

Mapping of Digital Health Tools and Technologies: Papua New Guinea Country Brief

September 2021



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Abbreviations and Acronyms

CBIS	Community Based Information System
CDC	Centers for Disease Control
CO	Country Office
COD	Common Operational Datasets
CRVS	Civil Registration and Vital Statistics
DICE	Digital Health Center of Excellence
EMR	Electronic Medical Record
GIS	Geographic Information Systems
HIV	Human Immunodeficiency Syndrome
HMIS	Health Management Information System
LDIS	Laboratory and Diagnostics Information System
LMIS	Logistics Management Information System
MFL	Master Facility Registry
MOH	Ministry of Health
NGO	Non-governmental organization
RCCE	Risk Communication and Community Engagement
RO	Regional Office
SMS	Short Message Service
UN	United Nations
UNICEF	United Children's Fund
USAID	United States Agency for International Development
USSD	Unstructured Supplementary Service Data
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization

Overview

Introduction

The [Papua New Guinea National Health Plan \(2011–2020\)](#) specifies under Key Result Area 3: “The health sector proactively identifies and uses innovative and evolving ICT solutions and delivers accurate and timely information for planning and decision-making.” To facilitate this national objective, the government developed a digital health strategy outlining the vision, strategic plan, activities, and budget for the health sector, and established a National eHealth Steering Committee tasked with developing a national eHealth strategic framework.¹

The ongoing COVID-19 pandemic has further highlighted the need for a strong and integrated digital health ecosystem. To address the urgency necessitated by COVID-19, UNICEF has developed the Digital Health Mapping tool to identify all existing digital health systems that can be adapted to respond to and recover from the COVID-19 pandemic and broadly, for strengthening the overall health system.

This report lists the digital health tools that are in use in Papua New Guinea with details of their usage and scale, and, where available, information about implementing agencies, donors etc. The report concludes with appendices which provide additional resources and information.

Background

UNICEF is implementing a comprehensive health response to COVID-19, focusing on outbreak control and mitigation of the collateral impacts of the pandemic, including the risks to the continuity of health services for children, women, and vulnerable populations in conflict-affected areas. A particular priority area is to support countries for the planning, introduction, and deployment of the COVID-19 vaccine. To support this effort, UNICEF has initiated a country mapping of relevant digital health tools and technologies that can be leveraged to support countries’ health initiatives in general as well as for their response to COVID-19.

In addition to this, in April 2021 UNICEF and the World Health Organization (WHO) co-founded the COVID-19 [Digital Health Center of Excellence \(DICE\)](#) to provide coordinated, standardized support and technical assistance to national governments and partners on digital health implementations and solutions, including COVID-19 vaccine delivery.

DICE is a multi-agency consortium with a UNICEF-WHO co-hosted Secretariat. It is funded by the Bill & Melinda Gates Foundation and GIZ, and is endorsed by the USAID, World Bank, the US Center for Disease Control (CDC), The Global Fund, Gavi, Digital Square, EU Commission and other partners. Partner organizations will support DICE through staff secondments to provide immediate technical expertise. Additional resources will be sought to further coordinate and scale its ability to meet rapidly growing demand. If you would like to request support from DICE, please write to contact@digitalhealthcoe.org.

Analysis Overview

An in-depth interview with the technology, health, immunization, and supply & logistics specialists working at the national (Papua New Guinea CO) and regional (East Asia and Pacific RO) levels was undertaken in early 2021. There are 12 digital health systems currently in use in Papua New Guinea of which 3 are implemented at the national level and 9 at the sub-national level. Data on digital systems and the scale of implementation that was

¹ <https://www.adb.org/sites/default/files/publication/677181/digital-health-implementation-guide.pdf>

collected as part of the interview is entered into the [Mapping of Digital Health Tools and Technologies](#) spreadsheet.

Strengths

- The National Health Information System has been in use in the country for nearly a decade and it is used for multiple use cases.
- A National eHealth Steering Committee has already been established with a view towards using innovative solutions for planning and decision-making.

Gaps

- It is acknowledged that the mapping tool reflects the knowledge of the stakeholders involved in the interview(s) and the presence of systems not known to them might have been inadvertently left out of this report. It would be prudent to engage with other organizations operating in the digital health ecosystem for a more comprehensive view.
- Most of the digital systems in use, barring KoBo and RapidPro, aren't recognized digital public goods which have developed functionalities for COVID-19 and could have been readily used in the pandemic response.
- Most digital systems are deployed only at a sub-national level and haven't been scaled nationwide.

Opportunities

- Identify opportunities to scale systems nationally while ensuring interoperability amongst systems.
- Explore digital health systems that could be deployed for use-cases such as telemedicine and patient and health worker registries.
- Foster coordination with other UN agencies, INGOs, and entities engaged in digital health interventions as well as with the MoH to ensure a more comprehensive mapping in future exercises.
- Consider keeping data on implementations updated on a yearly basis.

Digital Health Tools and Technologies

The digital health tools in use in Papua New Guinea and their associated use cases are shown below, categorized according to their scale of deployment. Full definitions of the use cases are provided in the [appendix](#).

National	Sub-national
HIV Registry: Unspecified tool	Cold Chain Equipment Monitoring: CCEM V2.1
Data Visualization: Microsoft Power BI	Community Based Information System: CommCare
Open Data Kit: KoBo	Health Management Information System: eNHIS
	Immunization Delivery Monitoring: eNHIS
	Immunization Stock Forecasting: ViVa
	Laboratory and Diagnostics Information System: VigiFlow
	Logistics Management Information System: mSupply
	Master Facility Registry: National Inventory of Health Facilities
	National ID: Unspecified tool
	Public Health Disease Surveillance: eNHIS RapidPro

Digital Health Tool	National Health Information System (eNHIS)
Description	<p>eNHIS was introduced in 2014 as an electronic version of the country's national health information system that incorporates all aggregate health data. eNHIS enables notification of health facility births and deaths to the National Department of Health, and provides morbidity-coded details of deaths and discharges. Tablets are used at the health facility to input patients' admission, discharge, consultation, vaccinations, birth, death and other health information.</p> <p>The eNHIS reports in nearly real-time (eliminating the need for monthly, paper-based reports) and allows electronic transfer of data at both facility and provincial levels.²</p>
<u>Current Use Case(s)</u>	Health Management Information Systems (HMIS) Public Health Disease Surveillance Immunization Delivery Monitoring Civil Registration and Vital Statistics
Scale	Sub-national
Implementer(s)	-
Donor(s)	-
Licensing	-
Website	-
COVID-19 Specific Functions	-
Digital Health Tool	CommCare
Description	<p>CommCare is an offline-capable mobile data collection and service delivery platform used in over 80 countries. CommCare is popular for its offline case management capabilities and has been proven to be effective at scale. It is designed for everything from simple surveys to comprehensive longitudinal data tracking and allows for easy digitization of surveys, has forms that are intuitive for end users, utilizes simple device deployment, and includes translation features.</p>
<u>Current Use Case(s)</u>	Community Based Information System (CBIS)
Scale	Sub-national
Implementer(s)	-
Donor(s)	-

² <https://crvsgateway.info/Establishing-mortality-surveillance-in-Papua-New-Guinea~1279>

Licensing	Open Source
Website	https://www.dimagi.com/commcare/
COVID-19 Specific Functions	Dimagi, the organization that develops CommCare, has designed and deployed a set of free, templated CommCare applications and reporting options using mobile, web, and SMS. These applications have been applied to a wide variety of COVID-19 use cases, including community preparedness, contact tracing, facility readiness assessment, port of entry screening, and health worker education. Dimagi has also collaborated with other digital development organizations to create a dedicated COVID-19 response team to provide hands-on support to many countries and large organizations to adapt and deploy CommCare applications for COVID-19 response.

Digital Health Tool	VigiFlow
Description	VigiFlow is a management system for recording, processing and sharing reports of adverse effects. VigiFlow supports the domestic collection and processing of individual case safety report (ICSR) data, and its sharing of reports with for example VigiBase. It permits maximum local control and provides effective means for management review and analysis of national data.
<u>Current Use Case(s)</u>	Laboratory and Diagnostics Information System (LDIS)
Scale	Sub-national
Implementer(s)	-
Donor(s)	-
Licensing	Proprietary
Website	https://www.who-umc.org/global-pharmacovigilance/vigiflow/
COVID-19 Specific Functions	In order to better understand the efficacy and safety of treatments used against COVID-19, it's crucial that countries share relevant adverse event reports in a timely manner. UMC provides this coding guidance for reports concerning COVID-19 treatments. The guidance can be found here .

Digital Health Tool	mSupply
Description	mSupply is a pharmaceutical supply chain management software primarily used by developing nations around the world. mSupply is designed from the ground up with pharmaceutical warehouses, stores and hospital dispensaries in mind.
<u>Current Use Case(s)</u>	Logistics Management Information System (LMIS)
Scale	Sub-national
Implementer(s)	-

Donor(s)	-
Licensing	Proprietary
Website	https://msupply.org.nz/
COVID-19 Specific Functions	mSupply features multiple tools to support vaccination programs, including COVID-19 vaccination efforts: mSupply Desktop, mSupply Mobile, mSupply ColdChain, mSupply Dashboard, and mSupply Synchronization. mSupply has been used for patient registration, stock management, vaccination distribution and stock management, and data visualization by countries during their COVID-19 vaccination campaigns. A presentation of the COVID-10 related work can be seen here .

Digital Health Tool		ViVA
Description	The Visibility for Vaccines (ViVa) tool is a stock monitoring dashboard that visualizes the pipeline of vaccine orders and forecasts, enabling country governments to identify risks of stock-out or overstocking and take corrective action before they occur.	
<u>Current Use Case(s)</u>	Immunization Stock Forecasting, Immunization Forecasting	
Scale	Sub-national	
Implementer(s)	-	
Donor(s)	-	
Licensing	Free	
Website	https://www.vivaplatform.org/en/default.aspx	
COVID-19 Specific Functions	ViVa is currently utilized by countries to track upcoming shipments of COVID-19 vaccines. Since it hasn't been used by many countries for this use-case, there isn't enough data at the moment to assess the impact of the tool on the planning of COVID-19 vaccines.	

Digital Health Tool		CCEM V2.1
Description	The Cold Chain Equipment Manager (CCEM) is a Microsoft Access-based software tool, developed as part of a collaborative effort among UNICEF, WHO, and PATH. It is accompanied by a user manual, data collection questionnaires, a surveyor's guide to these questionnaires, and an equipment identification guide. CCEM also comes with practice files, providing new users with practice data to demonstrate how CCEM will analyze cold chain equipment data and facilitate multiyear equipment planning. ³	
<u>Current Use Case(s)</u>	Cold chain equipment inventory	

³ <https://www.path.org/resources/cold-chain-equipment-manager-ccem/>

Scale	Sub-national
Implementer(s)	-
Donor(s)	-
Licensing	Free
Website	https://path.azureedge.net/media/documents/TS_ccem_tool_2012.zip
COVID-19 Specific Functions	-

Digital Health Tool	Unspecified Digital ID
Description	Digital national identity systems
<u>Current Use Case(s)</u>	National ID
Scale	Sub-national
Implementer(s)	-
Donor(s)	-
Licensing	-
Website	-
COVID-19 Specific Functions	-

Digital Health Tool	National Inventory of Health Facilities
Description	Comprehensive repository of health facilities of the country that includes the status of the facility and administrative information such as location, health services offered, staff, equipment, etc.
<u>Current Use Case(s)</u>	Master Facility Registry
Scale	Sub-national
Implementer(s)	-
Donor(s)	-
Licensing	-
Website	-
COVID-19 Specific Functions	-

Digital Health Tool	Unspecified HIV Registry
Description	An HIV registry includes relevant patient information associated with HIV patients, allowing providers to record critical elements of the care plan and retrieve treatment summaries.
<u>Current Use Case(s)</u>	HIV Registry
Scale	National
Implementer(s)	-
Donor(s)	-
Licensing	-
Website	-
COVID-19 Specific Functions	-

Digital Health Tool	Microsoft Power BI
Description	Power BI is a collection of software services, apps, and connectors that work together to turn unrelated sources of data into coherent, visually immersive, and interactive insights. The data may be in an Excel spreadsheet, or in a collection of cloud-based and on-premises hybrid data warehouses. Power BI lets users easily connect to data sources, visualize, discover and share what's important.
<u>Current Use Case(s)</u>	Data Visualization
Scale	National
Implementer(s)	-
Donor(s)	-
Licensing	Proprietary
Website	https://powerbi.microsoft.com/en-us/
COVID-19 Specific Functions	The Power BI team has created a COVID-19 tracking sample that enables governments to publish or customize interactive reports on COVID-19. Using Power BI Desktop, they can analyze and visualize COVID-19 data to keep their communities informed at the city, county, state, and national levels. The reports can even be shared publicly using Power BI Publish to Web in order to inform citizens.

Digital Health Tool	KoBo
Description	KoBoToolbox is a suite of tools for field data collection for use in challenging environments. The software is free and open source, with most users being aid professionals and researchers working in

	developing countries, as well as in humanitarian crises.
<u>Current Use Case(s)</u>	Open Data Kit (ODK)
Scale	National
Implementer(s)	-
Donor(s)	-
Licensing	Open Source
Website	https://www.kobotoolbox.org/
COVID-19 Specific Functions	As part of their efforts to support the humanitarian community and contribute to the global fight against the pandemic, KoBo has lifted data storage limits for all projects related to COVID-19. More information can be found here .

Digital Health Tool	RapidPro
Description	RapidPro is an open source software that allows the setting up of a workflow logic to collect any kind of data via SMS. The software has features for managing users' contacts, sending messages in multiple languages and inter-operating with external systems. The RapidPro software can be hosted as a service on a local computer server, or on the cloud. The SMS facility is widely available on all types of phones, hence can reach a wide and diverse audience. RapidPro does not require an active internet connection, making the SMS implementation cost-effective from a business standpoint. RapidPro provides a continuous stream of "living" data that offers unique opportunities to react in real time to changes at the level of implementation.
<u>Current Use Case(s)</u>	RapidPro for Health, U-Report, SMS, Facebook Messenger, WhatsApp
Scale	Sub-national (RapidPro for Health, Facebook Messenger, WhatsApp), National (U-Report, SMS)
Implementer(s)	UNICEF
Donor(s)	-
Licensing	Open Source
Website	https://community.rapidpro.io/
COVID-19 Specific Functions	In Papua New Guinea, U-Report has been used to engage with populations through surveys and as a platform for the youth to voice their opinions. In the context of COVID-19, U-report has been used to conduct

	population surveys on the impact of the pandemic on mental health ⁴ and polls to assess confidence in COVID-19 vaccinations. ⁵
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Auxiliary tools

Tool	Common Operational Datasets (COD)
Description	CODs are authoritative reference datasets used to support operations and decision-making in the initial response of humanitarian emergencies as well as to enable activities such as microplanning. Frequently collected and used CODs are geographical shapefiles, health facility catchment areas, settlements, population estimates, satellite imagery, and ancillary geospatial layers.
<u>Current Use Case(s)</u>	Geographic shapefile, Health facility catchment areas Population estimates, Ancillary geospatial layers
Scale	National (Population estimates) Sub-national (Geographic shapefile, Health facility catchment areas, Ancillary geospatial layers)
Access to CODs	Papua New Guinea CODs

Digital Health Tool	SMS Shortcode
Description	A shortcode is a special telephone number designed for high-throughput, two-way messaging. Shortcodes are used to send and receive SMS and MMS messages to and from mobile phones.
<u>Current Use Case(s)</u>	Core Mobile Services
Scale	National
Implementer(s)	-
COVID-19 Specific Functions	<p>Core mobile services can be used by governments and ministries of health for a variety of purposes related to COVID-19, such as to provide health advice, to share locations where care, testing, and vaccinations are offered; to provide COVID-19 test results, etc.</p> <p>As part of the World Bank-funded COVID-19 Emergency Response Project, UNICEF has delivered extensive nation-wide public education and community engagement campaigns across television, radio, social media and SMS, aimed at reducing the spread of coronavirus across the country.</p>

Tool	TV and Radio
Description	TV and radio are used for health messaging and/or risk communication

⁴ <https://png.ureport.in/story/931/>

⁵ <https://png.ureport.in/story/980/>

and community engagement, as well as for community health worker training.

As part of the World Bank-funded COVID-19 Emergency Response Project, UNICEF has delivered extensive nation-wide public education and community engagement campaigns across television, radio, social media and SMS, aimed at reducing the spread of coronavirus across the country.⁶

<u>Current Use Case(s)</u>	Traditional Media, RCCE
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Scale	National
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⁶ <https://www.worldbank.org/en/news/press-release/2021/06/25/us-30m-boost-for-png-s-covid-19-response>

Appendix: Use Case Definitions

Use Case	Description
Civil Registration and Vital Statistics (CRVS)	Digital systems used to record statistics on vital events, such as births, deaths, marriages, divorces and fetal deaths
Cold Chain Equipment Inventory	Technology to continually keep track of cold chain equipment status (inventory and working status)
Cold Chain Monitoring	Technology to continually monitor temperature-sensitive products being transported in a “cold chain”—that is, a supply chain of perishable and/or temperature-sensitive
Common Operational Datasets	Authoritative reference datasets needed to support operations and decision-making for all actors in a humanitarian response.
Community Based Information System (CBIS)	Family-centered health information system designed for CHWs to manage their work in educating households and delivering an integrated package of promotive, preventive, and basic curative health services
Comorbidity Registry	The presence of comorbidities can significantly affect a patient's treatment options, quality of life, and survival. Comorbidity registries keep track of comorbidities which help inform medical decisions
Contact Tracing	Contact tracing is the process of identifying all people that a positive patient has come in contact with
Core Mobile Services	Services used by GSM cellular phones (feature phones) (SMS Aggregator, SMS Shortcode, IVR Shortcode, USSD Services)
Data Visualization	Digital tools used for graphical representation of information and data
Digital Yellow Card	Digital credentialing for vaccinations
Electronic Medical Record (EMR)	Electronic record for patients - includes information about a patient's health history, such as diagnoses, medicines, tests, allergies, immunizations, and treatment plans
Geographic Information System	Framework for gathering, managing, and analyzing data
Health Management Information Systems (HMIS)	Data collection system to support planning, management, and decision making in health facilities and organizations. It can provide reliable and timely info on health system performance
Health Worker Registry	A registry of all the health workers in the country
Immunization Delivery Monitoring	Digital tools that are used for vaccine handling, distribution, and tracking of vaccines
Immunization Forecasting	The Immunization Calculation Engine (ICE) is an immunization evaluation and forecasting system, whose default immunization schedule supports all routine childhood, adolescent, and adult immunizations. ICE evaluates a patient's immunization history and

	generates the appropriate immunization recommendations for patients
Immunization Stock Forecasting	System or platforms that can forecast vaccine orders based on utilization which can enable COs to identify risks of stock outs or overstocking and take action before they occur
Interactive Voice Response (IVR)	Automated phone system technology that allows incoming callers to access information via a voice response system of pre-recorded messages
Laboratory and Diagnostics Information Systems (LDIS)	Software system that records, manages, and stores data for laboratories and can send laboratory test orders to lab instruments, tracking those orders, and then recording the results
Logistics Management Information System (LMIS)	System of records and reports used to aggregate, analyze, validate, and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage the supply chain. Includes stock on hand, losses and adjustments, consumption, demand, issues, shipment status, and information about the cost of commodities managed in the system
Master Facility Registry	Comprehensive repository of health facilities of the country - would include all admin information and the status of the facility, staff, CCes, etc.
Mobile Community Health Worker Learning Management System (CHW LMS)	Learning management systems functioning in the country for community health workers
National ID	Digital national identity systems
Patient Registry	A patient registry is an organized system that uses observational study methods to collect uniform data (clinical and other) to evaluate specified outcomes for a population defined by a particular disease, condition, or exposure, and that serves one or more predetermined scientific, clinical, or policy purposes.
Pharmacy Information System	Supports the distribution and management of drugs, shows drug and medical device inventory, and facilitates preparing needed reports
Public Health and Disease Surveillance	Contributes data and information to assess and characterize the burden and distribution of adverse health events, prioritize public health actions, monitor the impact of control measures, and identify emerging health conditions that may have a significant impact upon population health
RapidPro	RapidPro is a software product that allows you to visually build the workflow logic for running mobile-based services. This software includes features for managing your users' contacts dynamically, graphically analyzing the data your service receives, connecting to multiple communication channels (ie SMS, voice, USSD, and social media), sending messages in multiple languages, and interoperating with external systems

Social Media for Risk Communication and Community Engagement (RCCE)	Utilization of social media for health messaging dissemination
Social Monitoring	Capture of what is said in social media platforms
Telemedicine	Platform used by providers to connect with patients and share video and images. It can be integrated with a provider's electronic health record and scheduling systems
Track and Trace System	Track and Trace systems enable the traceability/visibility of products from origin through various distribution processes down to patient
Traditional Media	Traditional media that may be used for outreach and messaging (TV, radio, other)

Additional Resources

Resources	Description	Website
Mapping of Digital Health Tools and Technologies in Countries (View only)	This workbook indicates the presence of tools and digital technologies being used for health initiatives and other sectors in UNICEF Country Offices (COs)	http://uni.cf/mapping-digital-health
M&M Global goods possible use cases	This document provides a list of Digital Square approved global goods mapped across the use cases visualized in the DATEC. The global goods are grouped by those that have already been adapted to match a use case and those that could be adapted to match a use case (i.e., simple, easy, low-lift adaptations).	https://static1.squarespace.com/static/59bc3457ccc5c5890fe7cacd/t/60522885399dca3568666606/1615997063979/Global+Goods+COVID+Map.pdf
Digital Implementation Investment Guide (DIIG): Integrating Digital Interventions into Health Programmes	This practical Guide provides a systematic process for countries to develop a costed implementation plan for digital health within one or more health programme areas, drawing guidance from the WHO guideline—recommended digital health interventions, providing direction to ensure investments are needs-based and contribute effective and interoperable systems aligned with national digital architecture, country readiness, health system and policy goals.	https://www.who.int/publications/i/item/9789240010567
Digital Health Atlas	The Digital Health Atlas is a WHO global technology registry platform aiming to strengthen the value and impact of digital health investments, improve coordination, and facilitate institutionalization and scale.	https://digitalhealthatlas.org/en/-/
Global Digital Health Index Country Profile	The Global Digital Health Index is an interactive digital resource that tracks, monitors, and evaluates the use of digital technology for health across countries.	http://index.digitalhealthindex.org/country_profile/MNG

<p>Assessing country readiness for COVID-19 vaccines</p>	<p>The country readiness assessments for COVID-19 vaccines are undertaken jointly by governments; the World Bank; Gavi, the Global Vaccine Alliance; the Global Fund to Fight AIDS, Malaria and Tuberculosis; UNICEF and the World Health Organization. This report presents initial findings of 128 countries as of March 2021</p>	<p>https://documents1.worldbank.org/curated/en/467291615997445437/pdf/Assessing-Country-Readiness-for-COVID-19-Vaccines-First-Insights-from-the-Assessment-Rollout.pdf</p>
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