# Ma Santé: Saving Lives of Mothers and Children

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**Abstract:** Infant mortality in Mali is amongst the highest in the world – one out of five children does not survive the first years of his life [1]. In 2011 and 2012, 75 Community Health Workers (CHW) in the suburb of Yirimadjo (55.000 inhabitants) in Mali started using mobile phones to more efficiently monitor pregnant women and children under 5. A locally developed app enables the CHWs to collect data during house calls which is sent by SMS to a database, allowing nearby clinics to instantly monitor the health situation and call in patients for treatment when needed. Overall, we found that the use of the mobile data collection system has significantly enhanced the existing community health care in Yirimadjo. The system allows for a closer and more in-time monitoring of both the community and the work of the CHWs, helps to respond more swiftly to emergency situations, and saves lives.

## Improving health monitoring by using mobile

Local mothers acting as a Community Health Worker (CHW) play a vital role in overcoming the lack of knowledge on how to prevent malaria, malnutrition and diarrhea, promoting prenatal and postnatal care and vaccination, and making sure patients receive the right treatment in time. CHWs are trained by professional health staff to recognise health risks, such as early symptoms of malaria or dehydration of young children. By regularly making house-calls to check upon the health of particularly young children and pregnant women, it is possible to provide prevention and rapid health care. By 'mapping' the health situation of families on a large scale, health specialists can detect a potential outbreak of infectious diseases. However, in the data collection process and communication between CHWs and health specialists much is still to be gained.

In 2011, Dutch NGO IICD [2] and mobile operator Orange Mali launched a pilot project (Ma Santé) to strengthen the work of 75 CHWs and 10 health specialists working for Muso Ladamunen [3], a local NGO. The CHWs were trained in using a mobile device and a locally developed mobile application, called MAMMA (Mamans Mobiles contre le Malaria au Mali). The MAMMA app consists of a questionnaire listing various indicators which have to be checked and filled out during each health visit. The data thus collected is being sent by SMS to a database with a web interface allowing health specialists to monitor the health situation and to respond when needed. We assumed that being able to use mobile phones and the MAMMA application would bring along the following advantages:

- Health clinics and community associations can respond **faster** to outbreak of malaria
- Health clinics and community associations can allocate budgets to where it is needed most, thus making healthcare **more effective**
- CHWs are able to more **quickly contact** the health clinic for advice and ensure that patients get to see a doctor immediately.
- Doctors can more **easily contact** the CHW and help them to monitor patients;
- Health clinics can **quickly alert** CHWs and send information to the CHWs if an outbreak is detected.

By conducting prevention, diagnosis and treatment in a more efficient and cost-effective way, more people can be faster served. More lives can be saved.

## Methodology, software and hardware

Our action research has taken place in the rural town of Yirimadjo, a suburb of the Malian capital Bamako, from March 2011 to November 2013, and has involved children under 5 and pregnant women. The pilot was conducted in several phases, the first of which was a multi-stakeholder consultation of all those involved in health related community interventions, including the staff of the Community Health Centre, members of the city council, district health officials and CHWs.
The second phase consisted of an analysis of the existing data-collection and data-analysis tools, and of the information needs of the different stakeholders, especially the CHW's. We then tested existing software for mobile data

collection, in order to determine what tool would best be suited to the technological, linguistic and economic context of the Yirimadjo area. From this survey, it became apparent that the CHW's would have difficulties to fill in forms in French, while forms in the local language Bambara would be fairly suitable. This ruled out most of the existing software.

Another outcome of the survey was that many CHW's did possess a mobile phone, but that most were not familiar with the text-features (like SMS) of the phone.

In the next stage, we made a choice for affordable technology and open source software, and we chose to re-engineer the forms feature of FrontlineSMS Medic, in order to be able to insert forms in Bambara. The forms in Bambara were loaded on Nokia C1/01 feature phones. The data sent by the mobile phones are received on FrontlineSMS Medic via 2 modems, Sony Ericsson K800i and E173 Huawei Broaband. A web platform was developed in PHP/MYSQL to allow processing and analysis of the data sent by the CHW's during their daily house-calls in the community. This software package is running on a Ubuntu server 12.0LTS.

Once the system was operational and stable, we started to train the CHW's: a group of 25 experimented CHW's first received training in the use of the phone, and secondly in the manipulation of the different forms. This was followed by regular group and individual come-back sessions. Later on, the mobile phone training of a group of 50 newly formed CHW's was incorporated in their regular CHW training.

Next to filling in the different forms, the CHW's can also use the mobile phones to alert the health services. Keywords for alerts in specific cases, such as a request for an ambulance for a child in crisis, or for a woman in labor trigger cascading actions for actors involved in the management of emergencies.

Finally, we also inserted other value added fields in the forms, such as the detection of children without birth.

The implementation phase started with 25 CHW's from late 2011 on and was gradually upscaled to a total of 75 CHW's by early 2013. Feedback from the CHW's on the use of the mobile phones was gathered during their bi-weekly sessions with the CHW-supervisors, two doctors working for the NGO Muso Ladamunen.

From late 2012 on, with funding from IWG, the project was replicated in another suburb of Bamako, Sikoroni (80.000 inhabitants) with the local NGO Sigida Keneyali. Here too, the process started with a multi-stakeholder consultation, but the choice of technology and hardware could be based on the

preliminary experiences in Yirimadjo. Some forms were adapted to the specific needs as expressed by the local stakeholders in Sikoroni, 35 CHW's were trained and started using the application in early 2013.

## Results

On a yearly basis, Muso Ladamunen used approximately 312.000 SMS (150.000 SMS for the data sent by the CHWs, and 162.000 SMS for the reminders for vaccination and antenatal and postnatal consultations).
75 CHWs in Yirimadjo have been trained, and 96% of them now perfectly master the collection tools and data transmission; the 4% having trouble with the tool are mainly related to eye-vision and the size of the phone screen. We have registered 2475 children, of which 1796 were diagnosed for uncomplicated malaria. Each child now has a tracking sheet on the different interventions of the CHWs. 237 children with signs of severe malaria could be treated. 12% were tested positive for malaria via rapid tests. 60 % could be treated within the 24-48h interval.
180 women and 115 children were assisted thanks to SMS alerts. 44 children were found insufficiently or not vaccinated at all, and they were conscripted in a special immunization program. The dropout percentage for antenatal care went down from 35 % to 20 %. 125 children were found without a birth certificate and have received one by now. Thanks to the SMS alerts, the average delay for emergency care decreased from 1h45 to 30min. The alerts also enabled arrangements to be made before the arrival of the ambulance with the urgent cases at the community health center. The average response time of the CHWs within 24h has increased from 34% to 60 %, while the response time within 48 hours subsequently decreased from 70 % to 60 %, and within 72 hours from 80 to 65%. The improvements on response time can be related to the application which allows a regular monitoring of the individual interventions of a CHW and provides evidence for a feedback to the CHW by their supervisors. Incorporated geographical data on the forms allowed a fairly accurate identification of the areas most affected by malaria, and of areas with low rates of antenatal care subscription.
The analysis of the combined data also helped Muso Ladamunen and the involved health instances to intervene more effectively through targeted advocacy. Reminders for vaccination sessions, and for antenatal and postnatal visits were sent out by SMS – this partly explains the increase in the rate of antenatal care from 78-98 % and of postnatal care from 10% to 30%. The

improvement rates were particularly due to the fact that Muso could make a link between the registered pregnant women and their actual attendance of antenatal and/or postnatal sessions, and send reminders for these sessions. The comparison also allowed to identify all women who were late or absent for the sessions, and for CHWs to take specific steps towards these women.

## Conclusion

The use of the mobile data collection system has further enhanced the existing community health care system in Yirimadjo – and data from the second implementation in Sikoroni point in the same direction. The system allows for a closer and more in-time monitoring of both the community and the work of the CHWs, and helps to respond much more swiftly to emergency situations. Community Health Workers have proved to be able to relatively quickly master the technology, and indicate that it saves them time, and makes them more effective – and they take pride in their new role.

On the other hand, adaptation of the application to the local context (e.g. language), training and coaching of CHWs on the use of both the mobile phone and the application remains essential in a first stage.

Linking the health data to the existing national Health Information System would be a logical next step to help sustain the system. Recurrent costs are fairly low, and further upscaling may allow economies of scale on the investments in training and hardware.

## Footnotes:

[1] WHO, 'Levels and Trends in Child Mortality. Report 2012. Estimates Developed by the UN Inter-agency Group for Child Mortality Estimation'. Retrieved from: http://www.who.int/maternal_child_adolescent/documents/levels_trends_child_mortality_2012.pdf

2. The International Institute for Communication and Development (IICD) is a Dutch-based non-profit foundation, with over 15 years of experience in using information and communication technology (ICT) as a tool for development. Together with local and international partners IICD creates practical and sustainable solutions to persistent problems in economic development, education and health in 12 countries across Africa and Latin America. IICD's programmes have thus far benefitted almost 1 million people directly and more than 6 million people indirectly. www.iicd.org

3. From 2008 on, Muso Ladamunen has initiated a large community development program in Yirimadjo, and it conducts parallel activities in citizenship building, education, economic development and health. The health activities in the area are based on a model of universal access to healthcare, and on home based care via the CHWs of type II. http://www.projectmuso.org