Improving the quality of child health care in Malawi at the primary level through decision-support tools

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Integrated Community Case Management is used in hard-to-reach areas to complement facility-based services. In this project, health surveillance assistants use a mobile application to assist in providing health services to children under five years.

Malawi is among the nine low-income countries that reduced their under-five mortality rate by 60% or more between 1990 and 2011. Despite this progress, many children continue to die from conditions that are easily preventable and treatable.

-A large proportion of children in Malawi are still at increased risk of mortality due to common childhood infections. The leading causes of under-five mortality in Malawi are malaria (13%), AIDS (13%), pneumonia (11%), diarrhea (7%), and neonatal conditions (31%). The Ministry of Health (MOH) and its partners have been scaling up a package of high-impact interventions to reduce under-five child mortality since 2007 under the Accelerated Child Survival and Development strategy. These efforts have included integrated Community Case Management (iCCM) in hard-to-reach areas to complement fixed or scheduled facility-based services. D-tree International is the partner providing mHealth solutions to support the implementation of iCCM to improve the quality of care provided to children under five.

About iCCM

In this project, health surveillance assistants (HSAs), a cadre of community health workers, use a mobile application to assist them in providing health services to under-five children (2-59 months) in line with the MOH-approved iCCM protocol. The iCCM mobile application is a Mangologic application which runs on an Android platform.

The components of the mobile application strengthen the ability of HSAs to deliver effective and efficient care. These components are synergistic in providing a comprehensive array of tools and a supportive supervisory framework for the HSA.

The first component of the iCCM application captures all the elements of the village register used by the HSA. The application supports HSAs to make the appropriate decisions on treatment. HSAs are also enabled to accurately report on their work in a timely manner. The iCCM mobile application therefore enforces adherence to clinical protocols and iCCM holistically.

The second component links the iCCM application to the logistics management system to improve the availability of needed drugs to the rural clinics where HSAs see patients. This work has been coordinated with the MOH cStock program to improve its use in tracking drug inventories. D-tree developed a simple user interface within the application for the health workers to use to report stock levels, which is then submitted to cStock via structured SMS.

The third component of this project is the supervisory tool for those who are managing and supervising HSAs. The tool is based on the new paper-based routine supervision checklist developed by the MOH and Save the Children. It focuses on key performance indicators for the HSAs. The tool facilitates both collection and interpretation of data and also has a dashboard so users can see the status of the work being done by HSAs; it will also provide information for project-related decision-making.

Program Design Process

The algorithm for the application was developed using the MOH's approved iCCM protocol. After the development and design of the application, D-tree trained six HSAs from Ntchisi District to use the application in their respective village clinics. The six HSAs were engaged to solicit feedback about the functionality, relevance, and user friendliness of the application to refine it. The refinement process took two months. The district health management team and Integrated Management of Childhood Illnesses (IMCI) Unit were then informed and permission was granted to roll out the application to all HSAs conducting iCCM in the district. D-tree trained MOH officials to train the HSAs. MOH officials were used as trainers with the objective of ensuring sustainability, support, and easy management of mobile application use. To keep the MOH and other relevant stakeholders informed about the progress of the implementation, presentations on the application functionality and roll-out were made during IMCI technical working group meetings, which are hosted by the MOH and attended by partners such as the Malaria Control Program, Central Monitoring and Evaluation Department in the Ministry of Education, Save the Children,

UNICEF, Support for Service Delivery Integration, and the World Health Organization.

D-tree employs a number of avenues to solicit feedback to improve the application. D-tree has set up a chat group on Whatsapp which serves as a community of practice among the HSAs in their respective health facilities to share information on the usage and difficulties they may be facing. HSA supervisors also have a chat group on Whatsapp where they share ideas and give feedback on the use of the application. There is a dedicated helpline, which is available to all HSAs to call during working hours. D-tree interacts with IMCI experts who have the mandate from MOH to make changes to the protocols and to give feedback which is incorporated into the application. As part of project implementation, there are scheduled review meetings at the district and health facility levels where HSA supervisors and HSAs review progress and give feedback on use of the application. When feedback has been incorporated into the application, a new version is created and deployed remotely to the users. Users are informed through their respective chat forums and/or through SMS about the changes.

Growth in Scale

After initial development and refinement, the iCCM mHealth application was rolled out in Ntchisi District with about 20 HSAs in 2013. By December 2014, 138 HSAs and 15 HSA supervisors in Ntchisi District had been trained. The

application was expanded to HSAs in Dedza and Ntcheu districts in 2014 and in Mzimba North District in 2015. By February 2016, 128 HSAs and 33 HSA supervisors in Dedza, 116 HSAs in Mzimba North, and 133 HSAs and 38

Figure 1.
Number of children seen by quarter
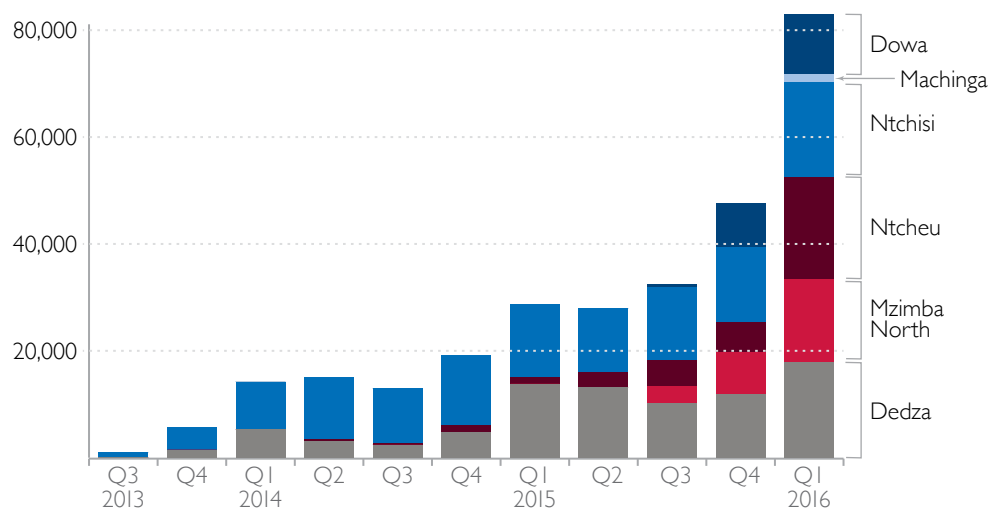
Flackson Chibwato, HSA, Chinguluwe Health Centre, Ntchisi

supervisors in Ntcheu had been trained to use the iCCM and supervisory applications. The HSAs have dedicated two to three days a week to running the village clinics. However, they see children who come to the village clinic even outside the dedicated days. On average, 75% of the HSAs are consistently using the mHealth application when assessing and treating children at the village clinics.

HSAs are responsible for a number of health services, including family planning; community case management; community-based maternal and neonatal health (CBMNH); nutrition; and water, sanitation, and hygiene (WASH). D-tree plans to integrate as many services as possible into one application to support the work of the HSAs. The current iCCM application was integrated with CBMNH protocols to have an integrated CCM/CBMNH application. This application was rolled out to 350 HSAs in Dowa District and 166 HSAs in Machinga District in 2015. In total, the program has trained and equipped 1,031 HSAs and 84 HSA supervisors since 2013. The total number of clients seen as of March 2016 is 307,762 (see Figure 1).

During 2016, D-tree will also add a family planning component to the application and add coverage to at least one more district.

Evaluation and Results

D-tree International carried out an evaluation to determine the clinical effectiveness of the electronic CCM. A mixed approach was used to collect both quantitative and qualitative data. The results showed higher scores in assessment, identification of danger signs referrals (diagnosis), treatment, and counseling. These are the key elements in the management of illnesses in children under-five.

Adherence to assessment using the eCCM app was 100% compared to 91% for those using paper. With the phone application, all questions are asked and recorded before going on to the next phase to encourage the HSA to go through the complete assessment. Paper users correctly identified 60% of the danger signs compared to 100% of the phone users. Treatment of cases with no danger signs was higher in the paper users (79%) compared to the phone users (74%). While the phone provides the recommended treatment, the actual treatment given depends on the availability of the drugs and supplies recommended. Sixty percent of cases were referred appropriately in the intervention (phone) group while 48% of the cases were referred correctly in the control (paper) group. Counseling and treatment advice were seen to be higher among the phone users (93%) than the paper users (87%).

From the HSA and caregiver interviews, considerable positive feeling and feedback were recorded. HSAs felt more confident in using the iCCM application. They also felt that there was a reduction in the frequency of visits by the same children as compared to before, which they attributed to the comprehensiveness of the assessment and care given to the child when using the phone. HSAs expressed knowledge gain in using the application from the prompts and advice as well as counseling messages they get from the phone. HSAs also expressed improved follow-up rates for cases. However, they

were concerned with the double entry of data as they use both the phone and paper registers.

Quotes from the district health team and HSAs include:

"It is better to use the phone than the paper, because the phone has everything you need to do CCM." —District IMCI coordinator

"The phone enables me to conduct a comprehensive assessment of the child. The phone makes a diagnosis for me, so it makes my work easier, unlike before where I had to make sense of the symptoms to make a diagnosis." —Daniel Mandevu, Bembeke Health Centre, Dedza

Lessons Learned in Program Implementation and Scaling

- **It takes effort to train and generate stakeholder interest in using data** arising from the implementation of a mHealth application; simply building program dashboards is not enough. We have now worked to ensure that the results from each district's activities are reviewed and presented at the quarterly program meetings. For instance, based on the usage levels from Dowa District in 2016, D-tree was able to establish that the HSAs faced acute drug shortages and therefore were unable to operate the village clinics at full scale. This was brought to the attention of the IMCI unit, which sent a team to try to resolve the situation.

- **The involvement of communities in managing the phones is critical to their sustainability.** There have been occasions when an HSA's phone was stolen and later returned by another community member, as they saw this as a tool that belonged to the community and not just an individual. This is because after the application training, the HSAs sensitize the communities that they will now be using the phone to assess and treat the children. The community then sees the phone as a tool for running the village clinic.

- **The implementation of the mHealth system is not a panacea to fix all the problems of the health system.** It is and should be part of an integrated system to improve health care and outcomes. Specific to the iCCM system, when there are drug stock-outs, the HSAs tend to close the village clinics, so a mobile tool will only have limited effectiveness. Therefore, continued supervisory support is needed for both eCCM and non-mobile sites to help the HSAs feel confident to still see sick children even if they lack medication, as they should be able to successfully diagnose them and identify those who need home care and those who need to be urgently referred.

- **When scaling up, it is important to have clear and sustainable follow-up and support processes in place.** It is more helpful to avoid creating parallel structures and instead use existing structures to provide the support.

- In order to enhance coordination efforts between programs at the MOH and to support the use of data for decision-making, **D-tree placed a team member at the IMCI unit** to serve as mHealth coordinator.

- Although the mHealth application does not yet directly connect into the District Health Information Software 2 (DHIS2), the **monthly reporting feature** has shown to be useful as the districts using the mobile application have shown improved reporting rates into DHIS2. In the Central West Zone, for example, the mobile districts showed 100% reporting rates for the last 5 months with 89% reporting on time as compared to a 77% reporting rate and 53% on time in the non-mobile districts.

Future Plans

D-tree plans to develop a supervisory application for the integrated CCM/CBMNH application, which will allow the HSA supervisors to monitor the performance of their HSAs from a mobile device. As the program has grown, we have seen the need to engage HSA supervisors as well as assistant environmental health officers as a way of extending the ability of the program to identify HSAs who are struggling and to resolve common issues. In addition, the supervisory application will improve interaction between the HSAs and their supervisors through remotely checking the HSAs' performance. Currently, physical supervisions to check HSAs' performance are irregular due to financial constraints in the MOH.

With the continuous support to improve quality of care, the next step for D-tree is to integrate family planning into the existing CCM/CBMNH application. This is another key component of the work of the HSAs and was identified as a priority following discussions with the MOH. With the addition of family planning, the application will now serve to support most of the functions the HSAs perform. The integration of applications is in line with the MOH strategic plan where standalone services are being integrated to ensure a holistic approach to health care given to clients whose health needs span across multiple services.

Two HSAs doing a role play at a CCM mHealth app training in Ntcheu

D-tree, in collaboration with other partners, is working with the MOH to put systems in place that will enable interoperability of both systems to allow data from the mobile application to be sent to DHIS2. Currently, the health information system (HIS) policy has been approved and standard operating procedures (SOPS) are being developed. The SOPs will determine the process of interoperability.

While there is strong support from the MOH for continued use of the application and scale-up, the current funding streams end in 2016 and 2017, presenting a challenge for the future. This is an issue the MOH faces in other programs as well, as donors are directing funding through development partners rather than through the MOH, limiting the government's ability to fund their priorities. ■

Snapshot: iCCM	
Geographic Coverage	Malawi Districts: Dedza, Mzimba North, Ntcheu, Ntchisi, Dowa, and Machinga
Implementation Dates	July 2012–March 2017
Implementation Partners	D-tree International (project design and implementation support) ThingsPrime (solutions architect) Ministry of Health (implementer) Save the Children (project partner) Jhpiego Support for Service Delivery Integration (project partner)
Donor(s)	Barr Foundation Save the Children Canada Jhpiego Support for Service Delivery Integration
Contact Information	Steve Ollis, Chief Operating Officer, D-tree International, sollis@d-tree.org

References & Additional Resources

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