

## Helpdesk Report: The Use of Mobile Phones to Improve Communication from Lower to Higher Tier Health Workers

Date: 10 August 2010

**Query:** What information is available from developing countries on the promotion of use of mobile phones (and telemedicine) by the government or NGOs, to improve communications and referrals from lower tier health workers (such as SBAs and multipurpose workers) to higher level health workers such as medical doctors in the periphery and district. Please can evidence be provided about increased consultations and improvement in performance indicators as a result of these schemes.

**Enquirer:** DFID Nepal

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### 1. Overview

Mobile phones and internet technology are being used in developing countries for health projects with some success. The bulk of the literature reports are on phones being used for workers to communicate with patients and for reporting and surveillance, rather than for communication between health workers. There is more information on health workers using technology for accessing medical information and for training.

Specific evidence on improvement in referrals and consultations is difficult to find. Projects are still relatively new so many research papers conclude that there is little evidence and that more is needed. Evidence that was found is detailed in section 2. Key findings include:

- 1,043 referrals transmitted over 18 months through the Multimedia Super Corridor Project in Malaysia.
- Over 300 referrals received from 44 doctors in remote areas during a 6-month period through an SMS telemedicine project in the Philippines.
- One report found personal digital assistants (PDAs) had positively impacted on different areas of hospital physicians work but that specific evidence was largely absent from literature.

Some relevant projects are listed in section 3. Evaluations for these projects could not be found in most cases.

Reports on a range of mhealth (medical and public health practice supported by mobile devices) projects, in section 4, show some common problems and lessons. For example:

- Problems with telemedicine projects arise where people are not comfortable with the technology or have not been trained sufficiently.
- Lack of government support is sometimes an issue.
- For success, technological solutions must enhance existing human relationships that have been established through conventional routes or as a solution to a long-felt community need.

## 2. Literature on the use of mobiles for communication between health workers

### **Role of teleconsultation in moving the healthcare system forward**

By Yusof, K. et al., in *Asia-Pacific Journal of Public Health*, 14(1):29-34, 2002

<http://aph.sagepub.com/content/14/1/29.full.pdf+html>

Preliminary findings of the implementation of the Malaysia Teleconsultation Network show that the frequent contact amongst health workers using teleconsultation has beneficial effects that outlast the teleconsultation event as workers appeared to retain skills learnt during the consultation and apply them to future patients.

Findings suggest that even in these early stages of implementation, teleconsultation has led to cost savings, a more efficient allocation of resources, enhanced diagnostic options and better health outcomes.

Specifically, it reports on a project in Malaysia run by the Ministry of Health to deal with the problem of manpower shortage. The Multimedia Super Corridor project links 41 sites nationally. Over 18 months 1,043 referrals were transmitted.

Findings include:

- Teleradiology, TeleCardiology, TeleDermatology, TeleNeurosurgery and General Medicine were the top 5 case types.
- The majority of the cases are respiratory (24.4%) which are suitable for management from a distance.
- More than 60% of the referrals were from district hospitals to tertiary hospitals.
- As store-and-forward (sent to an intermediate station before being forwarded to the recipient) teleconsultation is highly suitable for normal outpatient cases, it compromised 60.6% of all referrals.
- Data analysis reveals that teleconsultation plays a role in preventing misdiagnoses, subsequent inappropriate treatment and escalation of conditions – with the resultant reduction in morbidity, mortality and costs.
- Teleconsultation has dismantled boundaries allowing specialist knowledge to be tapped across the country.

### **Telemedicine in developing countries: Perspectives from the Philippines**

By Marcelo, A.B., in 'Telehealth in the developing world', Wooton, R. et al. (eds), *Royal Society of Medicine Press*, 2009

[http://www.idrc.ca/openebooks/396-6/#page\\_27](http://www.idrc.ca/openebooks/396-6/#page_27)

One case study in this article finds doctors communicating more effectively with SMS. The existing network was supplemented by providing modest prepaid SMS allowances to the doctors and offering them free conference call services for voice-based referrals. This system proved to be sustainable and effective. During a 6-month period, over 300 referrals were received from 44 doctors in remote areas.

### **The impact of mobile handheld technology on hospital physicians' work practices and patient care: A systematic review**

By Prgomet, M., Georgiou, A. & Westbrook, J., *Journal of the American Medical Informatics Association*, 2009; 16(6):792-801.

<http://jamia.bmj.com/content/16/6/792.full>

The authors conducted a systematic review to examine evidence regarding the impact of mobile handheld technology on hospital physicians' work practices and patient care, focusing on quantification of the virtues of mobile technologies. The authors identified thirteen studies that demonstrated the ability of personal digital assistants (PDAs) to positively impact on areas of rapid response, error prevention, and data management and accessibility. The use of PDAs demonstrates the greatest benefits in contexts where time is a critical factor and a rapid response crucial. However, the extent to which these devices improved outcomes and workflow efficiencies because of their mobility was largely absent from the literature. The paucity of evidence calls for much needed future research that asks explicit questions about the impact the mobility of devices has on work practices and outcomes.

### **Working with mHealth Applications in the Developing World. A Comparison of Three African Countries**

By Coleman, J., International Institute for Communication and Development (IICD), 2009

<http://bit.ly/dpaJr4>

This article reports on lessons learnt from the current use of mHealth in the three sub-Saharan countries of Tanzania, Zambia and South Africa. More specifically, it details what mobile phones are being used for and factors to be dealt with in implementing projects.

It finds Tanzania has established a telemedicine consultation network which operates throughout 43 health facilities, of which 40 are remote hospitals. It uses a system from the Tanzania Telemedicine Network, details in section 3.

## **3. Related Projects**

### **Tanzania Telemedicine Network**

<http://telemed.ipath.ch/tanzania/index.php?q=>

The goal of this project is to improve co-operation between hospitals in Tanzania, where hospitals have few specialists and few options for consultation. Thirty-three hospitals have been connected to the internet, most of them rural hospitals with satellite connection.

### **Aga Khan University, Improving Health services in Northern Pakistan through eHealth**

[http://www.medicinetoday.com.pk/chs/ehealth/eHealth\\_IHSNP.shtml](http://www.medicinetoday.com.pk/chs/ehealth/eHealth_IHSNP.shtml)

This program seeks to use mobile connectivity to achieve a teleconsultation link between different levels of health workers. It also aims to promote continuing education through distance learning and to link field offices for transfer of information to support monitoring.

### **AMREF Telemedicine Project**

<http://usa.amref.org/printindex.asp?PageID=32&ProjectID=39>

The African Medical and Research Foundation (AMREF) began a telemedicine project in 2004 in Kenya and Tanzania that seeks to provide second opinions to clinicians and will integrate teleconsultation and continued medical education.

#### **BuddyWorks Telehealth Project.**

[http://www.oshca.org/Members/twcook/oshca2007\\_presentations/BuddyWork\\_oshca\\_KL.ppt/view](http://www.oshca.org/Members/twcook/oshca2007_presentations/BuddyWork_oshca_KL.ppt/view)

University of the Philippines Manila, Buddyworks MMS telemedicine for dermatological cases allows users to send SMS, MMS or email referrals that are forwarded to specialists in Manila. There is an evaluation report from 2003 with lessons learned and recommendations:

[http://hinf.uvic.ca/archives/t\\_health.pdf](http://hinf.uvic.ca/archives/t_health.pdf)

#### **Nacer**

<http://tghin.org/node/151>

In Peru the Nacer solution aims to decrease maternal and infant deaths. It allows remote healthcare workers to share data with other remote workers, medical experts, and hospitals, using any telephone (mobile, satellite, or fixed-line telephone systems—personal or public) or Internet technology. Through Nacer, the entire health ecosystem can send and receive information in order to monitor patient health, provide referrals and follow-up care, and track supplies and disease outbreaks.

#### **Teledoc – Jiva Healthcare Project**

<http://www.comminit.com/en/node/116145/307>

TeleDoc, in India, uses Java-enabled mobile phones to connect village-based healthcare workers with doctors in urban areas for remote diagnosis and treatment. Doctors receive real time diagnostic information entered by the healthcare workers and prescribe appropriate treatments.

#### **National Telehealth Center, University of the Philippines Manila**

[http://www.idrc.ca/en/ev-137418-201-1-DO\\_TOPIC.html](http://www.idrc.ca/en/ev-137418-201-1-DO_TOPIC.html)

This centre has introduced an SMS component to their telemedicine initiative. Health workers are able to relay information and communicate with one another via SMS.

#### **ClickDiagnostics consultation services**

<http://clickdiagnostics.com/>

A global mhealth enterprise. For example: Teledermatology through mobile phones in Ghana. <http://clickdiagnostics.com/click-in-action/ghana/>

#### **Lady health worker, GSMA Development Fund**

[http://www.gsmworld.com/documents/lady\\_health\\_worker\\_pakistan.pdf](http://www.gsmworld.com/documents/lady_health_worker_pakistan.pdf)

The Lady Health Worker Programme is a joint initiative of Mobilink, the GSMA Development Fund, the UNFPA and the Ministry of Health, aimed at bringing mobile communications to LHWs for the first time to enable them to better perform their duties.

#### **Medisoft Telemedicine Pvt. Ltd.**

<http://www.medisofttelemedicine.com/>

Medisoft offers an mHealth application that can share live video of remote patients with a doctor via the web. They are also working on setting up a medical call centre. Locations of implementation include Pakistan and India.

#### **M-DOK: Mobile Telehealth and Information Resource System for Community Health Workers in the Philippines**

<http://www.apdip.net/resources/case/rnd54/view>

This project has established a system with health information modules stored offline on the mobile phone and a mobile electronic patient record. It aims to develop a network of community health workers and referral physicians to also be part of the system. Some early

technical evaluation is available  
[http://www.amic.org.sg/ict/external/awards/0501A3\\_L19\\_interim\\_report1.pdf](http://www.amic.org.sg/ict/external/awards/0501A3_L19_interim_report1.pdf) .

*Example of Telemedicine Software:*

#### **eMOCHA telemedicine system**

<http://emocha.org/>

eMOCHA software runs on Android-supported wireless devices and on a web server. This open-source telemedicine software allows for interactive video conferencing and supports other aspects of health communication and education.

Other similar telemedicine software platforms include Sana (formerly known as MocaMobile) <http://www.sanamobile.org/> and iPATH <http://sourceforge.net/projects/ipath/>

### **4. General mHealth research**

#### **mHealth for Development. The Opportunity of Mobile Technology for Healthcare in the Developing World**

By Vital Wave Consulting for The United Nations Foundations and Vodafone Foundation Technology Partnership, 2008

<http://bit.ly/QV9Im>

This gives a good overview of mhealth – the provision of health-related services via mobile communications. It covers:

- meeting health needs through a broad array of applications
- examining the impacts of mhealth projects
- assessing mhealth and future health needs in developing countries
- identifying the building blocks for sustainable and scalable mhealth programs
- a compendium of 51 mhealth projects

#### **A text message-based intervention to bridge the healthcare communication gap in the rural developing world**

by Mahmud, N., Rodriguez, J., Nesbit, J, in *Technology and Health Care*, 18, (2), 2010

<http://iospress.metapress.com/content/7052u77p13008718/>

A group of 75 CHWs in Malawi were supplied with cell phones and trained to utilise the network for a variety of usage cases, including patient adherence reporting, appointment reminders, and physician queries. At the end of the pilot, the hospital saved approximately 2,048 hours of worker time, 2,750 *on net* (3,000 in fuel savings minus \$250 in operational costs), and doubled the capacity of the tuberculosis treatment program (up to 200 patients). The research concludes that mHealth interventions can provide cost-effective solutions to communication barriers in the setting of rural hospitals in the developing world.

#### **Barriers and Gaps Affecting mHealth in Low and Middle Income Countries: Policy White Paper**

by Mechael, P et al. for The Earth Institute and mHealth Alliance, 2010

[http://www.globalproblems-globalsolutions-files.org/pdfs/mHealth\\_Barriers\\_White\\_Paper.pdf](http://www.globalproblems-globalsolutions-files.org/pdfs/mHealth_Barriers_White_Paper.pdf)

This review identified significant gaps in mHealth knowledge stemming from:

- the limited scale and scope of mHealth implementation and evaluation
- a policy environment that does not link health objectives and related metrics to available mHealth tools and systems
- little investment in cost-benefit studies to assess mHealth value and health outcomes research to assess success factors and weed out poor investments.

The review makes policy and strategy suggestions for different scale programs to implement and evaluate projects that link mobile technologies to national health objectives and health information systems in a way that benefits both citizens and health workers. Coordination and the identification of incentive structures and the rules of engagement for meaningful

collaboration between the public and private sector is needed. This will better inform public and private investments and deploy socially beneficial and commercially viable solutions.

### **Towards the development of an mHealth strategy: a literature review**

by Michael, P.N. for WHO and the Millennium Villages Project, 2008

[http://mobileactive.org/files/file\\_uploads/WHOHealthReviewUpdatedAug222008\\_TEXT.pdf](http://mobileactive.org/files/file_uploads/WHOHealthReviewUpdatedAug222008_TEXT.pdf)

This is a comprehensive review of technologies, applications and partnerships within mhealth. It comments on the benefits of technologies for health worker access to information and for training. The main recommendation is that key mHealth stakeholders consider focusing their next steps on catalyzing the testing and scale up of interventions that show promise in achieving key health outcomes.

### **Telehealth in the developing world**

Wooton, R. et al. (eds), *Royal Society of Medicine Press*, 2009

<http://www.idrc.ca/openebooks/396-6/>

This is a very wide-ranging book, rich in practical experience. It is full of real-life stories. Telemedicine is seen as central to the improvement of health and life in developing countries. Much has been said and written about telemedicine and its potential to transform life, but these are still early days. A great deal of what has been written and said has been theoretical. This book reflects the reality.

Within this book:

#### **Tele dermatology in developing countries**

[http://www.idrc.ca/openebooks/396-6/#page\\_121](http://www.idrc.ca/openebooks/396-6/#page_121)

By Steven Kaddu, Carrie Kovarik, Gerald Gabler and H Peter Soyer

The inherent visual nature of dermatology makes it suitable for telemedicine. Several tele dermatology projects have recently been initiated in developing countries, and the number is gradually increasing. Preliminary results underline a number of potential benefits to patients, remote health care workers and health care systems of host countries. These benefits include easy extension of specialized dermatological services to geographically remote areas with few dermatologists, reduction of patients' waiting time for appointments, faster screening for skin diseases, promotion and coordination of scientific health projects, and education of health workers and lay people. Local physicians benefit from the mentoring and educational aspects of the consultations, as well as the access to improved research facilities.

#### **Telemedicine in sub-Saharan Africa**

[http://www.idrc.ca/openebooks/396-6/#page\\_232](http://www.idrc.ca/openebooks/396-6/#page_232)

By Maurice Mars

This article notes that that many telemedicine projects in Africa are launched with a lot of attention, but there is little or no information about their subsequent progress. It concludes that for telemedicine to be of assistance in Africa there needs to be greater government will to embrace telemedicine, changes in telecommunication policies, provision of affordable bandwidth, and the development of sustainable and affordable rural tele-medicine solutions. This will require substantial external assistance, goodwill and perseverance.

### **Technology examples:**

#### **Datadyne**

<http://www.datadyne.org/>

A widely used application inspired by google and facebook – a mobile-phone-and-web-based data collection system)

#### **Cell-life Aftercare**

<http://www.cell-life.org/home>

This technology is for the management of HIV, as well as other infectious diseases such as TB.

## 5. A selection of recent evidence of mobile phones improving performance indicators

### **Mobile phones and development: analysis of IDRC-supported projects**

By Rashid, A.T. & Elder, L., *The Electronic Journal on Information Systems in Developing Countries* (2) 1-16, 2009

<http://idl-bnc.idrc.ca/dspace/bitstream/10625/36671/2/127745.pdf>

The Uganda Health Information Network (UHIN) project used timely two-way electronic information transmission to and from District offices in Mbale and Rakai, relying on mobile caching servers to transmit data over the cellular network. A cost-benefit analysis of the project showed that the network delivered 24% savings per unit of spending over the traditional manual data collection and transmission. Moreover, close to 100% compliance rate was reported in two District Health Services with their weekly disease surveillance reporting, compared to the national average of 63%.

### **Mobile-izing Health Workers in Rural India**

By Ramachandran, D., *Microsoft research*, 2010

[http://www.cs.berkeley.edu/~divya/ramachandran\\_chi2010.pdf](http://www.cs.berkeley.edu/~divya/ramachandran_chi2010.pdf)

Videos, designed to persuade village women and motivate healthworkers, were sent on mobile phones. Preliminary results showed increased dialogue between women, positive effects toward health worker motivation and learning, and key community influencers motivated to participate in promoting the health workers.

### **Every child counts : the use of SMS in Kenya to support the community based management of acute malnutrition and malaria in children under five**

By Berg, M., Wariero, S. & Modi, V., *Child Count*, 2009

[http://www.childcount.org/reports/ChildCount\\_Kenya\\_InitialReport.pdf](http://www.childcount.org/reports/ChildCount_Kenya_InitialReport.pdf)

The pilot has begun to show that an SMS based approach, using a system like ChildCount, can lead to improved maintenance of child-specific anthropometric records which in effect is helping to monitor a community's health. ChildCount also makes it easier to develop and maintain a comprehensive child registry that facilitates the ability to implement targeted interventions. The system has also already shown that it can be used to increase the level of accountability of CHWs while enabling the health team to better manage community-based care.

### **Information technology for primary health care in Brazil**

By Tomasi, E. et al., In 'Telehealth in the developing world', Wooton, R. et al. (eds), *Royal Society of Medicine Press*, 2009

[http://www.idrc.ca/openebooks/396-6/#page\\_34](http://www.idrc.ca/openebooks/396-6/#page_34)

The BH Telemedicine Project aimed to promote the continuing education of health workers in primary care units, as well as contributing to the modernization of the public health system. The BH Telemedicine network connects primary care centres to the University teaching units, with activities in the fields of medicine, nursing and dentistry. The network uses videoconferences for continuing education, and teleconsulting between specialists and staff at the primary care centres for second opinions and for discussion of clinical cases. The project has been evaluated by two groups. The results showed better outcomes for the cases discussed, with about 70% of patients staying in basic units, with no need for referral to a specialist. There was also a reduction of 71% in the number of patients who needed to travel to the Clinics Hospital of Belo Horizonte to be seen.

### **Data Gathering in Brazil**

**Information from: 'mHealth for Development. The Opportunity of Mobile Technology for Healthcare in the Developing World'**

By Vital Wave Consulting for The United Nations Foundations and Vodafone Foundation Technology Partnership, 2008

<http://bit.ly/QV9Im>

This project aims to help contain dengue fever by gathering data and warning households about the dangers of behaviours that encourage mosquito proliferation when required. The project team's preliminary evaluation has shown that the time spent in data gathering was drastically reduced, and end-user acceptability has been very high so far.

## 6. Additional information

### Author

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