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Technical brief:
mHealth for maternal and newborn health in resource-poor and health system settings, Sierra Leone

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INTRODUCTION

Project description: The research project – 'mHealth for maternal and newborn health in resource-poor community and health systems settings, Sierra Leone' – is funded by the DFID programme on New and Emerging Technologies, Research Competition. This technical brief summarises findings from Phase 1, a feasibility study which aims to generate further understanding of the key issues involved in mHealth. The main findings can be found in the feasibility study report ('I expect the health worker to call me', Feasibility Study Report, Magbity et al, August 2011). The findings will guide the development of more extensive implementation research in Phase 2 (due to be started end 2011).

The specific objectives of the research were:

(1) To assess mobile communication behaviour and perspectives of public health workers and their managers;
(2) To explore mobile communication behaviour and perspectives of health service users;
(3) To assess the logistical, technical, and financial aspects of mobile network providers and related services, including the testing of selected mHealth interventions;
(4) To assess risks and preconditions associated with the integration of mobile phone technologies into the health system in low resource settings.

Background to MNH in Sierra Leone:
Maternal and child mortality figures in Sierra Leone remain high, and Sierra Leone ranks 158 out of 169 countries in the Human Development Index. There have been recent policy improvements – the Reproductive and Child Health Strategic Plan was launched in 2008; maternal and child health are covered in the Basic Package of Essential Health Services (started in March 2010); and access to maternal and child health services has improved after the launch of a Free Health Care Initiative for pregnant/lactating women and children under five years of age (launched April 2010). However, both demand-side and supply-side factors remain barriers that affect the health of mothers, newborns and their children. And although 85 per cent of pregnant mothers attended antenatal care services at least once in their most recent pregnancy (DHS 2008), less than half of deliveries were attended by a skilled attendant, and only 25 percent of deliveries took place at a health facility (DHS, 2008).

The potential of mHealth: The recent enthusiasm for using mobile communication technologies for public health purposes has been fuelled by the quick rise in mobile phone usage in developing countries, particularly in rural areas, and the ever-expanding options within communication technology. Linked to this has been increased mobile network coverage and falling costs of mobile communication. A global coalition called for the innovative use of mobile communication technologies for public health (mHealth) to strategically contribute to broader efforts to improve maternal and newborn health (UN Foundation, 2010). These technologies address both MDG5 (reducing maternal mortality), and MDG8 (target 6 – to narrow the 'digital divide' between the global South and North).

A literature review identified a number of areas where mHealth has increased service utilization rates in Asia. However, there remains little evidence of peer-reviewed literature in sub-Saharan Africa (although studies are ongoing in Zanzibar and Ghana that may bring forward relevant and reliable data).

mHealth in Sierra Leone: The presence of mobile telephones in Sierra Leone's is still relatively low compared to other West African countries, with less than 21 mobile phone subscriptions per 100 population. However, mobile phone use is on the increase throughout the country. Sierra Leone has four main mobile phone companies – Airtel (ex-Zain), Africell, Sierratel, and Comium. Prepaid mobile phone cards can be purchased throughout the country. The coverage of mobile phone networks is not uniformly distributed (although no data is readily available, personal communication with Sierra Leone's National Telecommunications Commission mentioned a geographical coverage of 80 per cent).

Though the Sierra Leone government has developed a national ICT policy, it is yet to embark on developing an mHealth policy. This report will inform the development of any such future mHealth policy.

METHODOLOGY

General research methodology: The study was implemented in two sites, Kenema district and Western Area. Kenema district is one of the three districts in the eastern region of Sierra Leone. The Western Area, on the other side of Sierra Leone, hosts the capital city Freetown. The selection of the two districts was purposive – both districts have had mobile phones introduced for work purposes within the health sector, and both districts have relatively high mobile phone coverage already. The situation thus cannot be taken as representative for the current situation in all districts; but the idea is that – as the interventions are ready for scaling up – technology would have caught up in other districts where mobile phone coverage is currently expanding.

The main research methods used were qualitative: semi-structured interviews, in-

depth interviews, and focus group discussions. These tools were field-tested before finalizing, and data collectors were carefully trained in applying the study protocol.

The research participants were 45 district health workers (including managers), 85 health service clients and community members from the districts (male / female / and younth), and key informants (including 4 national health managers and 2 experts).

A toll-free information line: As part of the four objectives, the study instigated a toll-free information line, reachable from any phone. This was set up as a small intervention implemented in the Western Area only, in collaboration with the mobile network provider Airtel. The intervention was tried for 4 weeks, where calls were taken by rotating staff from the Ministry of Health Service's Reproductive Health department. The toll-free information line – called 'Belleh-woman & Pikin' – was promoted through the national radio station. The medium of the queries were specified as English and Krio. Data was collected on the number and duration of the calls; the topics discussed, and the user experience. This data is forthcoming, and will be shared at a later stage.

Health worker-initiated client monitoring: This small intervention was implemented in both study districts, in a health facility in each that had a high dropout rate from antenatal and postnatal visits. They were each provided with three mobile phones with top-up cards of 3 of the 4 network providers. Health providers were asked to inform and remind clients of clinic appointments (with a focus on antenatal and postnatal visits), medication, and the importance of delivering in a health facility. The data is forthcoming on both the provider and client experience with this aspect of the intervention, and will be shared at a later stage.

Other health applications for mHealth: Initially, another awareness-raising application was to be tested, whereby pregnant women during their first ANC visit would be asked to agree to receive regular text messages on pregnancy-related issues as well as appointment reminders. However, as the research team became increasingly aware of the issue of widespread illiteracy, this idea was abandoned. Secondly, closed mobile networks for staff were going to be introduced, but these proved to be too ambitious for phase 1 in terms of effort, time and funding.

DISCUSSION OF FINDINGS

Communication among health workers: Several district health management teams in Sierra Leone have opted to use a 'closed user group', whereby a bulk contract for voice calls and text messaging is established (between the district and a mobile network provider) for a limited number of phones within the group. This is also referred to as a virtual private network (VPN). The benefits are: that it improves free-of-charge communication options among health staff, fixes costs per month, and prevents non-work-related use.

Current use of mobile phones by health workers: *"The phone is with, or is in the care of, the CHO. If he is not around we may not be able to use the phone. (...) In such instances we may need to use our personal phone to make the work easier for us. (...) [But] there are times that we don't have money at that moment to buy [top-up] cards for our phones."*

- Female health worker, Western Area

Work-related use of mobile communication for health is already very common amongst health workers. Surprisingly however, most use their personal phones rather than work phones. Despite the implemented closed user-group system, very few health workers actually had access to the facility mobile phone. They spend substantial amounts of their own money on work-related calls – a clear indication of how mobile communication has become an indispensable part of their daily work.

Reasons for current use by health workers: Health workers currently use mobile communication in a variety of ways, the most popular of which were: to receive and provide information on meetings; for referrals (emergency obstetric care was mentioned here several times); to communicate about logistics and stock replenishment; to speak to each other or their supervisor for consultations and advice on diagnosis and case management. Using the mobile phone has also saved time and cost, since information is shared without the need for travel to district offices:

"Every Friday we call the M&E officers and read out the information on drugs, ANC attendance and patterns of diseases from our books."

- Female health worker, Western Area

Communication between health workers and clients: Whilst most of the health workers interviewed possessed a mobile phone, only a third of the female clients interviewed possessed their own phone. Another third could access a close relative's phone after asking permission, and the final third reported not having access to a mobile phone. All the health workers reported using the phone (mostly their personal one, but also some mentioned using the facility-owned phone) for work-related calls; but none of the clients had ever used their mobile phones for health-related calls.

Current use of mobile phones between health workers and clients: Health workers mostly use mobile phones to follow up with clients (e.g. after initiating treatment, or after pregnancy). Some also use it to agree on appointments with clients or to give reminders.

"After every delivery we request for the phone numbers of the mothers, and if we do not see them (...) for postnatal care we communicate with them to follow up."

- Female health worker, Kenema

Mode of communication: The preferred mode of communication for both health workers between themselves, and for health workers to contact clients, is voice calls – *"Calls are the most effective because I get an instant response*", explained one male health manager in the Western Area. Half of the health workers also reported using text messages. Clients expressed concern that text messages would be difficult for them because of levels of illiteracy; they also mentioned that they would prefer to interact immediately with a familiar health worker. Unlike many African countries where mobile communication has seen a rapid increase over the past few years, text messaging has not gained much popularity in Sierra Leone, possibly due to illiteracy, and also due to the preference for using local languages (which are primarily verbal).

Barriers: There are some external factors that were seen to affect mHealth, notably the poor coverage of the mobile network (especially in rural areas), and low literacy levels of traditional birth attendants and community health workers/volunteers. There are also some internal logistical factors, including: poor access to battery charging facilities, limited access to duty/facility phone, and poor access to top-up cards. Several health workers had to pay to make work calls on their personal phones – an unwelcome financial burden.

"Because we do not have a generator in this facility, we always pay 1000 Leones anytime we charge the phone, and this is done frequently."

- Female health worker, Western Area

Potential use of mobile phones: Although no clients had used mobile phones for health communication, the study led to some interesting potential uses for mHealth, particularly relevant to MNH. One possibility is that female clients could use mobile communication to contact health workers when facilities are closed, to enquire about pregnancy tests, and to ascertain times of immunization.

Clients indicated that they expect health workers to express concern for them and other clients by calling to find out about their own or their children's health – a more

'passive' interaction from the client's side, and one that would considerably increase the health worker's workload.

"If I leave the hospital feeling very ill, I expect the health worker to call and find out how I feel."

- Female client, Kenema

Topics suitable for discussing over the phone: Most issues related to sexual and reproductive health were deemed to be easy to communicate via mobile phones, including family planning, pregnancy, ANC, delivery, and child health. But both health workers and clients found that STIs, HIV, abortion, and test results in general were not suitable for mobile phone communication.

Concerns: Health workers were concerned that an increase in calls received may lead to health workers being overwhelmed by the added workload. From the client perspective, confidentiality and privacy issues were raised as the main concerns because people tend to share phones within a household. This is compounded by the issue of illiteracy:

"I do not receive text messages because I do not know how to read. I can only receive calls. I cannot even make the call myself. My brother usually helps me out."

- Female client, Kenema

Sensitivities: In addition to the issues of confidentiality and privacy concerns mentioned above, gender issues were also raised – some female clients preferred to talk to female health workers, whilst others preferred to talk to male health workers because they perceived them to be better at maintaining confidentiality. The location of the conversation was also a concern, as clients often share telephones and live with many other members of the household. If a health worker calls to leave a message on a shared phone (including one shared with a neighbour), this multiplies the concerns over confidentiality and the sensitivities of the topic. Another concern mentioned was that some husbands may not be aware that their wives are using certain health services.

Rationale for mHealth: There were many perceived benefits for clients and health workers that came out of this study, including: an improvement in health information and awareness, service delivery, access, quality, efficiency, responsiveness, and ultimately health outcomes (all of which contribute to the WHO health system framework and the National Health Sector Strategic Plan). Looking at these potential uses, it is not difficult to see how this could influence the three delays model and positively impact on maternal and neonatal health.

PRELIMINARY CONCLUSIONS

This section highlights some preliminary conclusions, which – although neither far-reaching nor final – are included as food for thought. They will also help generate insights and inputs for the Phase 2 study.

The relationship with mobile network providers: Although all four mobile network providers participated in the February 2011 stakeholder workshop, communicating and receiving relevant information regarding coverage data, subscribers, and tariffs has been challenging. To date, the regulator NatCom has not shared relevant information either. Potential for engaging the network operators may be to combine closed user groups so they negotiate on contracts together; this would probably result in substantial cost reductions.

How mHealth interacts within the wider health system: Mobile communication is perceived as being potentially beneficial in a number of ways; but care must be taken to prepare for the strains and demands on the health system.

There are a number of various dimensions of interaction between mHealth strategies and health sector aspects which have not been given consideration. For example, mHealth applications could be used to strengthen in-service learning by health workers. Several of these interactions will be addressed in the framework of the Phase 2 intervention study.

How to make the most of closed user groups: Currently, the closed user groups are not fully operational, as most health workers cannot access the duty/facility phone. Remedying this would involve addressing the issue of joint phone ownership, as well as the availability and accessibility of top-up cards for health workers. There may also be a possibility of using part of the Performance-Based Funds (PBF) to purchase top-up cards for health workers, or for pregnant women, as the phone calls would help to reach the PBF targets (such as number of antenatal visits, number of health visits to a facility etc). The next issue to consider is whether other districts should initiate similar closed user groups.

Considering different modes of communication: Future consideration could be given to increase the usage of text messaging for communication between health workers (although it doesn't seem like a promising mode of communication between health workers and clients). There are also other modes of mobile phone applications that have not been explored, including picture messages, voice-response systems, and automated remote monitoring of clients.

Addressing internal barriers: Consideration should be given to how to overcome some of the internal barriers uncovered by this study. One option is to implement battery charging alternatives, such as solar power chargers. Another suggestion to emerge from the clients is the possibility of providing top-up cards to pregnant and lactating women. Similarly, there are possibilities to distribute top-up cards to health workers to make mHealth less of a financial burden. As for the issues of confidentiality and privacy, further work could explore whether clients who do not have a personal phone could nominate a person they trust to receive phone calls and/or messages on their behalf.

Seizing opportunities of involving men: The potential to use mHealth to engage men more in sexual and reproductive health and rights SRHR issues seems high; however, whether or not the female partner is in favour of this will have to be taken into account.

Considering efficiency gains: Some clients may use the phone conversation as a proxy for a clinic visit. This would result in ultimately less gain for health outcomes. Similarly, obtaining information from a toll-free information number should not be used as a substitute for receiving proper care, if needed.

The need for communication protocols for health workers: The availability and use of mobile communication will lead to new demands on health workers' skills and routines. There may be a need to develop a kind of protocol for how health workers should deal with mobile communication with clients. Areas that this protocol would address include: confidentiality, hours of the day health workers can and cannot be reached, and interference of phone consultations with clinic work.

Financing: Consideration should be made on how to make services affordable and thus accessible to poor clients. Otherwise, the information and service gap will widen between those who can and cannot afford to access these. One suggestion that surfaced was that top-up cards could be given to eligible clients (e.g. pregnant women), or vouchers transferred through mobile phones to entitle clients to certain services for a reduced fee, or free of charge, at designated clinics.

Governance: Currently, decisions to embark on mHealth strategies rests with each district health management team separately. But easy gains could be made if more than a few districts embark on similar mHealth strategies and negotiate systems and tariffs with the mobile network operator together. Revitilisation of the National Steering Committee on mHealth will also be beneficial.