



Mobile phone use among patients and health workers to enhance primary healthcare: A qualitative study in rural South Africa



Jocelyn Olivia Todd Anstey Watkins^{a,*}, Jane Goudge^b, Francesc Xavier Gómez-Olivé^c,
Frances Griffiths^{a,b}

^a Division of Health Sciences, Warwick Medical School, University of Warwick, Coventry, United Kingdom

^b Centre for Health Policy, School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

^c MRC/Wits Rural Public Health and Health Transitions Research Unit (Agincourt), School of Public Health, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

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ABSTRACT

Mobile phones have the potential to improve access to healthcare information and services in low-resourced settings. This study investigated the use of mobile phones among patients with chronic diseases, pregnant women, and health workers to enhance primary healthcare in rural South Africa. Qualitative research was undertaken in Mpumalanga in 2014. Semi structured in-depth interviews were conducted with 113 patients and 43 health workers from seven primary healthcare clinics and one district hospital. Data were thematically analysed. We found that some health workers and patients used their own mobile phones for healthcare, bearing the cost themselves. Patients used their mobile phones to remind themselves to take medication or attend their clinic visits, and they appreciated receiving voice call reminders. Some patients and health workers accessed websites and used social media to gather health information, but lacked web search strategies. The use of the websites and social media was intermittent due to lack of financial ability to afford airtime among these patients and health workers. Many did not know what to search for and where to search. Doctors have developed their own informal mobile health solutions in response to their work needs and lack of resources due to their rurality. Physical and social factors influence the usability of mobile phones for healthcare, and this can shape communication patterns such as poor eyesight. The bottom-up use of mobile phones has been evolving to fill the gaps to augment primary care services in South Africa; however, barriers to access remain, such as poor digital infrastructure and low digital literacy.

1. Introduction

1.1. Mobile health interventions in low- and middle-income countries

Digital technologies such as mobile phones are providing solutions for improving access to healthcare information and services in low- and middle-income countries (LMICs). The use of conventional mobile and wireless technologies to support health objectives is known as mobile health or mHealth (WHO, 2011). The capabilities of digital communication technologies to create, store, retrieve, and transmit information among users may improve and support the delivery of healthcare solutions (Akter and Ray, 2010; Odendaal et al., 2015). The potential of mHealth to be integrated into existing health systems has been widely acknowledged in the literature (Labrique et al., 2013; Ruxwana, 2007; UN, 2012), including in LMIC settings (Mehl and Labrique, 2014; Ruxwana, 2007; UN, 2012). The mobile phone infrastructure is the

most advanced infrastructural development in Africa, far surpassing roads and water, with many rural households having access to mobile phone services but not piped water (WorldBank, 2017).

In rural resource constrained contexts, with shortages of health professionals (Beratarrechea et al., 2017), affordable, effective, and accessible mHealth solutions (Beratarrechea et al., 2014) have been increasingly adopted. A realist review of the use of mHealth for long-term conditions in sub-Saharan Africa indicates that mHealth can address the lack of capacity at the point at which people access healthcare (Opoku et al., 2017). However, mHealth presents many challenges. For example, a qualitative study from South Africa suggests that scaling up mHealth in community-based services is limited by the lack of availability of digital communication technology and privacy of information (Leon et al., 2012). Studies that assessed the feasibility and acceptability of mHealth to support self-management of chronic diseases (Kamis et al., 2015; Leon et al., 2015) in Bolivia and South Africa and

* Corresponding author.

E-mail address: jotawatkins@outlook.com (J.O.T. Anstey Watkins).

sexual and reproductive health (Ippoliti and L'Engle, 2017) (mostly from African contexts) agree that mHealth is effective in reaching patients; however, data privacy and phone access are limiting factors.

Lines of evidence of the effectiveness of mHealth solutions in LMICs have been inconsistent in systematic reviews (Bärnighausen et al., 2011; Bloomfield et al., 2014; Catalani et al., 2013; Cole-Lewis and Kershaw, 2010; Fjeldsoe et al., 2009; Free et al., 2013; Krishna et al., 2009; Mbuagbaw et al., 2015; Velthoven et al., 2012; Yasmin et al., 2016). For example, in a review on mHealth for noncommunicable diseases (NCD) in sub-Saharan Africa, Bloomfield et al. (2014) concluded that evidence to support mHealth effectiveness for NCD care is insufficient. Discussions on how few publications have evidenced scalability in low-resourced contexts continue (Hill, 2015; Kumar et al., 2016). In response to the insufficient programmatic evidence of implementation and scale-up of mHealth, Tomlinson et al. (2013) recommended that the mHealth component must be guided using behaviour change theory.

Most published research evaluated mHealth interventions in LMICs that have been designed and implemented as part of a research programme. By contrast, an interview study by Hampshire et al. (2016) described how health workers in Malawi ($n = 18$) and Ghana ($n = 16$) used their phones informally to support healthcare delivery. In doing so, they bore 'the costs of bottom-up mHealth' (Hampshire et al., 2016, 34). The present study focused on this idea of bottom-up mHealth.

1.2. The present study and its context

This paper reports a large qualitative study that investigated how and why patients with chronic disease, pregnant women, and nurses and doctors in the public health system of a rural north eastern part of Mpumalanga province, South Africa used their own mobile phones for healthcare. Although South Africa is a middle-income country, with free healthcare provided at the point of access, health outcomes in the rural areas are poor. This has been attributed to an ineffective national response to the country's burden caused by leading diseases: HIV and AIDS, tuberculosis, hypertension, and diabetes (StatsSA, 2013). The national maternal mortality rate was high in 2014 (133 deaths per 100,000 births) (van Shaik, 2015, 80). Health service management is not always effective (Scott et al., 2012); governance failures (Coovadia et al., 2009) and ongoing health workforce crises (Rispel et al., 2016) are prevalent. Altogether, these problems create barriers to quality healthcare in the rural communities (Ataguba et al., 2011; Goudge et al., 2009). We investigated the use of mobile phones to fill healthcare gaps and augment services. Our research question was as follows:

How are mobile phones being currently used from the bottom-up by patients and health workers to enhance the delivery of primary healthcare within rural South Africa?

Our study had the following objectives:

- To investigate the current uses of mobile phones to enhance health;
- To determine how patients engage with a clinic-initiated mHealth intervention;
- To understand how bottom-up mHealth practices can be developed to improve healthcare in similar rural areas in South Africa in future.

1.3. Patient and health worker initiated use of mHealth in South Africa

In South Africa, 84.2 percent of households own a mobile phone (Gillwald et al., 2012, 49). A study that used a story-based approach with young South African people (8–25 years) to elicit phone use found that many used digital social networks and consulted the Internet through their mobile phones to 'secure effective healthcare' (Hampshire et al., 2015, 90). A qualitative study with 16 South African nurses undertaking an advanced training programme in midwifery found that the

midwives working in a remote area used mobile phones to connect themselves to 'online communities' (Pimmer et al., 2014, 1402). They also established a Facebook group to consult with each other about patient cases and share specialised knowledge (Pimmer et al., 2014). Another qualitative study (van Heerden et al., 2017) on the publicly funded HIV services in KwaZulu-Natal, reported data from 10 female patients living with HIV and 12 community health workers. In focus groups, the community health workers described how they communicated with each other through WhatsApp and used Google to search the Internet for health information (van Heerden et al., 2017, 100).

1.4. Public health service initiated use of mHealth in South Africa

The South African Government is enthusiastic about mHealth to improve healthcare (Agarwal and Labrique, 2014) and has published an mHealth strategy (NDOH, 2015). In 2014, the National Department of Health launched MomConnect to deliver health promotion messages to pregnant women registered for antenatal care. These messages are tailored to their stage of pregnancy and after delivery, until their child is one year old (Peter et al., 2016; Seebregts et al., 2016; Wolff-Piggott and Rivett, 2016), at no cost to the woman (Barron et al., 2016).

1.5. Evaluations of mHealth interventions in South Africa

In a randomised controlled trial undertaken in Cape Town, patients with hypertension were sent reminders and text messages on behavioural change information to their mobile phones for 12 months (Bobrow et al., 2016). A slight reduction in systolic blood pressure was observed in the intervention group at 12 months compared with the control group; however, this change was not statistically significant. A marked improvement was noted in the intervention group's clinic attendance compared with that of the control group. The results of the study's process evaluation suggest that the patients who benefitted the most from the intervention were those with ongoing stressful life situations such as poverty, causing them to take breaks from taking hypertension medication (Leon et al., 2015). Moreover, also in Cape Town, a trial on interactive mobile text messaging with motivational interviewing aimed at enhancing breastfeeding among women living with HIV is underway (Zunza et al., 2017).

In contrast to these intervention studies, we report initiatives undertaken by patients and health workers to use their own mobile phones to fill gaps and augment primary healthcare services.

2. Methods

We conducted an interview study to examine the current use of health-related digital mobile communication among patients and health workers at their first point of access to services in rural South Africa.

2.1. Study setting

Fieldwork was conducted in one district hospital and seven primary healthcare facilities located in or on the borders of the Agincourt sub-district of rural Mpumalanga province, north eastern South Africa (Fig. 1) (Kinsman et al., 2015; Agincourt, 2014b; Sartorius, 2013). The Wits/MRC Agincourt Health and Demographic Surveillance System (HDSS) site runs a Public Engagement Office (PEO). The PEO assisted with access to the community and entry into healthcare facilities.

The HDSS site covers 420 km², encompassing 32 villages, with approximately 16,000 households (Kahn et al., 2012). The area is broadly representative of the most marginalised rural communities in South Africa. Unemployment rates remain high; therefore, economic 'out migration' to cities for labour is common (Collinson et al., 2007, 3). Many of the village households are densely settled, remote, and underserved by government services. However, two-thirds of households

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