

# Preliminary findings from a malnutrition mobile app randomised trial in Wajir, Kenya

Severe Acute Malnutrition (SAM) is responsible for between 1–2 million preventable deaths every year and affects around 17 million children under five. Integrated Management of Acute Malnutrition (IMAM) is a proven approach to identify and treat acute malnutrition. However, its effectiveness is limited if treatment protocols are not followed and data is unreliable. A mobile health application developed to help health workers do IMAM was evaluated in 40 health facilities in Wajir Kenya. The study found that the app reduced the number of reporting errors by 25%, provided caseload and treatment data to decision makers within 1.3 days of collection, increased the accuracy and reliability of treatment outcome data and improved health workers' adherence to the IMAM treatment protocol. The IMAM app has the potential to drastically improve the speed of response to surges in caseloads, identify and resolve operational bottlenecks and improve quality of care and treatment effectiveness. However, its effectiveness is dependent on health workers being well trained and ongoing software support being available to ensure that the app functions properly.

**S**evere Acute Malnutrition (SAM) is a major cause of death in children under five. Its prevention and treatment are critical to child survival and development. Integrated Management of Acute Malnutrition (IMAM) enables health workers and volunteers to identify and initiate treatment for children with acute malnutrition before they become seriously ill, using ready-to-use therapeutic foods (RUTF) – a high-energy, micronutrient enhanced paste which mothers can give their children at home. However, the success of IMAM is limited if treatment protocols are not followed, record keeping and data management is poor and reliable data is not available in time for decision makers.

An IMAM mobile health application was developed by World Vision and Dimagi in 2013 to guide health workers through IMAM protocols and provide accurate and timely data for district health managers to respond to changes in caseloads and treatment outcomes, manage supplies, and inform national statistics. The application was piloted in Chad, Kenya, Mali, Niger and Afghanistan between



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2014 and 2016 by World Vision, International Medical Corps and Save the Children. In January 2015 Save the Children through [Transform Nutrition](#), launched a study to evaluate the impact of the IMAM application on the quality of IMAM treatment and data in 40 health facilities in Wajir, Kenya, including remote locations.

▲ A health worker screening a child for malnutrition, using the IMAM app.

## How the IMAM app works

The IMAM app is used on tablets or mobile phones and provides health workers with simple, step-by-step guidance to help them assess, treat or refer children visiting the IMAM programme. The app is built on the open source CommCare platform, which uses a touch swiping function to take health workers through the IMAM steps. It reminds them of the treatment protocol and counseling messages, and it calculates z-scores, numbers of RUTF sachets. It also records the child's information making child follow up easier and uploads the data to the 'cloud' providing live and accurate data for county level management.

## What was the study design?

Forty health facilities from three sub counties in Wajir were selected and randomly allocated to the intervention and control group. The intervention facilities received a tablet with the IMAM app and 31 health workers from 20 facilities were trained over three days to use the tablet. Routine child level IMAM data recorded on paper registers was collected from all 40 facilities (N=1,200) for one year prior to the trial period to estimate accuracy of reporting and similarity between the intervention groups. After the

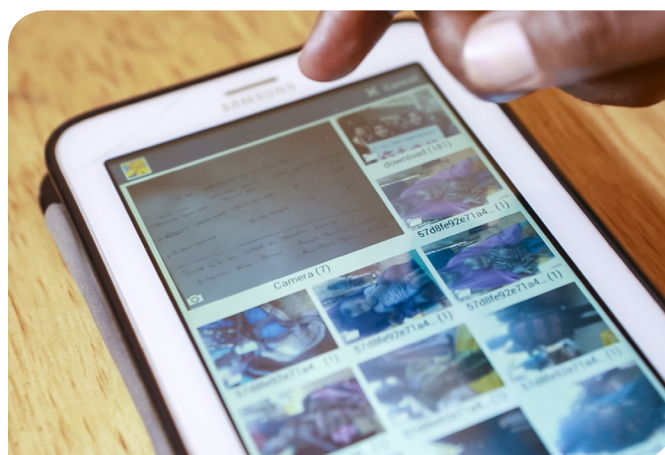
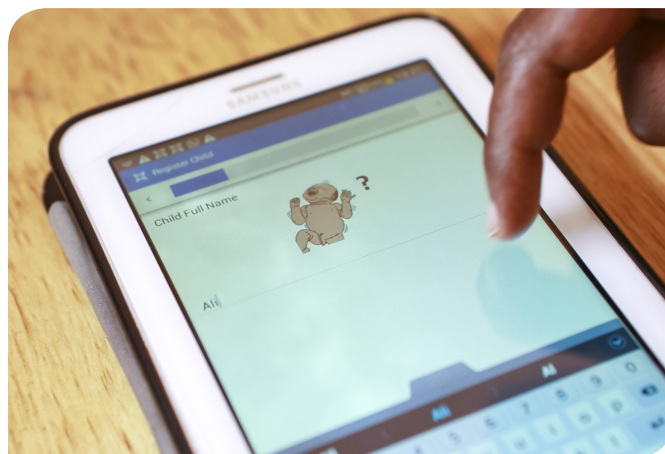
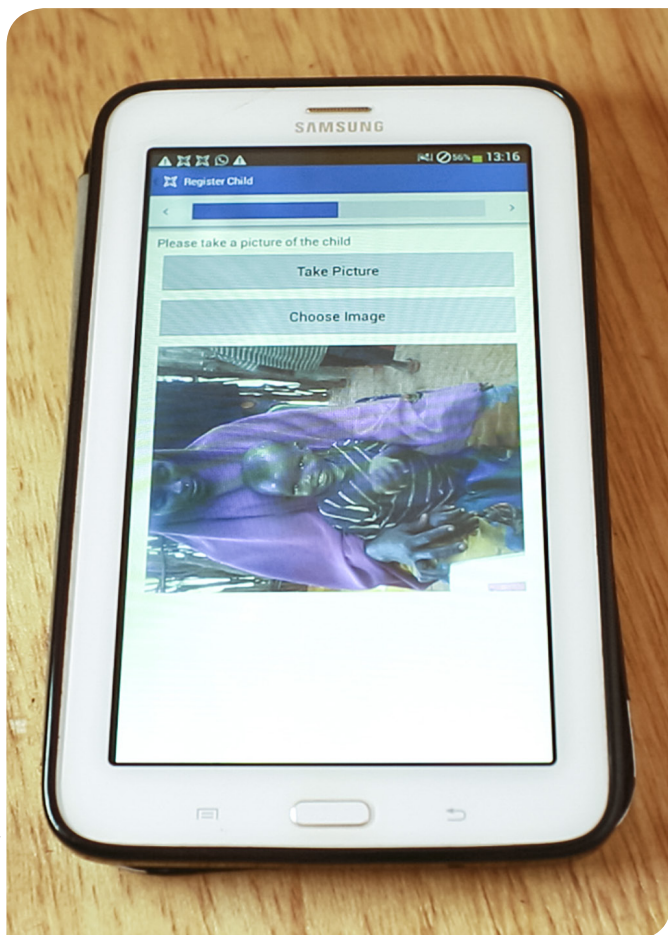
app introduction, the same paper register data was collected from the 20 control health facilities (N=903) and compared with the equivalent data collected by the app in the 20 intervention facilities (N=668) over a one year period. Direct observations of health workers providing IMAM services in both groups was also done over 3 months to assess adherence to IMAM protocols.

“Forty health facilities from three sub counties in Wajir were selected.”

## IMAM Data: why is it needed?

- Child age, sex, height, weight and Mid Upper Arm Circumference (MUAC) is used to assess whether the child is malnourished and requires treatment, if they have met discharge criteria and if they are improving or deteriorating during treatment
- This data is used to assess treatment outcomes (% cured, defaulted, died or not recovered) across facilities overtime, which allows management teams to identify poor and high performing facilities and respond appropriately
- Date of admission and exit and the rate of weight gain allows health workers to monitor individual children's progress in treatment

▼ Sample screens from the IMAM application which helps health workers assess and treat children with acute malnutrition and counsel mothers on child care and treatment.





◀ Health workers screening children for malnutrition, Wajir, Kenya.

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## What did we find?

### *The app reduces data errors*

- Only 73% of paper register IMAM data was usable: The rest was either missing, unreadable or implausible. The variables with the most missing data were those related to the child exiting the treatment programme, exit date (46% usable) and the reason (defaulted, cured, died) (37% usable)
- 100% of the data generated by the IMAM is complete. There is no missing or unreadable data because the app identifies gaps and errors and prompts the health workers to correct and complete them while they are assessing the child

### *The app provides 'live' data to decision makers*

- With the paper-based system, it may take up to 40 days for child data to be viewable and usable at district level, as health facility data is aggregated only once a month and reports are due to the district 10 days after the close of the month.
- With the app, it takes a median of 1.3 days for child data to be available to decision makers at district level. The time depends on connectivity and health workers capacity to upload the data.

### *The app improves adherence to the IMAM protocol*

- 99% of MUAC measurements observed in the intervention group were done correctly compared with 84% in the control group. MUAC measurement errors include misplacing the MUAC tape along the arm, lifting the arm while measuring or pulling the tape too tight or too loose which can lead to misdiagnosis.
- Across the 18 recommended medical checks that should be performed to identify other health problems, 40% of tests were done in the intervention group compared to 11% in the control group. The

appetite test (offering RUTF to the child) is particularly important because it helps identify a child with more serious medical complications requiring referral or other treatment. Only 13% of children observed in the control facilities had an appetite test compared to 39% in the intervention facilities.

- If a child has oedema, they are severely malnourished and must be treated as such regardless of other indicators of malnutrition. Oedema was assessed in only 9% of children observed in the control facilities compared to 16% in the intervention group.

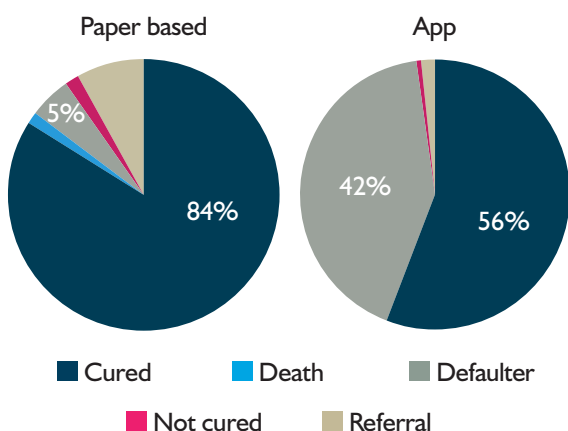
“With the app, it takes a median of 1.3 days for child data to be available to decision makers at district level.”

- Although the app increases the likelihood that IMAM steps are followed, many shortcuts are still taken even when using the app.

### *Many children are mis-diagnosed in the paper based system*

- Weight for Height Z-score (WHZ) is one of the more complicated methods to assess if a child is malnourished as it relies on the health worker first correctly measuring the child's height and weight and then identifying the WHZ score (deviation from a standard reference population of healthy children) from a three way table.
- A reanalysis of all WHZ scores from the raw weight and height data in the paper registers found that 28% of WHZ were incorrectly calculated
- A reanalysis of children's admission weight, height and MUAC data found that 17% of children were wrongly admitted to the IMAM treatment programme (they were not severely malnourished).
- The accuracy of WHZ measurements in the IMAM app generated data is still being assessed.

**Figure 1 Proportion of children cured, defaulted, died or not cured when they exited the IMAM programme.**



*The app improves the accuracy of treatment success*

- District Health Information System reports from the 40 study facilities prior to tablets being introduced reported 95% cure rates suggesting that the majority of children that were admitted to the IMAM programme were cured.
- The app data however tells a very different story. In the 20 intervention facilities, only 56% of children were cured and 42% had defaulted compared to 84% and 5% respectively in the control facilities over the same period. Defaulters are children who have not attended IMAM services for three consecutive weeks.

- Defaulters are often linked to operational issues such as: RUTF stockouts at the health facility or long distances between home and health facility which reduces caregivers willingness and ability to attend the IMAM service.

*Implementation challenges*

- With four measurements of malnutrition, 18 medical checks and ten counselling messages, the current IMAM treatment protocol is time consuming. In remote low resource facilities with high caseloads as found in Wajir, health workers take short cuts even when using the app. This calls into question the operational feasibility and complexity of the treatment protocol in areas where there are low resources, high caseloads, and where treatment of acute malnutrition is one of many services provided by the health worker
- Ongoing software issues, including ‘bugs’ reduced the efficiency of the IMAM app causing frustrations amongst health workers, and affecting uptake. Making sure the app functions well and bugs are fixed promptly is key.
- Ongoing support and training for health workers is vital; both for the paper based and app based service delivery. In areas where there is high staff turnover and mobility between health facilities, there needs to be regular training and supportive supervision to motivate health workers to follow protocols and use the IMAM app.

**Credits**

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*Disclaimer: results presented in this brief are preliminary and should not be quoted.*

**Conclusions and recommendations**

- Paper-based systems do not provide reliable data in good time to allow decision makers to respond to surges in caseloads and address operational challenges. The IMAM mobile app improves adherence to the IMAM protocol and provides real time accurate data to decision makes which overtime can improve IMAM coverage and treatment effectiveness.
- Even with the app however, health workers continue to miss key IMAM steps because the treatment protocol takes time and health workers working in remote low resource health facilities with high caseloads are forced to take short cuts.
- The effectiveness of the app relies on health workers being properly trained and supported and the app functioning well. This requires ongoing support for software improvements and bug fixing, as well as refresher training and field visits especially where staff turnover is high.



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