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**Title** Mobile Technology to Improve Treatment, Reporting, and Monitoring for Acute Malnutrition

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## Background and Objectives:

Community-based Management of Acute Malnutrition (CMAM) is a proven approach for treating acute malnutrition. Its effectiveness is undermined by poor adherence to clinical protocols, inaccurate record keeping and weak supervision systems. In response to these challenges, a mobile application (app) for CMAM was developed to provide health workers (HWs) with case management tools and job aids. The app, built on the CommCare platform, was contextualized and deployed within ongoing CMAM programmes in partnership with local ministries of health in Afghanistan, Mali, Chad, Niger, and Kenya beginning in 2014. One hundred and seventy-nine health workers were trained on the application, in 106 health facilities across the five countries. This was a pilot project to assess the potential for this technology to improve CMAM programming.

## Methods:

Final evaluations were conducted in a staggered manner in the five countries during 2016 to assess the effect of the app on protocol adherence, monitoring, reporting, user acceptability and competency. Evaluations were also intended to compile recommendations and lessons learned to inform scale-up and deployments to other countries. Data was collected from a purposive sample of one third of the implementation health centres and was compared with health centres using the traditional paper-based system. Both quantitative and qualitative methods were employed using standardized tools: observation checklist to assess clinical protocols, interview guide for focus group discussions with HWs and beneficiaries, and key informant interviews with project staff, Health District officials and Community Health Committee members. Project monitoring tools administered quarterly provided information on user acceptability, competency, and contextual factors (connectivity, caseload, logistics). A separate randomized impact evaluation was conducted in Kenya led by Save the Children.

## Results:

Adherence to clinical protocols improved across all five countries, with Mali and Niger showing the most noticeable improvement. Child records were more complete in implementation sites. HW acceptability was high, although following the protocol as required by the app increased case management times, which was perceived negatively given the high workload of HWs. Beneficiary perceptions of the technology were positive; they appreciated the counselling messages in the local language, and generally ‘trusted’ the instructions from the app, reducing conflict with HWs. Reported treatment outcomes were above Sphere standard targets over the course of the project in each of the countries. Engagement of Ministry of Health (MoH) in the app deployment varied across the five countries. In Afghanistan, Mali and Kenya where MoH were most engaged, the potential for future scale up is greatest.

Technological issues, which varied by country, including limited battery life, small screen size of mobile phones, and poor network speed and coverage were challenges to HW uptake. The requirement for dual reporting (paper and electronic) throughout the pilot was an additional barrier.

## Conclusions:

The experience across five countries in contextualizing and piloting the CMAM app demonstrated the potential for this technology to improve CMAM service delivery in diverse settings. The app is considered a valuable job-aid for HWs. Key learnings include: developing a single set of ‘global specifications’ for a CMAM app is not appropriate given the differences in national protocols; country contextualization is complex and time consuming requiring on-going responsive support from a technology partner to address ‘bug’ fixes; field testing with end users is vital; a technology partner who can accommodate timeline flexibility and works in fragile contexts is necessary; weak CMAM services in some countries affected uptake of the app, recognizing that the app is not a replacement for quality training and supervision for HWs. The project highlighted the need to examine current global CMAM clinical protocols in light of what is feasible in terms of capacity and time for HWs in low-resource settings, with high patient caseloads. While the end of project evaluations demonstrated the potential for the app to improve acute malnutrition programming, more rigorous research of the impact of this technology on treatment outcomes, including cost effectiveness, is needed.

**Keywords:** Acute Malnutrition, Technology, Nutrition, mhealth, CMAM

**Conflict of interest:** None

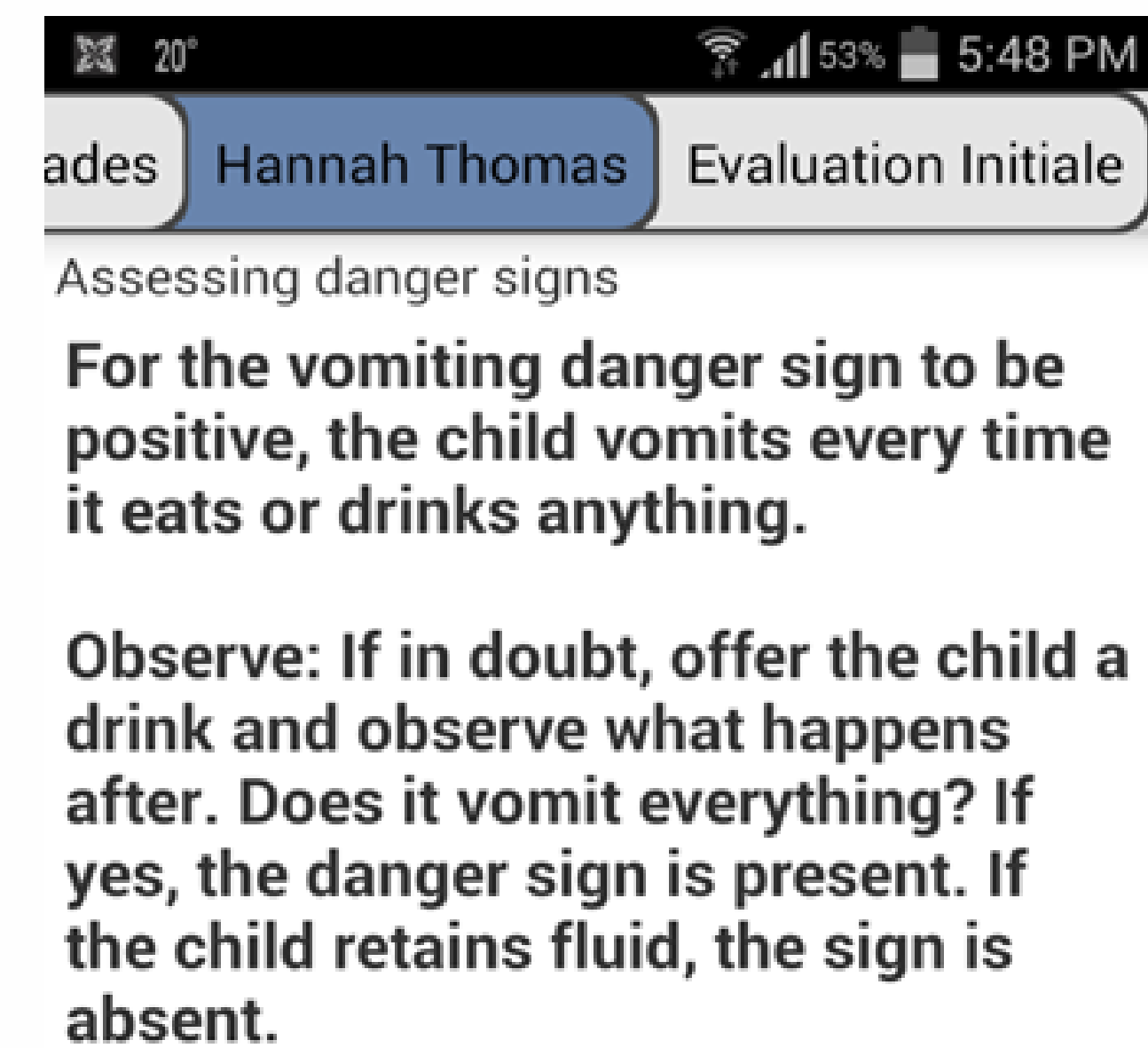


Table1: CMAM Mobile Health (mHealth) application features

Issues/Challenges	CMAM mHealth App Solution / Feature
Complex treatment protocol and low protocol adherence	Response-triggered decision tree algorithms
Low literacy, numeracy of health workers and language barrier with local population	Text, voice, and pictures prompt health workers along the treatment protocol
Difficulties in tracking an individual during treatment and between different treatment programmes	Automated referral initiation and tracking • Automatic reminders for follow-up • Referral notifications
Infrequent, inconsistent counselling on improved nutrition, health and hygiene practices	Integrated multimedia for targeted counselling
Paper based system slow, unresponsive and poor quality—not available for decision makers	Real-time monitoring through automatic generation of reports
Unresponsive stock management system: frequent stock outs of therapeutic and/or supplementary food at health facilities	Reminders and alerts to supervisors and supply chain



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