Digital Health Tools for Community Health Worker Programs

MATURITY MODEL AND TOOLKIT

ACKNOWLEDGEMENT AND THANKS

Contents

Acronyms

CBA	Cost benefit analysis
CHW	Community Health Worker
DHIS2	District Health Information System (second version)
DQA	Data Quality Analysis
ICT	Information and Communications Technology
IP	Implementing Partner
IVR	Integrated Voice Response
LMIC	Low and middle income country
M&E	Monitoring and evaluation
MNO	Mobile Network Operator
MOH	Ministry of Health (some countries refer to the Department of Health)
NGO	Non-governmental organization
SDG	Sustainable Development Goal
SLA	Service Level Agreement
SMS	Short Messaging System
SOP	Standard Operating Procedure
UCD	User-centred design
UHC	Universal Health Coverage
WHO	World Health Organization

Introduction

Community health workers (CHW) play a crucial role in providing primary health care to communities in low-resource settings. They are crucial to achieving universal health coverage by 2030, a target of the Sustainable Development Goals (SDGs). Over the past decade, many projects have used digital health tools within CHW programs. Some of these have grown to considerable scale with 100,000s of CHWs using digital tools. This toolkit aims to improve health by supporting community health programs to use information and communications technology (ICT) more effectively by assisting Ministry of Health (MOH) and health program managers at national and sub-national levels to assess, plan and implement digital health tools in CHW programs, building on experience of a broad range of initiatives throughout the world.

Digital health is the application of information technologies and the data they generate to support engagement and informed decision making by individuals, health providers, and health systems to increase health and wellness for all. This consensus definition was developed by the Health Data Collaborative Digital Health & Interoperability working group and at time of publication was under review. **CHWs** are a cadre of the health workforce that provide basic health and medical care to the community, which can include preventive, promotional and rehabilitative care.

> Community health workers should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and they have shorter training than professional workers.[1]
>
> There are many different names used for CHWs in different countries and contexts. Names for CHWs include Accredited Social Health Activists, Community Health Assistants, Community Health Extension Workers, Community Health Volunteers, Health Educators, Health Extension Worker, Lay Health Workers, Promotoras de Salud, Village Health Team members, Ward Based Outreach Team member and more.

This toolkit was developed by HealthEnabled with support from Living Goods. It includes a maturity model that was developed through an intensive document review process and key informant interviews. A series of participatory design workshops were conducted in Uganda and Kenya at national level with officials of the Ministry of Health, implementing partners and other experts to review and validate the model. Field-testing workshops were held in Iganga and Kitgum districts in Uganda, Kisii county in Kenya and with the Kenyan Ministry of Health. During the review and design process, the desire for a "how to guide" to help institutions move from assessment and planning to implementation was indicated. This has been incorporated into the toolkit as a quick reference resource or cookbook with links to more comprehensive materials on various aspects of digital health programs for CHWs.

This Digital Health for CHWs Maturity Model and Toolkit is a contribution to Global Goods[2] developed by the digital health community for use anywhere in the world for free. These tools can be useful in assessing, planning and implementing digital health services. This document makes a distinct contribution to the Global Goods as it focuses specifically on issues related to community health programs and builds on and complements other digital health knowledge global goods.

Digital Health Knowledge Global Goods

- Principles of Digital Development[3]
- mHealth Assessment and Planning for Scale (MAPS) Toolkit[4]
- Digital Health Atlas[5]
- Global Digital Health Index[6]
- Health Information Systems Continuous Stages of Improvement[7]
- Health Information Systems Interoperability Maturity Model[8]

Overview of Digital Tools for CHW Programs

There are many ways in which digital tools have been used in support of CHW programs. Following the WHO Classification of digital health interventions[9], the following functions are examples of interventions relevant to CHWs.

Classification	Examples
1. Clients	
1.1.2 Transmit targeted health information to client based on health status	Family Connect: Information SMS to pregnant women and mothers linked to CHW services[10]
1.1.3 Transmit targeted alerts and reminders to client(s)	mTIKA: send SMS reminders to families when their children are due for immunization[10]
2. Healthcare providers	
2.1.1 Verify client unique identity	eCompliance: Portable fingerprint biometric identification system operated by CHWs[10]
2.1.2 Enrol client for health services	iCCM: CHWs capture all elements of the village register for children[10]
2.2.1 Longitudinal tracking of client's health status	DHIS2: Stores information about individuals and tracks them over time for usage by CHWs
2.2.4 Routine health indicator data collection and management	CRS Senegal: Collects data on childhood illness and manage diarrhoea cases[10]
2.3.1 Provide decision support prompts and alerts according to protocol	CRS Senegal: Provides messaging and steps for CHWs for the quality of health services[10]
2.3.2 Provide decision support checklist according to protocol	ASHA-links: A decision tree to guide ASHAs to identify, manage and refer complications[10]
2.3.3 Decision support to screen clients by risk or other health status	OpenSRP: Electronic forms with decision-support for risk assessment by CHWs[10]
2.5.1 Communication from healthcare provider to supervisor	HELP: Allows CHWs to communicate directly to supervisors and toll-free helpdesk[10]
2.5.2 Communication and performance feedback to healthcare provider	CommCare in Madhya Pradesh: Communicate detailed performance feedback
2.5.5 Peer group for healthcare providers	HELP: Group chats for CHWs to share knowledge[10]
2.6.1 Coordinate emergency response and transport	mHealth for safer deliveries: CHW notifies health facility that a woman is in transit[10]
2.7.2 Schedule healthcare provider's activities	mCARE: helps CHWs to digitally manage their daily workflow[10]
2.8.1 Provide training content to healthcare providers	Mobile academy: IVR training course for CHW's knowledge of family and baby health[10]
3. Health system managers	
3.1.1 List health workforce cadres and related identification information	iHRIS Manage: Track, manage, deploy and map the health workforce
3.1.2 Monitor performance of healthcare providers	iCCM: Routine supervision checklist on indicators of performance by CHWs[10]
3.2.1 Manage inventory and distribution of health commodities	cStock: A toll-free SMS reporting system on current stock levels and medicines received[10]
3.5.5 Transmit or manage incentives to healthcare providers	mHealth Family Planning: CHW pay-for-performance system with monthly targets[10]

WHO Guidelines

Following a systematic and critical appraisal of available evidence, the WHO published Recommendations on Digital Interventions for Health System Strengthening[11] in 2019. This document recommends the use of digital tools in the following function which are relevant to CHWs using mobile devices:

- Stock notification and commodities management;

- Client-to-provider telemedicine;

- Provider-to-provider telemedicine;

- Targeted client communication (regarding sexual, reproductive, maternal, newborn and child health);

- Health worker decision support;

- Digital tracking of clients' health status and services;

- Digital provision of educational and training content to health workers.
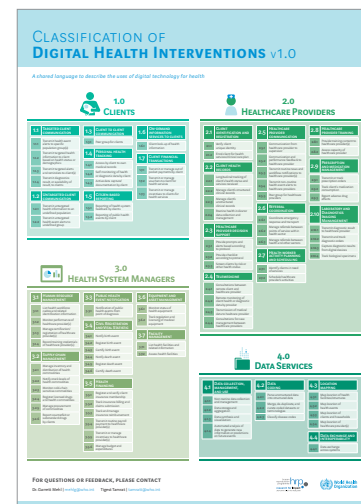
System Providers

There are several established software platforms that have developed for use by CHWs. Below are some of the major platforms (the inclusion of these platforms and vendors is not an endorsement).

- CommCare[12] (provided by the company Dimagi and others)

- Community Health Toolkit[13] (provided by the company Medic Mobile[14])

- DHIS2 Tracker[15] (provided by the company the Health Information Systems Program[16] and others)

- Open Data Kit[17] (ODK) (an open source community)

- Open Smart Register Platform[18] (OpenSRP) (an open source community, provided by ONA[19], D-Tree International[20] and other companies)

A useful resource for comparison of tools is the Kopernik Impact Tracker Tech.[21] It gives information on various systems, including mobile data tools, and assesses them for Usability, Accessibility and Affordability.

Global Goods

Global Goods[22] are digital health tools that are adaptable to different countries and contexts. There are three types of global goods: Free and open source **Software**; **Services**; and **Content** (such as this maturity model and toolkit). It is recommended that this resource be consulted when deciding which system to choose, building upon the experience and investments of the wider digital health community and not starting from scratch yourselves.
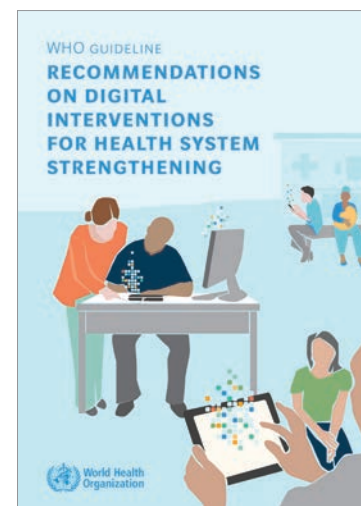
Maturity Assessment

A maturity model is a tool for identifying the stage at which an organization, system or initiative has reached along a scale of continuous improvement towards a desired end goal. If a lower stage has been reached there is room for improvement to progress towards a higher stage. This maturity model helps to identify the stage that has been reached through examining the various components necessary for an effective digital CHW program. It is an "as is" assessment, meaning that the initiative as it is currently should be considered, not an aspirational future state.

The ultimate audience for the results of the assessment are decision makers, managers, implementors and donors of digital CHW programs to help plan for future developments. The intention is that an assessment is carried out by completing this maturity model, which could be done by an individual but it is better when several relevant people are involved, ideally through a workshop (which is discussed below). In completing this maturity assessment, the organizer should involve people who represent the MOH, other government ministries such as finance or ICT, implementing partners, donor agencies, local government officials, technical experts and academic institutions. Efforts should be made to ensure that there is equitable representation of men and women familiar with the landscape of community health worker programs as well as the current state of digital health in the area (country / district / county etc.).

The assessment has 3 domains: First, the **CHW program** itself is considered, separate from any digital systems. The second domain covers the **enabling environment** of policy and technical infrastructure. The third focusses on **CHW digital systems** that already exist. If no digital health for CHWs programs have started, the maturity model can still be used by completing the first two domains. While the third domain will score zeroes, it is useful to read through the third domain to see which issues should be considered when CHW digital programs are started.

Within the three domains there are 12 components and 21 indicators. Each of the indicators should be given a score in the range 1 – 5, by selecting the stage in the maturity model that best describes the current situation. Some indicators may be less mature than stage 1, so would have a score of zero.

This assessment can be carried out for different levels of scale of a health system: **national** or federal level, **sub-national** (such as district, county, province, region or state) or for **individual** projects, such as those run by implementing partners, NGOs, community-based organizations, or companies.

Conducting the Maturity Assessment

The assessment is best done by completing the maturity model in a one- or two-day workshop. The aim of the workshop is to:

- Draw on the expertise of participants who are involved in the program (whether the digital health project exists now or is planned for the future) to complete the assessment;

- Use the assessment results to prioritize follow-on activities.

Ideally the workshop should convene between 10 - 15 participants. Ideally there should be 2 facilitators guiding discussions, tracking and consolidating, assessing scores, supporting any group discussions on the assessment itself, identifying the next steps in a blueprint for action and documenting the process. The following Workshop Agenda (which can certainly be adapted) is suggested to guide the facilitator conducting the workshop.

Suggested Workshop Agenda

9:00 - 9:30 am	Introductions, workshop objectives and overview
9:30 – 10:00 am	Presentation Maturity Model for digital health for CHWs
10:00 am – 12:00 noon	Applying the Maturity Model to District Level CHWs Programs – Group exercise (1.5 hours exercise and 30 minutes report back) Activity: Break participants into small groups representing different digital health for CHW programs with the maturity model and a worksheet.
12:00 – 1:00pm	Lunch and Networking
1:00 – 1:20pm	Presentation of the Top 10 Tips
1:20 - 3:00pm	Group Exercise: From Assessment to Mapping Out Next Steps Activity in same break out groups: What are the prioritized next steps that they would undertake after having done the assessment? What areas of the maturity model should be worked on to improve the overall initiative?
3:00 – 3:30pm	Break and Refreshments
3:30 – 4:00pm	Individual Post-it Exercise Activity: What information would you need to move from the assessment and planning phase to implementation? What are the key next steps?
4:00 – 4:30pm	After Action: Using post-it notes ask participants what worked best and what they would like to recommend for the process moving forward
4:30 – 5.00pm	Next Steps and Closing

Assessment of the Maturity of Digital Health (mHealth) for Community Health Worker Programs

	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5

DOMAIN A. CHW PROGRAM

Component A1. Existing CHW Program

INDICATOR 1. Scale of CHW implementation and national CHW policy

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
There are small CHW programs implemented within or outside government with no official government policy on CHWs.	There is a draft policy on CHWs and some CHW programs led by government at sub-national scale.	There is an official policy on CHWs and the government is implementing the CHW programs, with trained CHWs deployed to 25-50% of the country.	There is an official policy on CHWs and the governemnt is implementing CHW programs covering 50-100% of the country.	CHWs are part of the formal health workforce and operating at national scale with regular review and improvement of the CHW program.

INDICATOR 2. Standardized CHW package of care and standard operating procedures

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Each CHW program has different packages of care and their own standard operating procedures.	There is a draft standard package of care (incl. linkage to the health system and standard operating procedures). There are standard forms, but they are not used consistently across all programs.	The standard package of care has been implemented with 25-50% of CHWs. There are standard operating procedures (including forms) but they are not used consistently across all programs.	The standard package of care with standard operating procedures is implemented by 50-100% of CHWs with supportive supervision to ensure that processes are followed correctly.	The full standard package of care is implemented by 100% of CHWs standard operating procedures followed. The CHW package of care and standard operating procedures are reviewed and updated regularly.

Component A2. CHW Skills

INDICATOR 3. Skills of CHWs, including the ability to use information and communication technologies to find, evaluate, create and communicate information

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
CHWs are literate and have some familiarity with using mobile phones. They have received some CHW training but it is not standardized across all CHW programs.	All CHWs are literate and have a basic level of education (e.g. primary) and can demonstrate ability to use mobile phones and tablets. The CHW training is extensive but is not standardised.	All CHWs have a basic level of education (e.g. primary) and can use digital tools. There is a standardised CHW training curriculum. CHWs pass a competency test.	All CHWs have secondary education, have received standard training and passed their tests. Mentorship and refresher training is provided for CHWs as needed.	All CHWs have secondary education, have received standard training and passed their tests, and mentorship is provided. CHW training is evaluated and updated.

Component A3. CHW Data

INDICATOR 4. Data collection, quality (complete, accurate and timely), and use

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Some data is collected by CHWs, but it is not standardized, consistent, or digitized and is not reliably complete, accuracte or timely.	There is an approved procedure for data collection and review carried out by CHWs and their Supervisors covering completeness, accuracy and timeliness of data. Where possible, the data is being collected digitally.	Data is being captured by digital tools, not as a stand alone process. Aggregated and disaggregated data is made available to CHWs and their Supervisors.	There is an approved data quality assurance and use strategy, and procedures to ensure implementation. Data is regularly reviewed to ensure completeness, accuracy and timeliness.	Data is regularly reviewed at all levels from individual CHW to national to inform decisions and actions. Data analytics are automated and allow easy understanding of the data through visualizations and dashboards.

	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5

B. ENABLING ENVIRONMENT: POLICY AND TECHNICAL INFRASTRUCTURE

B1. Leadership and Governance

INDICATOR 5. Leadership and governance structure for digital health for CHW

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Digital tools for CHWs are not included in the national health strategy, and there is no coordinating or governance structure established.	Digital tools for CHWs are included in the national health and/or digital health plan, with relevant strategies with milestones and metrics of success. A coordinating body has been formed.	Digital tools for CHWs are included in the national health and/or digital health plan. A coordinating body meets regularly to plan and oversee digital tools for CHWs activities and reports on achievements and challenges.	Digital tools for CHWs are included in the national health and/or digital health plan. A governance structure with relevant representation is institutionalized and achieves measurable progress in the development and evaluation of annual plans.	Digital tools for CHWs are included in national health and digital health plans. The governance structure includes a technical working group that meets regularly and includes relevant partner organizations, representation of marginalized groups and has gender balance.

B2. Legislation and Policy

INDICATOR 6. Digital health policies and legislation

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
There are no laws or policies on data security, privacy and data ownership relevant to digital tools for CHW programs.	A law or policy has been proposed on data security, privacy and data ownership relevant to digital tools for CHW programs.	A law or policy has been passed on data security, privacy and data ownership relevant to digital tools for CHW programs, but is not implemented.	A law or policy has been passed on data security, privacy and data ownership relevant to digital tools for CHW programs. It is implemented but not consistently enforced.	A law or policy has been passed on data security, privacy and data ownership relevant to digital tools for CHW programs. It is implemented and consistently enforced. Policy is regularly reviewed and updated as required.

B3. Funding for CHW Digital Health

INDICATOR 7. Budget available and aligned with health system

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Budget for digital tools for CHWs is available through short-term once-off funding for small-scale implementation, mainly covering the cost of the technology (system, devices and airtime).	Single-year funding is available for digital tools for CHWs standard package development and testing at sub-national level.	Single-year funding is available for digital tools for CHWs standard package implementation nationally.	Multi-year funding which covers all necessary costs is available for digital tools for CHWs standard package at national level included in the wider CHW program budget.	Ongoing funding for national digital tools for CHWs is secured in a government budgetline as part of the CHW program, which allows for innovation, review and updating as required.

B4. Digital Health Capacity, Implementations and Standards

INDICATOR 8. CHWs integrated within national digital health policies, systems and services

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
CHWs are not considered within the national digital health policies, systems and services (including registration in health workforce registry, digital health architecture, terminology standards, etc.).	An assessment has been conducted to identify relevant digital health policies, systems and services to include the needs of CHW programs.	A plan has been developed to include CHW programs as part of relevant digital health policies, systems and services.	CHW programs are included within relevant digital health policies, systems and services.	CHW programs are included in relevant digital health policies, systems and services. There is a routine review and updating of digital health policies, systems and services to meet the evolving needs of CHW programs.

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5

B5. Technical Infratructure for CHW Digital Health

INDICATOR 9. Connectivity and electricity infrastructure in regions where digital tools for CHWs are planned

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
The infrastructure needed for digital tools for CHW programs (connectivity and electricity) have not been considered in program implementation.	Information on connectivity (coverage and bandwidth) and electricity has been collected as part of digital tools for CHW program planning.	Plans for digital tools for CHWs have been developed that address poor connectivity, low bandwidth and access to electricity for device charging.	Plans for digital tools for CHWs have been implemented that address poor connectivity, low bandwidth and access to electricity for device charging.	Connectivity and electricity are optimally provided. There is routine review and updating of infrastructure considerations as new systems are deployed and improved.

INDICATOR 10. In-country software technical capacity

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
There is no in-country capacity to develop, implement or upgrade digital tools for CHWs. All training, technical development, implementation and support is done by out-of-country entities.	The software development, adaptation and configuration is done by out-of-country entities with in-country partners for training and implementation.	In-country partners have the capacity to adapt, configure and support implementation of hardware and software with significant technical support provided by out-of-country entities.	In-country partners have the capacity to adapt, configure and support the implementation of hardware and software, and provide technical support with some linkages to out-of-country entities.	The adapters, designers, developers and implementers of digital tools for CHWs are reputable in-country entities staffed by skilled local staff.

C. EXISTING CHW DIGITAL HEALTH

C1. Scale and Scope of Digital Health for CHW

INDICATOR 11. Geographical coverage of digital tools for CHWs

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Some programs with CHWs using digital tools exist at small scale, but they are not standardized or integrated with the formal health system.	Sub-national demonstration projects using digital tools for CHWs and Supervisors have been implemented.	Regional or several sub-national programs have been implemented and evaluated using digital tools in CHWs programs to inform national scale up.	Full national integrated digital health systems providing tools for CHWs have been implemented.	Digital tools are used in all CHWs programs nationally, and they are regularly reviewed, updated and rolled out.

INDICATOR 12. Digital tools for CHW range (all standard health care packages, e.g. malaria, HIV or maternal)

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
Digital tools for CHWs are used for a single health care package (e.g. just for HIV).	Digital tools are used by CHWs for several health care packages (but not all the health care packages they perform).	Digital tools are used by CHWs across all health care packages that they perform in most programs.	Digital tools are used by CHWs across all health care packages that they perform in all programs in an integrated way.	Digital tools are central to all CHW health care packages in an integrated health service delivery system. There is regular review and updating to improve the use of digital tools to support health outcomes.

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
INDICATOR 13. Digital health for CHW functionality (the various functions digital tools can perform e.g. data collection, education, decision support, case management, scheduling etc)				
Digital tools for CHWs are only used for one function (e.g. just data collection).	Some programs with CHWs use digital health tools for 2 or more functions, but they are not standardized or integrated with the formal health system.	CHWs use digital tools to support multiple types of activities, including when they are face-to-face with a client.	CHWs use digital tools to support multiple types of activities, including when they are face-to-face with a client. These digital health functions are integrated so that it easy for the CHW to use the different functions together.	All relevant digital health functions are implemented in activities performed by CHWs and their supervisors in an integrated health service delivery and digital health system. There is regular review to improve digital tools for CHWs.
INDICATOR 14. Interaction with clients / public using digital health				
Digital tools for CHWs do not interact with clients.	Some programs with CHWs use digital tools to send reminders, messages, or follow up with clients, but they are not standardized or integrated with formal health system.	CHWs use digital tools to send reminders, messages, or follow up with clients that are standardized and integrated with the health system.	CHWs use digital tools to interact with clients (not just one-way messaging). These are standardized and integrated with the health system.	Digital health is central to CHW - client interactions as part of a comprehensive health services. The CHW program regularly reviews and updates effective use of digital tools to improve CHW - client interaction.

C2. Linkage with Other Health Information Systems

STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
INDICATOR 15. Interoperability of CHW system with other digital health				
The digital tool for CHWs is standalone and does not interoperate with any other digital health systems.	The digital tool for CHWs interoperates with a few other systems, such as DHIS, patient records at facilities or LMIS for stock management.	The digital tool for CHWs interoperates with all relevant other digital health systems at varying levels of scale, supporting continuity of care.	The digital tool for CHWs interoperates with all other relevant digital health tools at national scale supporting continuity through all stages of care.	The digital tool for CHWs interoperates with the national digital health architecture, linking with all relevant services supporting full continuity of care.
INDICATOR 16. Digitization of reporting				
Data capture is required on both electronic and paper systems.	After an initiation phase with dual data capture, there is a plan to move to single electronic entry (with a system for evaluating data consistency and accuracy and milestones to go paperless).	The system is electronic at sub-national scale, with paper records printed as needed for hard-copy. There are established procedures if the electronic system fails and for poor connectivity settings.	The system is electronic at national scale, with paper records printed as needed for hard-copy. There are established procedures if the electronic system fails and for poor connectivity settings.	The reporting system is end-to-end electronic at national scale, with all data available to all users (subject to access control).

	STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5
C3. Appropriate Digital Health for Management and Quality of CHWs					
INDICATOR 17. User-centred design of digital health for CHWs					
	No CHWs, supervisors and administrators were engaged in the initial design of digital health tools.	Some CHWs, supervisors and administrators were engaged in initial design of digital health tools with testing and user feedback.	CHWs, supervisors and administrators are actively engaged in the design, planning and implementation of digital health tools in each new setting where they are being deployed.	At each level of scale up CHWs, supervisors and administrators are actively engaged in the design, planning and implementation of digital health tools. Modifications are made at pilot, sub-national or national as needed.	CHWs and other representative stakeholders are routinely engaged in review and optimization of digital tools as well as the design, implementation and evaluation of new digital tools or functions.
INDICATOR 18. Training of CHWs in the use of the digital health tool for CHWs					
	There is no digital health in the pre-service training curriculum of CHWs. There is limited one-off training provided on specific digital health tools as they are introduced.	Digital health training is proposed and under review as part of CHW pre-service curriculum. Formal training in digital health is designed and implemented for current cadre of in-service CHWs.	Digital health training for CHWs is part of the pre-service curriculum in some institutions and courses. Refresher training is available and carried out as needed.	All new CHWs, supervisors and administrators receive pre-service training in digital health and in-service training in digital tools as part of routine training. Refresher training is available and carried out as needed.	Digital health pre- and in-service training for CHW programs is comprehensive. It is regularly evaluated and updated.
INDICATOR 19. Technical support for digital health					
	Limited or ad hoc technical support is provided to CHWs and supervisors for troubleshooting as problems arise.	There is an identified and skilled person to provide technical support to CHWs and supervisors.	Supervisors or other identified people are trained to provide hands-on support in troubleshooting applications or devices.	There is a dedicated technician at the sub-national level and a central HelpDesk to support technicians and trained Supervisors.	Comprehensive support is provided at local and national level. HelpDesk requests and troubleshooting needs inform system improvements and training updates.
INDICATOR 20. Performance management					
	The digital tool for CHWs is not used for performance management.	The digital tool for CHWs provides basic information on the activities of CHWs to the supervisors.	The digital tool for CHWs allows Supervisors to view all relevant performance management information on individual CHWs.	The digital tool for CHWs provides data visualisations on individual CHWs and groups of CHWs that allows supervisors to manage and support CHWs to provide quality health services.	The digital tool for CHWs provides well-designed information on individual CHWs and groups of CHWs to allow supervisors to manage and support CHWs to provide quality health services. The system is regularly reviewed and updated.
C4. Operational logistics					
INDICATOR 21. Airtime and device management					
	There is no formal policy for management of airtime or devices after they have been allocated to CHWs. There are no replacement devices.	There is a formal policy for management of airtime and devices and there are a few replacement devices.	There is a formal policy for the management of airtime and devices. Replacement of devices (10% per year) is planned for and implemented.	Airtime and device management is implemented within all CHW digital health programs with replacement of devices (around 10% per year) planned and implemented.	The policy and process of airtime and device management works optimally and is reviewed to inform updates, training, planning and budgeting.

Interpreting the Maturity Assessment

Plotting the Findings on a Spider Diagram

Completing the maturity assessment will produce a set of 21 numbers, each representing a stage 1 – 5 of the 21 indicators. These can be represented in a circular 'Spider diagram'. This shows the 21 indicators like spokes around a wheel, with the value 0 at the centre and 5 on the outside (the circumference). For each of the 21 indicators a dot is placed at the appropriate distance from the centre, and then a line is drawn between the 21 points (see the example in the diagram). It is called a spider diagram as the result looks a little like a spider's web. This gives a good visual image where you can see the elements that are less mature (points closer to the centre) and those that are more developed (points near the outside).

The spider diagram can be plotted in several ways:

- Excel spreadsheet (it can be found under Insert Charts, and Excel calls it a 'Radar chart'),
- Flip chart, or
- Blackboard/whiteboard.

The diagram provides a visual overview to how the indicators can be compared. The spider diagram results can also be used to see progress, as the indicator scores change over time, e.g. annually.

Spider Diagram of an Example Digital Health for CHW Program
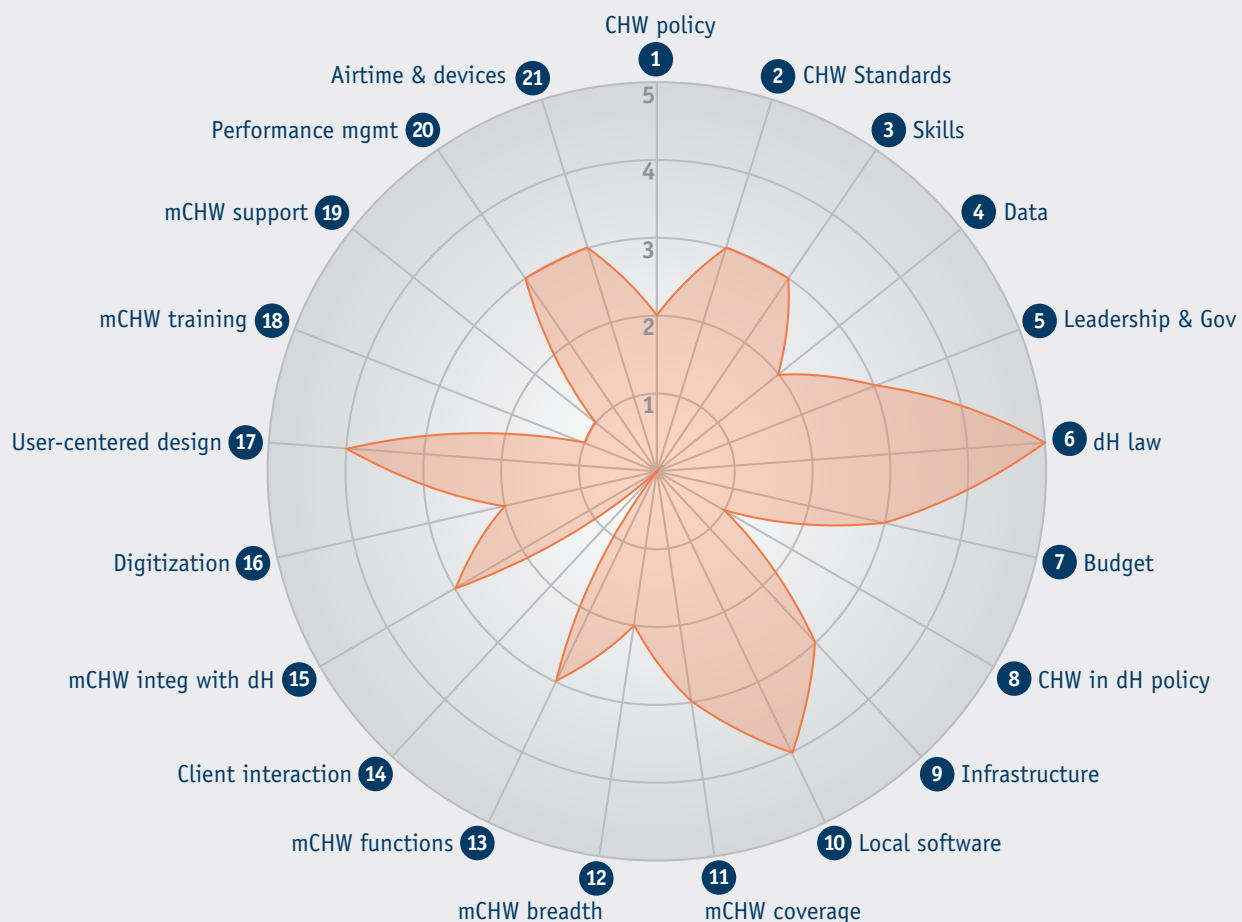
Prioritization and 'Go / No Go' Decisions

The maturity assessment assists consideration of which elements of the digital CHW program should be prioritized to make the program more mature. In general, those indicators with lower scores should receive attention first to improve the program overall. Section 5 of this toolkit provides a guide to how to improve various aspects of a digital CHW program. The maturity assessment can also be used to assist in making decisions on whether you are ready to start a digital CHW program, or if you have started whether it is appropriate to progress to greater scale. The following can be a useful guide.

- **Stage 1 (in indicators 1 – 10)**

  Starting a first small formative digital CHW project

  If no digital CHW projects already exist in your area, the first 10 indicators covering the CHW program and the enabling environment should be considered before implementation begins. If any of those 10 indicators is zero (below 1) then that could be problematic, and it is recommended that this issue is addressed before the first project starts. The first implementation should be small, e.g. up to 50 CHWs in a few health facilities. There are lessons often learnt in the first formative implementations. In the first six months there should be a few iterations with new versions of the software developed to better meet the needs of CHWs and other users, improving change management, training, support and performance supervision so that the digital tool becomes a useful part of the CHW workflow. It is important to acquire this experience before scaling up – making mistakes when they can be easily fixed. Short-term once-off donor funding can be used for this level of project as you are testing to see if these digital tools are useful in your contexts. However, following the principle of "Start with scale in mind", ensure that the the program allows for growth in the future beyond this initial stage if it is successful. This means including the MOH from the start as they will be less enthusiastic if they are only involved later in the program. Inform any donors that this is the initial stage testing the program for futue wider roll-out that would also require funding and ensure the technical design can scale and integrate with other digital health systems.

- **Stage 2 (over the 21 indicators)**

  Ready to scale to a wider sub-national area (if resources allow)

  Scaling the system to a sub-national level (e.g. district, county, region or province) should only be done when there is some experience of small-scale implementations. We recommend that all the indicators should at least be at the value 2 before making a decision to move to a larger scale with dozens or hundreds of health facilities and hundreds or thousands of CHWs. By this stage the digital tool should work well and the CHWs and other users are happy to use it. At this level the focus is on health system strengthening.

- **Stage 3 (over the 21 indicators)**

  Ready to consider scaling to national level (if resources allow)

  Once there has been satisfactory performance of the system at sub-national level for several months, then scaling to national level can be considered. This probably will involve thousands of facilities and several thousands of CHWs. We suggest that this decision is only taken when the indicators have mostly reached stage 3. For sustained national scaled implementation, ongoing funding for the digital CHW program should be part of the national MOH budget for CHW activity.

Top 10 Tips

The following Top 10 Tips are key lessons that have been learnt through the experience of implementing many digital CHW systems and should be kept in mind when designing and implementing new programs.

1
Technology is a means to an end, not the end itself

The end is improvement of health outcomes through the effective delivery of timely high-quality services by CHW with appropriate linkages to care. Quality health care, information and case management should be the focus – get that right and data for program and performance monitoring will follow as a by-product.

2
CHW-centred design

The most important person is the CHW herself. Put her at the centre and design the digital system with her to make it as easy and useful. If she doesn't like it, it'll fail. As well as the core CHW functionality, make it as useful to the CHW as possible by automating reporting and scheduling, and providing access to weather widgets and maps for planning household visits.

3
The Ministry of Health or health delivery organization leads

Donors can provide funds, but the MOH or the implementors of CHW programs must lead. Only if the system meets the needs of the MOH and health partners will it be sustainable after donor funding ends.

4
Build local capacity

Provide training and support on digital literacy and service delivery skills for CHW, supervisors, managers, technicians, and the national MOH. Any service provider or implementor must undertake to effectively build local capacity and train staff. Insist on working with local technology providers – an international developer must have a local partner for configuration, hosting, roll out, training and support.

5
Formative and iterative development and testing

Start small with a few health facilities and their CHW teams and grow. Don't go too big too fast. Iterate and optimize the system until it can be implemented well in the range of settings it is intended to be used. Create feedback mechanisms so that CHWs and other users can tell you when it works.

6
Total cost of ownership

Consider all relevant costs, don't look only at the initial pilot or the technology cost. Do a comprehensive costing over at least 5 years of all costs, including – but not limited to – change management, training, device management (including replacement of devices), refresher training, airtime and solar power.

7
Plan for sustainability

Consider resources carefully – human capacity, system operations and make sure secured funding allows at least 5 years of a well-resourced strong project. Reduce scale if necessary. Digital health should be a core part of the CHW service and not an add-on. Aim for the system to be absorbed into the CHW program budget of the MOH if it works well.

8
Link to the people

Digital systems can and should, where appropriate, interact directly with the clients the CHWs serve. This will enable them to take care of their own health. This can be done through health promotion messaging, appointment reminders, linkage to the health system, WhatsApp discussion groups, and rating health services.

9
mLearning

Digital systems should be used to increase the skills, provide health alerts, supportive peer-interaction, facilitating referrals, and incentivizing CHWs to improve knowledge and capabilities on both health topics as well as in digital literacy on the job. CHWs are the greatest resource of the community health system. Use digital systems to support and motivate them.

10
Change management, not just tech

The technology is the easy part. Changing behaviors and shifting cultures within the health system is much harder. Change management is a key part of implementation. Assess what changes will likely impact CHWs as a result of digital health, and be sure to address and account for them in training and supervision approaches.

Cookbook
"How To" Guide

Introduction to the Cookbook

When the maturity model assessment is completed and the priorities for action are determined, this section aims to assist in creating a plan of action. The ideas in this section derive from the document review and interviews with practitioners. They distill the experiences of those who have implemented large-scale digital CHW programs. The primary audiences for this guide are managers and other implementors of digital CHW programs. It offers guidance on how to develop action plans that respond to the priority areas identified through the maturity assessment process. While these short guides are not meant to be exhaustive, references are given to toolkits and other documents that can provide more detailed information for those that want it.

This 'How To' guide is presented as a cookbook, similar to a collection of recipes for making food. The pages on different issues start with why this dish is a good one to make or the issue is important for digital CHW programs, and what the finished product looks like. Then it moves on to the ingredients needed to make it (what you need to get started), and the steps that should be taken. Further reading on the topics is provided in the references in Section 7. The topics covered in this cookbook are: Design, prototype and test; Costings and contracting the system provider; Devices; Implementation; Scale up; Performance management; Data quality, analytics and decision making; Monitoring and evaluation; and Sustainability.

There are four key resources that should be highlighted:

- CHW AIM: Community Health Worker Assessment and Improvement Matrix (CHW AIM): A Toolkit for Improving Community Health Worker Programs and Services".[23] This resource published by the WHO focuses on improving CHW programs without an emphasis on digital technology.

- mHealth MAPS toolkit: mHealth Assessment and Planning for Scale.[4] This WHO toolkit assists mHealth project teams to critically assess their project as they move from piloting to planning their next steps for overcoming the challenges inherent in scaling up. It has six areas: Groundwork, Partnerships, Financial health, Technology & architecture, Operations & Management, and Monitoring & Evaluation. Each of the six areas contains a set of structured self-administered questionnaires and scorecards that enable mHealth project teams to objectively measure their progress, together with lessons and tips from the field.

- Mobile Technology in Support of Frontline Health Workers.[24] This is a comprehensive report on mHealth programs for frontline health workers (many of the projects involve CHWs) that was published by Johns Hopkins University in 2016. It reports on over 140 projects.

- Health Information Systems Stages of Continuous Improvement toolkit.[7] This toolkit helps countries or organizations holistically assess, plan, and prioritize interventions and investments to strengthen a Health Information System.

Design, Prototype, and Test

What's the Issue?

If the system is not in line with what the MOH or other CHW implementing partner wants, then no matter how well it functions internally, it will not be successful. Badly designed systems make a project work poorly or fail. Once the objective of the overall program has been established, "User-centred design" (UCD) is the name of the game (the term human-centred design is also used). UCD is defined as "a flexible yet disciplined approach to innovation that prioritizes people's needs and concrete experiences in the design of complex systems".[25]

What Does the Finished Product Look Like?

A well-designed digital CHW tool that meets health service needs and is aligned to the vision of the MOH. All key stakeholders see their contributions into the system implemented, and it is easy to use and supportive of all system users. The system has been implemented at small scale, with a number of iterations to ensure that it functions well, and it is ready to be scaled.

INGREDIENTS

- High-level connections and support with the MOH or implementing partner

- User-centred design methodology.[26]

- Humility: CHWs know best what their needs are. All outsiders know less than she does about how to address her challenges and make her work easier.

- Time: It usually takes more than 6 months to go from an idea to a functioning well-designed system – this time is crucial and shouldn't be cut short.

RECIPE

1. Identify key MOH and other stakeholders, and run a workshop to define the health system needs.

2. Develop the specification for the system, considering functional requirements (what the system will do) and non-functional requirements (how the system will do it).

3. Carry out user-centred design with CHWs, their supervisors, program administrators and other ecosystem members. Consider the distinct needs of different CHWs, different CHW cadres, the differences between urban, rural and other settings.

4. System developers spend time with CHWs and relevant stakeholders to understand their world. Consider safety to minimize risk (smaller phones are easier to conceal in high-risk environments).

5. Identify metrics of success for all stakeholder 'archetypes' in the 'value chain', from the CHW, supervisors, and managers up to officials in the national office who will use the program data.

6. Make the system easy to use so it's quicker to complete the CHWs tasks with the tech system than the previous way (paper).

7. Make it useful to help CHW, e.g. improved data accuracy, automatic reporting, scheduling visits and appointments, notifying patients, weather app, mapping least distance between households, links to other CHWs or referral pathways.

8. Create a feedback mechanism. Find out what CHWs would like to know about their and other CHWs' activity.

9. Test the prototype system with a few CHW teams. The CHWs should initially use the system for a few months. Redesign based on feedback every couple of months. Repeat in an iterative manner.

10. After around 6 months, assess the system's effectiveness. Conduct user acceptance testing and obtain sign-off from the MOH. Consider scale-up only when everyone is happy. While ongoing iterative adaptation may continue, scaling the system before it's ready is always a mess!

11. Document the process of implementing the digital tool to aid future rollout of the system, including change management, training, support and performance management.

Costing and Selecting the Right Digital Health Partner

What's the Issue?

If the budget for a program is too high, it might never happen. If the budget doesn't cover everything the program needs for implementation, then lack of funds can reduce success. Also, choosing the wrong implementation partner (the service provider who delivers the ICT system that runs the digital health tool) can lead to failure – an inappropriate system might not do what the MOH requires. From the beginning, the system must meet the needs of the MOH for the program to integrate, scale or be sustained long-term. If the digital health tool or platform is not adaptable, then after the initial implementation it could be very hard or costly to scale, adapt or integrate with other digital systems. The cost of the system is crucial, but it is often difficult to compare the prices of different available systems without full consideration of long-term costs. Being careful to avoid dependency is important – ensure that you are not locked into a particular system.

What Does the Finished Product Look Like?

A realistic costing has been carried out so that the approved budget provides the resources needed for successful implementation (with some contingency to cover unforeseen costs). An appropriate digital health system provider is selected to deliver a system that meets the needs of the MOH within the time frame required, the available budget, and to the quality expected (including considerations of national coverage and range of services provided). There is a clear contract which specifies the responsibilities of the technical system provider with an agreed Service Level Agreement (SLA) stating clearly the performance expected. There is a local service provider for training, implementation, and day-to-day support that is available for meetings locally. When the initial contract ends, there is no lock-in, meaning a new contract could be awarded to the first company again or to another one that is able to use and adapt the existing system. Negotiations have happened with the Mobile Network Operators (MNOs) to obtain the best bulk pricing of data, voice and SMS.

Costing and Selecting the Right Digital Health Partner, continued

INGREDIENTS

- Political support and buy-in from a senior official in the MOH

- Needs Analysis (developed in the Design, prototype and test Section discussed above). It's important to start with the health objectives, not what the tech company wants to sell you

- Costing tool (a good one[29] is provided on the Principles of Digital Development site[3]

RECIPE

1. With the senior official, determine the budget available for the initiative. Also identify the individual or position that will serve as the project champion. Also identify who will be the decision maker for the whole project- for selecting the digital health service provider and for signing off the contract (who might be the project champion). Are there tender procedures, donor requirements or other constraints that need to be followed?

2. Determine the decision-making process for approval of the overall project and for selection of the digital health implementation partner. Start that process early (it can take many months).

3. Based on the Needs Analysis, develop a costing for the program. It is important to consider all costs, not just the tech or the initial pilot. Use a Total Cost of Ownership (TCO) model such as the one listed above.[29] Start by understanding the Ecosystem and the Cost Drivers.

4. Through the designated official, obtain approval for the budget and the overall initiative.

5. Identify possible implementation partners that could provide the service (see the organizations listed in Section 2, and consider the Global Goods described there). When needed, ask for advice from the Global Digital Health Network email list.[30]

6. Obtain proposals with price quotations from potential implementation partners, following the required tender procedure or donor process. To compare costings between the different possible companies, use a standardized scenario, otherwise the different pricing structures can be confusing and very hard to compare (see an example of this in Appendix A). Open source systems tend to be cheaper in the longer term, though proprietary ones may be cheaper for a pilot, particularly if using a Software-as-a-Service, per usage fee, or per user license pricing model.

7. Through an objective process, select the digital health service provider. Follow the contracting process, which may be driven by the legal or procurement department.

8. Ensure in the contract that there is in-country capacity to implement and support the system – if it doesn't exist already, oblige the implementation partner to work with a local organization to build those skills. This includes technical support, training, implementation, as well as system updates and upgrades. Be assertive on this – sometimes 'capacity building' of local organizations is very superficial. Write the standard required in the contract and don't make final payment until the local organization has demonstrated it is capable.

9. Include in the contract national data governance and ownership rules to ensure privacy and security.

10. Specify a Service Level Agreement (SLA) in the contract. Negotiate penalty clauses if it's not met.

11. Negotiate with the MNOs (the companies that run the mobile phone networks) to obtain the best bulk pricing of data, voice and SMS. Get written support from the Minister of Health, and compare prices from different MNOs in your country. The digital health implementation partner may be able to arrange discount rates. Negotiating discounts may only be successful when the program goes to scale with a larger number of users than in the initial stages.

12. When the system has been implemented, ensure the working system is handed over to the MoH.

FURTHER READING

See resources number 3, 4, 29, 30 and 31 in the references section for further guidance.

Devices

What's the Issue?

Digital systems need digital devices to function. The choice of device for any CHW digital health project usually involves the selection of either a mobile phone or a tablet for use by CHWs. Getting the choice wrong can cause frustration, under-performance, extra cost, and impact CHWs' motivation. As devices change so rapidly, we will not be recommending specific handsets, but rather provide guidelines on what needs to be considered.

What Does the Finished Product Look Like?

Simply put, success is having appropriate cost-effective devices that can provide the required digital support to the CHW program with adequate network coverage, electrical power supply and connectivity contracts. CHWs are easily trained in the use of the device. They are easy to troubleshoot.

INGREDIENTS

• The technical specification (spec) of devices that meet the requirements of the system

RECIPE

1. Find the cheapest good quality phone or tablet that is already supported in the country that meets the spec. Have a look at one and use it yourself for a while before making a bulk order. Check with the digital solution provider that this device is appropriate. Do NOT select the cheapest phone you can find on the internet that doesn't have local support.

2. Ensure that the mobile device cannot be used for non-work activity, e.g. by installing software to limits its usage.

3. Airtime and data costs need to be covered so that the device can operate reliably without a high administrative burden. Do not require individual CHWs to use cash for pre-paid vouchers – this is very expensive and inefficient. Contracts that allow a set data limit per month can work. If a network in your country provides this, set up a Closed User Group (or something similar) so that registered devices can communicate through a dedicated data connection only with each other and the server with one central fee to the organization.

4. Where mobile data coverage is unreliable, the software should be designed to allow offline use, so that after using the device without connectivity, it can be taken somewhere that allows connection, e.g. a town or hill, so that the data can be uploaded to the central system.

5. If the area you are working in does not have easily accessible electrical power, find ways to provide alternative power sources. Often the best solution is good quality long-lasting solar power. Recharging at street kiosks can be problematic (e.g. batteries are swapped out, software can be deleted and could cause a breach of security). Sometimes recharging at the health facility or other relevant organization is possible.

6. Bring your own device (BYOD) is when workers use their own personal device for work. It is only effective if the program is just using SMS and voice or if staff already have similar high-end devices, such as Android smartphones, so that software and support can be standardized. This is less likely to work if the CHWs are volunteers, and with salaried CHWs they will probably expect to be compensated for the use of their personal device.

Implementation

What's the Issue?

After design and testing, the system must be implemented before it can be scaled. Implementation concepts include clarity of the goals and objectives, clear link between the digital system and prioritized health outcomes, process reengineering, stakeholder engagement, content, community outreach, resourcing (finances, personnel etc.), personnel, training, support and maintenance. The transition from paper to electronic data capture can lead to duplication of effort and frustration if not handled well.

What Does the Finished Product Look Like?

The system is working smoothly with clear Standard Operating Procedures (SOPs) being followed. Training, support and performance management lead to high quality health care services using digital health tools with good data collection and usage. The digital system is used for data entry, record keeping and management so that data is only entered once, but should resources fail (e.g. a power cut) there is a protocol to smoothly revert to paper records which can be integrated with the digital system later.

INGREDIENTS

- Training curriculum and manuals (for the CHW program and for the digital tools)
- SOPs including referral networks
- Data collection and storage tools (data collection for M&E)
- Implementation procedures, including change management, training, support and performance management that were developed and updated based on the design, prototype and test phase

RECIPE

1. Conduct train-the-trainer sessions so that staff can train the CHWs and other stakeholders in SOPs around delivery of health services, referrals, and using technology devices.

2. Follow the change management and other implementation procedures developed during the testing phase.

3. When introducing the digital tool, there will be a transition period when the old paper forms are used as well during the initial phases of the new digital system. This should be short-term until a pre-agreed data quality target is reached (ensuring the data is Correct, Complete, Current and Consistent), when the transition fully to digital can happen. If paper documents are still required, the digital system can make print outs in the format required for hard copy records. A good example comes from the Zambian immunization registry.[32]

4. Collect baseline data to evaluate the effect of the system later (see M&E section).

5. Design a SOP for failure in the digital system (e.g. no electricity, no connectivity, or stolen devices). For example, have some paper records and forms available as a back-up plan if the digital fails, and design the process for the data to be entered digitally when the system is working again. This could be through a data entry officer at district level, or a task assigned to the CHW team.

6. Conduct regular continuing education and re-training.

7. Sensitize the community to the role of CHWs and how CHWs use digital tools to provide better health outcomes to community members.

8. Hold regular consultative meetings including users, technologists and subject matter experts to review the implementation of the digital CHW system and provide feedback to the system managers.

9. Conduct consistent data capture for M&E, and use of the M&E data to adapt and improve the CHW program (see the cookbook page on M&E).

See resources number 3, 4, 23, 32, 33, 34, 35 and 36 in the references section for further guidance.

FURTHER READING

Scale Up

What's the Issue?

Moving from sub-national to national scale digital CHW programs brings new challenges. Sustained impact on health outcomes with CHW-based interventions will not be achieved unless "the gap between small scale efficacy studies and large-scale interventions is bridged".[33] Scaling digital tools for CHWs programs assumes scale in the underlying CHW program. "A pitfall affecting ... CHW programs, is the tendency of planners and managers to uncritically assume that because something works well when implemented on a small scale with fairly intensive engagement and support ... there should be no problem doing more or less the same thing on a large scale".[34] Several aspects of the program could be enlarged: the geographical area covered up to national scale; additional numbers of CHWs using the digital tool; additional numbers of clients receiving services from the CHWs; extra health services, referrals and potential linkages into other systems (such as social welfare or police). Issues include the management and support of thousands of devices (that may not be the same model), rolling out updates of the app, and full integration with other elements of the national digital health architecture.

What Does the Finished Product Look Like?

Full national operation of a digital CHW program fully integrated with national digital health architecture with data flow and interoperability with other services. The digital tools support all health priorities in community health with monitoring and evaluation systems leading to regular review and improvements. The funding for the digital CHW program is in the core MOH budget for community health (see the Sustainability cookbook page).

INGREDIENTS

- Assessment of the effectiveness of the pilot, demonstration project, or smaller scale program.

- Government buy-in and political support at the Ministry of Health and sub-national levels.

- The *mHealth Assessment and Planning for Scale* (MAPS Toolkit)[4] is a good resource for taking digital health programs to scale.

- Funding and relevant participants to attend a 3 – 4 day workshop. This should include national and representative sub-national health officials, representative CHW and CHWs supervisors, costing experts, M&E experts, commercial partners and civil society partners.

- Information inputs required to inform planning, including the geographical coverage, the target numbers of CHWs and supervisors, the range of health areas and functionality to be covered, the devices that will be used, the health system capacity constraints, and the available resources

RECIPE

1. Convene the stakeholders for a 3 - 4 day workshop, which can lead to government buy-in. Ensure all stakeholders agree on a common understanding of the overall health objectives and the community health priorities that the digital CHW program will support.

2. Use the MAPS Toolkit[4] as a guide for topic areas for consideration and a methodology for planning to move digital health projects to large scale. Develop goals, the strategy, and a budget for the next phase of the digital CHW program.

3. Build strong M&E systems which are crucial to ensuring that interventions perform adequately at each milestone through conducting periodic effectiveness assessments and correcting the course of the program as needed.

4. Implement the roll out of the system at large-scale, with periodic review.

FURTHER READING

See resources number 4, 24, 31, 33, and 34 in the references section for further guidance.

Performance Management

What's the Issue?

For CHWs to contribute to better health outcomes for clients, they must provide good quality health services and be supported to address challenges that relate to their performance, motivation and retention. The management of workers is key to successful scaling of digital tools for CHW programs, and mobile phones can be a strategic tool in management.[33] Poor recruitment, training and supervision can lead to poor performance and CHWs leaving (attrition). Some cadres of CHWs are paid, and others are not; and managing non-salaried CHWs requires a greater emphasis on rewards and incentives rather than sanctions.

What Does the Finished Product Look Like?

Managers follow practices that attract, recruit, train and retain motivated and high performing CHWs and manage their performance. Supervisors use additional functionality in the digital tools for the CHW system to monitor, manage and support their team of CHWs. CHWs have access to their performance data and where appropriate summary data on the performance of their colleagues. Clear SOPs guide CHW and supervisor's performance with regular re-training.

INGREDIENTS

- Clearly defined and communicated expectations of CHWs whether salaried or voluntary
- CHW code of conduct
- Supervision checklists
- Communication plan between CHWs and supervisors with feedback to CHWs
- Agreed referral pathways and protocols guiding CHWs to refer cases to service providers

RECIPE

1. Develop guidelines on how to attract, motivate and incentivize both salaried and voluntary CHWs. Incentives can be linked to the performance of the individual CHW. Indirect benefits can make voluntary work more attractive for example inviting CHWs to participate in national health campaigns and officially recognize their work.[37]

2. Conduct regular supervisory visits that include reviewing reports, providing constructive feedback, and problem-solving support to the CHWs.

3. Develop SOPs procedures to ensure alignment of CHWs incentives based on workloads and covering recruitment, retention and performance management.

4. Design a training curriculum to equip CHWs with the necessary knowledge and skills, including how to use digital tools to improve their service.

5. Map out key performance indicators and a monitoring and evaluation framework (M&E) to ensure effective supervision of the CHWs by the managers.

6. Conduct regular in-service training and supportive supervision as needed.

FURTHER READING

See resources number 4, 23, 33, 37, 38, 39, 40 and 41 in the references section for further guidance.

Data Quality, Analytics and Decision-Making

What's the Issue?

Ultimately, quality data means information that is accurate, timely and complete. Having quality data is integral to monitoring and evaluation and ultimately to the provision of quality health care. Digital health systems can assist in the improvement of data quality. Mobile phones used for the collection of data by community health workers tend to result in more accurate and timely data.[42] These data issues should be resolved and work well during sub-national implementation before the system is scaled-up.

What Does the Finished Product Look Like?

High quality data of the CHW program supports the delivery of community health services and enables health system managers to build strong health systems. The app that the CHWs use has been designed to improve the collection of quality data (e.g. by using dropdown menus that reduce data entry errors and data entry rules so that, for example, letters cannot be entered where there should be numbers). There is regular review and auditing of data quality through automated and manual processes. Data analytics allow easy understanding of the data through visualizations and dashboards. There is a data quality improvement plan, which is reviewed regularly. Data use policies have been written for all staff levels, including for managers. All staff are trained in them. Electronic tools allow supervisors to manage the performance of CHWs. Community-level data are used for M&E and quality improvement of community health services.

INGREDIENTS

- Political buy-in from the government and health authorities for improving data quality and use
- Stakeholders with expertise in data analytics, community health systems and ICT
- Mappings of current and ideal data flows
- Devices that collect information where there is no connectivity and then upload the data when connectivity is restored
- Laws and regulations on data security and confidentiality

RECIPE

1. Convene all stakeholders to graphically map information flows, including sources of data, how and why data are collected, aggregated, collated, prioritized, used, and analyzed, and by whom.
2. Identify gaps in the data (information) flows and assess how the data processes could be made more efficient, particularly at the CHW level.
3. Assess the quality of data with a Data Quality Analysis (DQA) toolkit. See the DQA tool by MEASURE Evaluation.[43]
4. Conduct a community health information system (CHIS) assessment.[35]

FURTHER READING

See resources number 4, 34, 35, 42 and 43 in the references section for further guidance.

Monitoring and Evaluation

What's the Issue?

Monitoring means regular oversight of the activities of a program against its plan to support ongoing management. Evaluation is a systematic and objective examination concerning the relevance, effectiveness, efficiency and impact of the program against its specified objectives. Evaluation can examine the change in health outcomes (an impact evaluation) or on how the processes within the health system change (a process evaluation). This section is about the M&E of the CHW program and not digital tools, but there can be comparison of the CHW program before and after the digital tools are introduced to examine any effect the tools are generating.

What Does the Finished Product Look Like?

Ongoing day-to-day monitoring is conducted in the program by the regular collection, management, collation, aggregation, analysis and use of data through digital tools over time. Such data is reviewed and used at all levels of the health system to continually improve program quality over time. There is regular (e.g. every two years) process evaluation of the overall effectiveness of the CHW program (impact evaluation is more difficult and requires additional funding). The digital tools are used for supportive supervision to monitor and evaluate the performance of CHWs as well as the services they provide.

INGREDIENTS

- List of prioritized health outcomes linked to CHW activities

- Monitoring and evaluation team(s)

- The resource *Monitoring and evaluating digital health interventions: a practical guide to conducting research and assessment*[44]

- The digital devices are being used by the CHWs for collecting relevant data. There digital system has been designed to collate, manage, aggregate and then visualize the data collected in a way that is aligned with tracking of priority health outcomes.

RECIPE

1. Develop an M&E Plan that includes a Logic Model, Results Framework or Theory of Change to explain the proposed rationale for using digital tools in CHWs programs.[45]

2. Conduct a baseline assessment. It is very important to do it properly before the intervention gets going. Several projects have failed at this, and then later cannot demonstrate the impact of the intervention because they have nothing to compare it against. Don't leave it til later because you are so busy at the start!

3. Implement the data collection and monitoring system (designed it to be part of the digital tool). Include in the training of the CHWs and their supervisors in the purpose, importance and practice of data collection and M&E.

4. Monitor the information being collected to improve the day-to-day running of the CHW program, with regular (e.g. 3-monthly) reviews.

5. Monitor the digital devices (e.g. distribution, usage, connectivity, airtime, electrical issues, technical problems, theft or crime) and the use of the digital tools (e.g. ease of use, bugs or software problems, quality of data collection, time taken compared to paper system). After a time (e.g. six months) evaluate the devices and digital CHW tool to determine if they are meeting the intended objectives.

6. After two years conduct a process evaluation.[46]

7. Conduct a Cost – Benefit Analysis (CBA). A good process to follow has been developed by Living Goods.[47] A CBA can be useful in justifying ongoing funding for the program (see Sustainability section).

FURTHER READING

See resources number 4, 44, 45, 46, 47 and 48 in the references section for further guidance.

Sustainability

What's the Issue?

In digital health, sustainability is "a process that enables individuals, communities and organizations to decrease their dependence on insecure resources and maintain the health gains of the intervention beyond the specific / initial project period".[4] For a digital health system to be sustainable, it must be supported by secured financial and technical resources as well as having enduring partnerships and support systems. Sustainability also depends on the capacity to continually adapt to the demands of users, evolving operational environment, and advancements in technology.

What Does the Finished Product Look Like?

The MOH takes ownership of the digital CHW program and ongoing funding comes from a budget line in the allocation for community health. There are established long-term partnerships between key stakeholders, including CHW program implementing partners, other relevant government ministries (such as the Ministry of ICT and the Ministry of Finance), technical companies and other relevant organizations. There is capacity within the country to implement, host, train and support the usage of the digital tools, and also to adapt the system to meet the evolving needs of the health system. The digital CHW tools are considered a core part of the community health system by all levels of health staff from the CHWs themselves to national managers. The data that flows through the system is used to manage and improve the delivery of quality health care. The benefits of the digital tools on the community health (both in improving care and reducing costs) are demonstrable, strengthening the case for sustaining the program.

INGREDIENTS

- Buy-in from government (national and sub-national), CHW supervisors, CHWs and community

- Identified potential long-term partners

- Ongoing costing (see Costing and contracting Section above)

- Process evaluation and Cost-Benefit Analysis (see the Monitoring and Evaluation Section above)

- MAPS toolkit.[4]

- The Digital Impact Alliances guide to scaling projects Beyond Scale: How to make your digital development program sustainable.[49]

RECIPE

1. Complete the sustainability assessment section in the MAPS Toolkit[4] and review the DIAL scaling guide.[49]

2. Based on the CBA, develop a motivation for the continuation of the program. The aim of this is to be able to demonstrate if there have been benefits – including overall cost-savings for the CHW program as a whole. Such process evaluations can demonstrate a change in the operations of the CHW program (e.g. more households visited, more clients receiving medical tests), and changes in the costs of running the CHW program.

3. Secure continued government buy-in/ownership by ensuring the program is responsive to MOH community health needs and the relevant officials are aware of the program.

4. Maintain and strengthen long-term partnerships for the digital CHW program, for example by setting up an ongoing working group.

5. With partners identify the financial model for sustainability- embedding within the MOH community health program, minimizing costs, seeking external funding). The Living Goods model of sustainable CHW services is worth considering.[50]

Conclusion

Digital Health Tools for Community Health Worker Programs: Maturity Model and Toolkit aims to support the next generation of community health projects through the more effective use of digital tools by CHWs, their supervisors, managers, and policy makers. Digital health is a fast-growing and evolving field. Over the next few years, devices will become cheaper, more powerful and be even more widely available; connectivity will improve; and national digital health architectures will strengthen. All these developments will mean that digital tools will be better placed to make significant contributions to community health.

This toolkit was developed to assist in the maturation of the field, so that digital health tools can be established as core components of community health programs to meet the goal of Universal Health Coverage by 2030. The authors hope that this guide makes it a little easier to develop successful scaled and sustainable implementations, allowing practitioners to build on previous successes and lessons learned. This is a living document that will be updated as new developments and contributions are made and the model and how to guide are implemented. The authors welcome learning further lessons in digital health for CHW programs in general and in the use of this toolkit in particular so that experience can be incorporated and the field can grow together. We wish you success in using digital tools to improve health outcomes through community health.
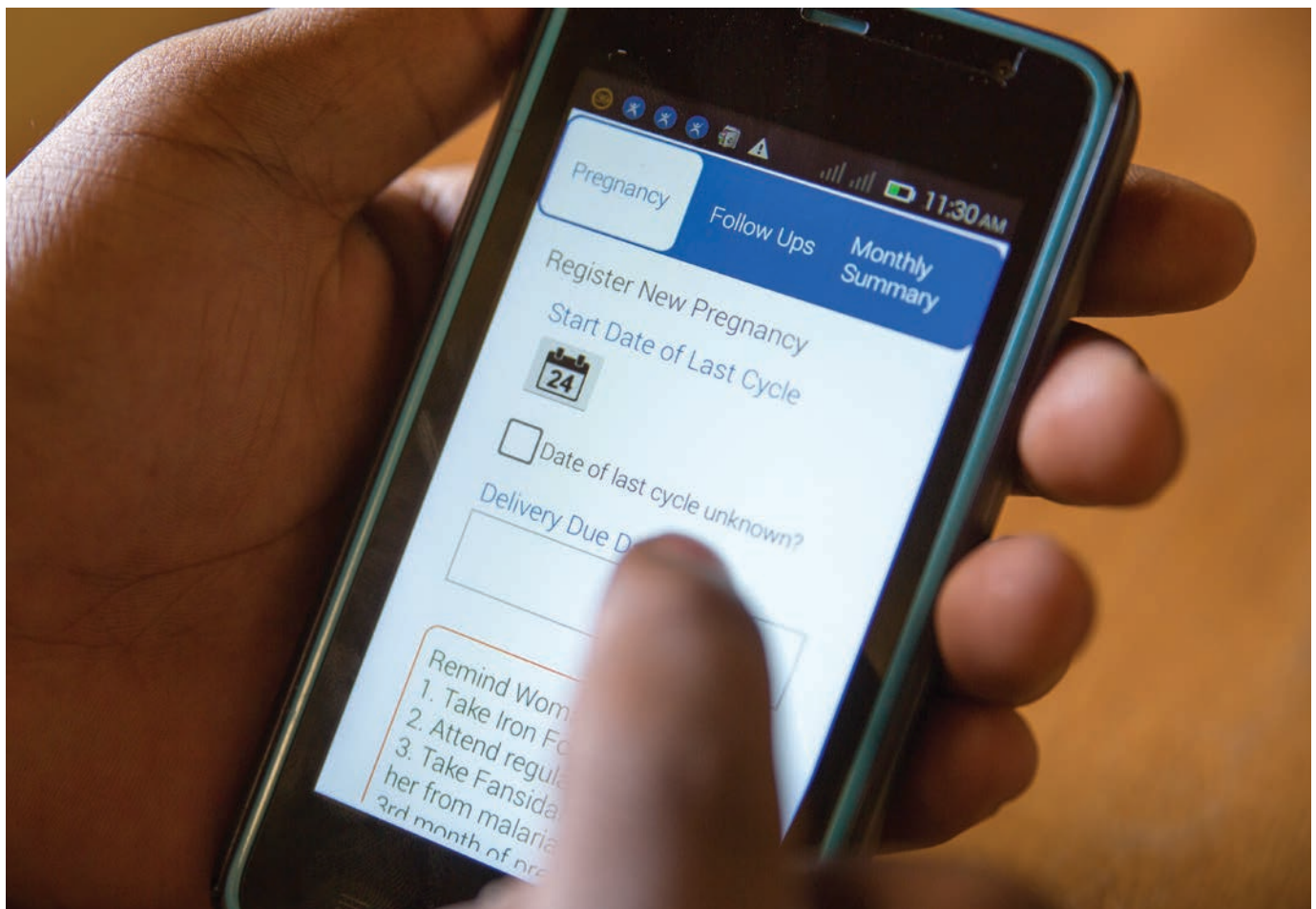
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APPENDIX: Costing Scenario for Digital Health for CHW System

This scenario can be used to obtain quotes from different digital health system providers that are comparable.

Scenario Outline

Please prepare an outline indicative quote for the following scenario.

This is a system for data collection of health information by Community Health Worker (CHWs). The CHWs will work from specific health facilities, working with many households that are assigned to them.

For ease of comparison, this is a simple data collection system. It does not include scheduling, decision support, referral networks, triggered SMS messaging or notifications, peer-peer communications, audio or video, or any other functionality.

Scale of implementation: One province

Number of facilities: 500

Number of users: 5,000 CHWs

Data elements in form: 50 (mainly numeric or selection, 5 free text fields)

Estimated number of clients per CHW: 100

Estimated number of forms per CHW: 50 per week

Support: Support will be required. This can be estimated as 100 hours per month. Any bugs identified will need to be rectified at no additional cost. (This is second and third line support – simple first line user support will be provided by trained MOH staff)

Data and hosting: The data will be owned by the Department of Health, and all data can be downloaded in CSV or equivalent format. The provider organization will host and maintain the server (with appropriate data security and protection).

- User license
- External system interface
- Support
- Hosting and data center
- Security
- Customization to NDOH requirements
- Training (include 10 district train-the-trainer sessions, each lasting 3 days. The DOH covers all transport and logistics)

Please also give an estimate of the cost of Android devices that are suitable for your system. If you have any special procurement arrangements, please specify.

A. Quotation for Project Stage 1: Implementation and Scale-Up in First Year

The system mentioned above is required to be implemented over one year. Please provide a quotation for the costs for configuration, piloting, implementation and scale-up in the first year.

This quotation should include costs of the following (not all these line items may apply):

- System design and configuration
- Initial pilot for three months with two iterative re-configurations
- Scale up implementation
- Devices required
- Annual user license
- User and admin support
- Hosting and data center
- Maintenance
- Training cost (2 train-the-trainer sessions, each lasting 3 days)
- Upgrade
- Security

B. Quotation for Project Stage 2: Operational Costs for Additional Year

Now the system mentioned above is implemented and stable. Please provide a quotation for the operational costs for an additional year of implementation.

This quotation should include costs of the following (not all these line items may apply):

- Annual user license
- User and admin support
- Hosting and data center
- Maintenance
- System adaptation for slight modifications to the system (such as changes of user screens, an added field or a change to a dashboard). This will require 1 week of coding effort which should be included in the quote.
- Training cost (2 train-the-trainer sessions, each lasting 3 days)
- Upgrade
- Security

(No new devices are required)

This toolkit is dedicated to
Professor Marc Mitchell,
a pioneer in digital health.

LivingGoods

Living Goods aims to save lives at scale by supporting digitally empowered community health workers. We work with governments and partners to leverage smart mobile technology, rigorously strengthen performance, and relentlessly innovate to cost-effectively deliver high-quality, impactful health services.

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We are digital health architects.

HealthEnabled is an Africa-based not-for profit that helps governments integrate proven life-saving digital health interventions into their health systems. We are accomplishing our mission by partnering with national governments and other large health implementers to develop and operationalize their digital health strategies. At the global level, we drive digital health progress through advocacy and thought leadership, collective action, and evaluation of the state of the field through our work on the Global Digital Health Index.

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