRO to power BI completed.
- ✔ Elaboration of terms of reference and training programme for MINEDH technicians completed.
- ✔ Conducted training of trainers to 4 MINEDH technicians about the SMTR system.
- ✔ Coordinated training for the users of the SMTR system to 19 trainees from provincial and district level.
- ✔ Conducted training about the use and maintenance of the Asterisk call centre to 16 trainees, technicians from MINEDH.
- ✔ Reviewed the ODK, power BI and monitoring and evaluation manuals and training materials.
- ✔ Elaboration of the Rapid PRO manual completed.

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MINEDH is coordinating a comprehensive and integrated response with its cooperation partners, aiming to prepare students and teachers for the safe resumption of classes.



Handover of Equipment to set up Call Centre at the Ministry of Ministry of Education and Human Development (MINEDH).

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Above: Jembi Mozambique Senior Advisor, António Sitoi with Dr. Mouzinho Saïde, Director of the Central Hospital of Maputo, and Dr. Cesaltina Lorenzoni, Scientific Director at Central Hospital of Maputo.

16. Cervical Cancer Capacity Building

Jembi partnered with Cardno in Mozambique to support a gynaecologist Master Trainer for Cervical Cancer capacity building in Mozambique. Jembi rendered administrative, contract management, logistics and monitoring and evaluation services to the project for 15 months as the Master Trainer led regional training for cervical cancer prevention and treatment.

The MD Anderson-PEPFAR-Cardno partnership, in collaboration with Jembi/UEM-mOASIS through the support of the National Cancer Programme, donated health equipment and materials to the MoH, which helps the clinical diagnosis of cervical diseases and support to the centre of health training and research at the Central Hospital of Maputo. **The donated materials include:** 6 laptops, 12 HP Dual Core desktops, 3 projectors, 8 screens, 4 speakers, 4 cameras, 2 laser pointers, 6 printers, 4 wireless modems, 6 CPR dummies, 6 specula, 4 LUCIA Kits, 500 protection masks, 100 visors, 600 gloves, 3 colposcopy atlases (febrasgo collection), 6 whiteboards, and 12 movitel internet refills.



Jembi Mozambique Programme Manager, Ivan Pinto, M&E and Communications Specialist, António Macheve Junior, and Programmes Director, Dr. Alessandro Campione.

17. One Health and Veterinary Sciences

The ERFAN, or Enhancing Research for Africa Network, is a scientific network of African and Italian veterinary institutions promoting collaborations and coordination to address health priorities in Africa. As a co-founder of the ERFAN network and avid proponent of the One Health approach to solving health problems, Jembi Health Systems participated in the 2021 virtual ERFAN Dialogue where Programmes Director, Dr. Alessandro Campione, Mozambique Programme Manager, Ivan Pinto, and M&E and Communications Specialist, António Macheve Junior, contributed to the dialogue with a presentation on the impact of disease surveillance on Public Health interventions and described the epidemiological situation in Southern Africa in the context of the COVID-19 pandemic. The meeting was held virtually on 6 December 2021. It was attended by representatives from the African National Veterinary Laboratories and Veterinary Schools of Algeria, Angola, Botswana, Egypt, Ethiopia, Italy, Libya, Mauritania, Morocco, Mozambique, Namibia, Senegal, South Africa, Sudan, Tanzania, Tunisia, Zambia and Zimbabwe. The OIE (World Organisation for Animal Health) Sub-Regional Representations for Southern Africa and North Africa attended the meeting and highlighted the high value of networking in achieving ERFAN's objectives as a project supported by the OIE.

Mozambique Programme

18. Social Events and Institutional Development



Jembi Mozambique Family (Office 1 staff).

Jembi Mozambique Year-end Function

Since the beginning of the COVID-19 pandemic, the Jembi Mozambique team had no opportunities to socialise outside of the office environment as a full unit due to the mobility and social distancing restrictions. Once the government lifted restrictive measures, the Jembi team gathered at Complexo Palhota in Matola, Mozambique for an evening of team-building, joy, dance and relaxation.



Mozambican Women's Day

The celebration of Mozambican National Women's day has become a tradition at the Jembi Mozambique office. It is known as National Women's Day because this day marks the anniversary of Josina Muthemba Machel's death on 7 April 1971. Josina was a key figure in the struggle for the emancipation of African, and specifically Mozambican, women. Women spend this day dressed in cultural attires, wearing sarongs locally known as capulana. The Jembi Mozambique women were no different; they all dressed in capulanes and enjoyed a local Mozambican dinner together.



CDC visited Jembi/UEM-Moasis offices in Maputo

Ms. Rachel Murray, the Project Officer of the Partner Management Branch, and Mrs. Rosária Beete, Cooperative Agreement Specialist at CDC Mozambique, visited the two Jembi/UEM-mOASIS offices and the warehouse in Maputo for a meet-and-greet with the staff. As a representative of one of the main funders of the Jembi/UEM-mOASIS projects in Mozambique, the CDC delegation was introduced to the organisation's key health information system projects and other initiatives explored in Mozambique.

Dr. Alessandro Campione, Jembi's Programmes Director, highlighted some of the projects that have been producing tangible results in the past 11 years and have paved the way for further engagement, in the current cooperative agreement until 2025 to support the strengthening of information systems and interoperability in crucial national institutions such as the Ministry of Health and the Ministry of Justice, Constitutional and Religious Affairs.

2

Publications & Presentations

Publications



Fraser HSF; Mugisha M; Remera E; Ngenzi JL; Richards J; Santas X; Naidoo W; **Seebregts CJ**; Condo J; Umubyeyi A.

User Perceptions and Use of an Enhanced Electronic Health Record in Rwanda With and Without Clinical Alerts: Cross-sectional Survey.

JMIR Med Inform. 2022 May; 10(5): e32305.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9115652/>



Campione, A.

COVID-19 Data Gaps in Africa Unveil the Challenges in the Pandemic's Response.

Quotidiano sanità. February 2022.

<https://www.moasis.org.mz/en/publications/articles/>

Presentations

29 March 2021

📍 **WEBINAR UK Royal College of Medicine**

Interoperability for system resilience // By Koczan, P., Davis, E., Foster, R., Bota, A., Foley, G., Daniel, C., Nchabeleng, M., Biddulph, B., Booth, N., **Seebregts, C.J.**, Solomon, W. Flaszman, C. and Boule, A.

September 2021

📍 **National Health Sector Conference, “Jornadas de Saúde”**

Interoperability between eCRVS and the Mortality System of the Health sector in Mozambique // By Mugai, M.

3

Corporate Services

General review of operations

Jembi Health Systems NPC (“Jembi”) had an increase in both income and expenditure during the financial year running March 2021 to February 2022 which is explained in further detail in the Chair and CEO reports. Jembi’s planning works around a five-year cycle that also links into the period of our funding awards. In October 2021 Jembi moved into year two of our new five-year COAGS with CDC. Jembi feels very fortunate in today’s trying times to have been able to enter into year two of our COAGS and in addition to many shorter projects starting within this new cycle. This cements Jembi’s ongoing situation as a going concern as we enter FY23.

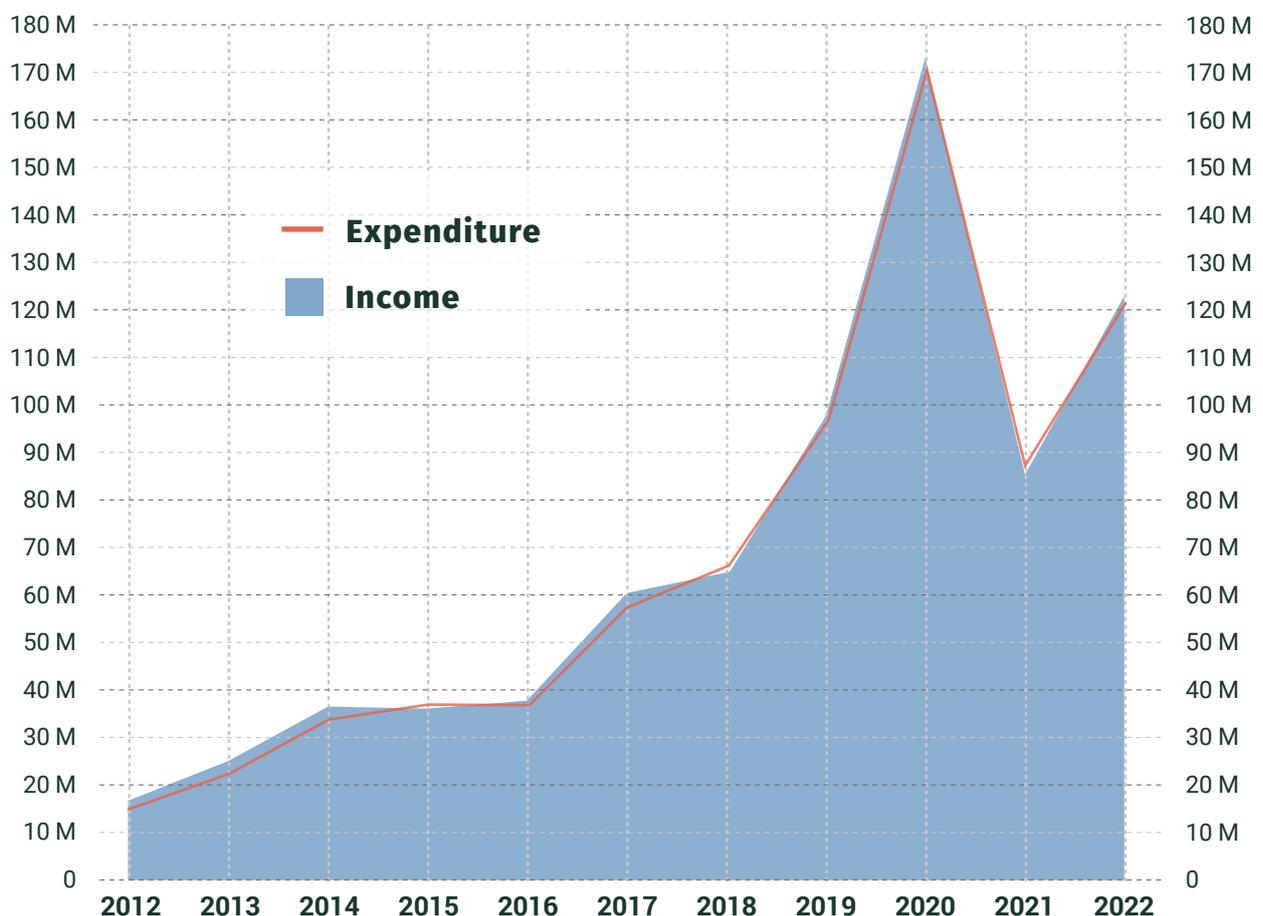
Income growth

Jembi’s overall income increased by **42% to ZAR 123.4 million** at the end of financial year FY22. This figure is not including interest earned. Expenditure figures were closely aligned to income over the same period increasing by **40% to ZAR 121.7 million** excluding non-current asset expenditure. The company reserves increased by ZAR 2.2 million, linked to interest earned and deliverable-based agreements.

Income in this financial year was mainly derived from United States government federal grants, which represented 80% of the total income and was split between the Centers for Disease Control (74%) and USAID (6%), both through prime awards and sub agreements. The remaining 20% of annual income was derived from other donors. This is a result of many years of trying to diversify Jembi’s funding pool and reduce Jembi’s reliance on any one single donor source and to ensure the sustainability of our operations. Our non-USG funders are a combination of local and international organisations, with funding coming through philanthropy and foundations as well as partner organisations.

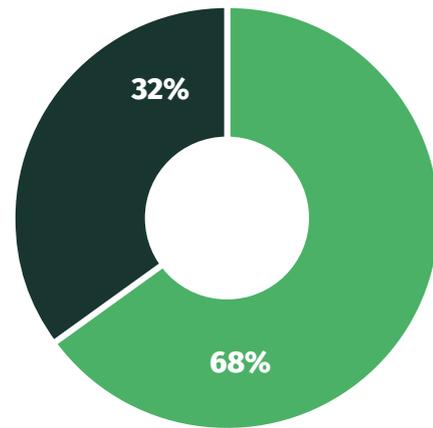


Jonnea Smith, Director of Corporate Services.



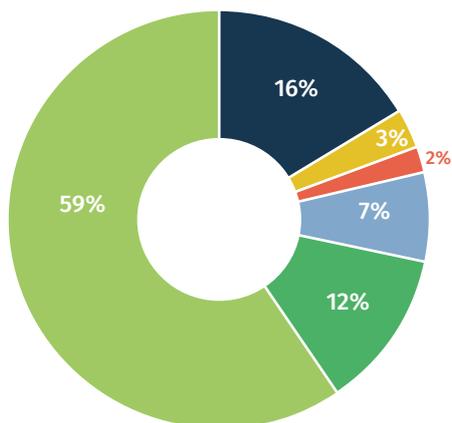
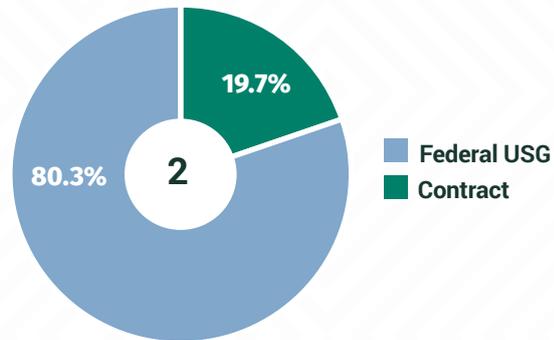
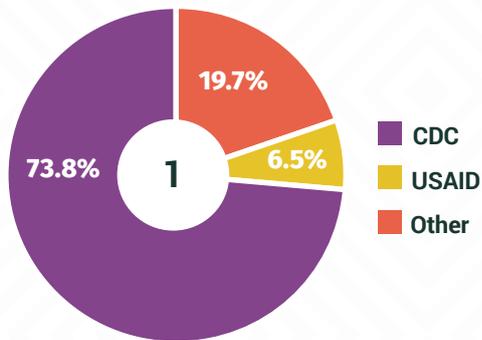
Programme breakdown

Jembi's programmes are grouped into two programme areas for the year ending FY2022: The Mozambique Programme and the HQ Programmes Division. The expenditure across the two programme areas was broken down as: Mozambique at 32% of expenditure, and HQ Programmes Division at 68% of annual expenditure.



■ Mozambique Programme ■ HQ Programmes Division

Donor landscape



Jembi's expenditure-by-cost category saw an increase in the use of contractual work to supplement Jembi's staff component in order to fulfil our work plans. The hybrid model of staff and contractual workers ensures that we have flexible teams that deliver our work plans. The main cost area for Jembi remains staff with 59% of our spend being linked to staff and 19% of our spend linked to contractual work.

■ Salaries ■ Project Support costs ■ Travel
 ■ Procurement ■ Governance/Strategy and Comms work ■ Contractual and Comms work

Increase of Staff in 2022

At the end of February 2022, Jembi's staff numbers had increased to 114, with the Mozambique office experiencing an increase of 7%, ending the year with 62 staff members and the South African/International base increasing by 6% to 52 staff members. The total staff count of 114 staff at the end of February 2022 showed an increase of 6 staff members from the prior year's total of 108 staff members.

Our Impact



933

hardware and software maintenance interventions as part of ITP

100% OF ALL REQUESTED TECHNICAL INTERVENTIONS RESOLVED AT DPS LEVEL

150,000

Immunisation events recorded over the three-year implementation period of the RAD project on the border of Kenya and Uganda.

Health equipment and materials donated to MoH (Mozambique)

6 laptops, 12 HP Dual Core desktops, 3 projectors, 8 screens, 4 speakers, 4 cameras, 2 laser pointers, 6 printers, 4 wireless modems, 6 CPR dummies, 6 specula, 4 LUCIA Kits, 500 protection masks, 100 visors, 600 gloves, 3 colposcopy atlases (febrasgo collection), 6 whiteboards, and 12 movitel internet refills.

3,000

Jembi/UEM-Moasis has trained 3,000 professionals of the National Health System in Mozambique since 2011.

1,000+

Help Desk surpassed the 1,000-ticket mark since the beginning of the project in October 2018.

40+

As of 22 August, there are more than 40 donors registered on the BSIS South Sudan system.

\$US 650,000+

of supplies procured and purchased for PEPFAR HIS projects, in less than 3 months.

Jembi's Collaborators

Jembi thanks all our collaborators for a successful year.





Jembi Health Systems

Annual Report

2021/22

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