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E-health and M-Health in Bangladesh: Opportunities and Challenges

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Contents

1	Introduction	2
2	Background	3
2.1	Health and health systems in Bangladesh	3
2.2	Digital Bangladesh: a vision of a technology-enabled future	4
2.3	The rapid spread of mobile phones	5
3	E-health and m-health initiatives in Bangladesh	7
3.1	Government e-health and m-health initiatives	7
3.2	Private sector e-health and m-health initiatives	8
3.2.1	Health advice lines	9
3.3	Partnership with service providers	10
3.3.1	Websites and text messages as sources of health information	10
3.3.2	The use of smartphones to enhance the capacity of health workers	11
3.3.3	Intermediaries in a complex market	11
3.4	Regulatory issues	12
4	Health information-seeking behaviour by the poor	13
5	Conclusions	16
	References	18
Tables		
Table 3.1	E-health and m-health initiatives in Bangladesh	7

1 Introduction

There is growing enthusiasm amongst analysts of global health for the possibilities opened up by the rapid spread of mobile phone coverage. This includes substantially increasing access to health-related information and advice and to expert medical consultations. Some argue we are reaching a tipping point in the organisation of health systems in which new technology will drive new organisational arrangements (Christensen, Grossman and Hwang 2009; Bloom and Standing 2008). This is encouraging investment by foundations and bilateral aid agencies in the development of e-health and m-health as a way to improve access to health services in low- and middle-income countries.

As with the introduction and spread of any new technology, there are a number of possible outcomes – or pathways – with different implications for the types of service provided and the distribution of benefits in the short and longer term. A recent STEPS Centre publication (2010) proposes the following characteristics of the way a technological innovation is spread: the *direction* of development and the way organisations incorporate the new technology into their operations; the *distribution* of benefits from the technology and the *diversity* of ways the technology is applied. It argues that the actual pathway of development is strongly influenced by political processes, involving a number of stakeholders with differing interests and understandings.

A number of analysts argue that health systems are particularly path-dependent because of the importance that people give to arrangements they believe protect them from serious health problems (Bloom and Standing 2008). Lee and Lansky (2008), for example, suggest that resistance by stakeholders and complex regulatory barriers are substantially diminishing the impact of new technologies on the organisation of the American health system. Because of the path-dependent nature of the health sector, decisions made early in the emergence of a new technology are likely to have a strong and lasting influence (Bloom and Wolcott 2013).

This report presents a snapshot of how information and communication technologies (ICTs) are influencing health system development in Bangladesh. Section 2 presents background information on the health system in Bangladesh and on the spreading use of ICTs in that country, Section 3 provides more detail on e-health and m-health initiatives, Section 4 presents preliminary findings of a scoping study of health information-seeking behaviour in Bangladesh and Section 5 outlines emerging conclusions about ways forward.

2 Background

2.1 Health and health systems in Bangladesh

Bangladesh is very densely populated. In 2011 it had a population of 139 million, more than 80 per cent of whom lived in the rural areas (BBS, SID and Ministry of Planning 2012). Although it has experienced economic growth, the latest data show that 37 per cent of the population still live below the poverty line.

Bangladesh has a pluralistic health system in which government health facilities and a wide variety of private actors provide health services and drugs (Ahmed *et al.* 2013; Bhuiya 2009; Koehlmoos *et al.* 2011). The private actors include large and small non-governmental organisations (NGOs), private hospitals and clinics, as well as a very large number of informal providers of health services and drugs, known as village doctors. These informal providers work largely outside a health regulatory framework and provide diverse treatment pathways. Small pharmacies, or drug sellers, are scattered across all areas of human settlement in Bangladesh and many of these display adverts informing people of possible treatments as well as supplying antibiotics and other drugs. Drugs are frequently issued in Bangladesh without prescriptions, in dosages which are determined by the amount the client can pay, and may vary according to the client's immediate reactions, stopping as soon as the client feels better rather than completing a prescribed course of medication. The majority of residents of rural areas or urban slums have limited access to trained health workers. In fact, 42 per cent of outpatient visits are to informal providers and drug sellers (HIES 2010). As Bangladesh Health Watch pointed out in 2008, there were only 0.58 qualified health workers for every 1,000 Bangladeshi and only 16 per cent of these health workers were located in rural areas (BHW 2008). This diverse context provides scope for people to seek help from a range of health-related services, with varying degrees of curative success and with a wide range of possible economic costs.

Notwithstanding the deficits in the formal health system, Bangladesh has experienced substantial reductions in maternal, infant and child mortality during the past ten years and it is on track to meet its health and other MDG targets (World Bank and HLSP 2010). In addition, although the differences in the burden of illness between income groups remain substantial, they have diminished. The widespread availability of informal providers and drug sellers has meant that all but the very poorest can obtain drug treatment for common illnesses, if they choose to pay for it. However, there is evidence that many people buy unnecessary drugs, leading to excessive expenditure and the risk of side-effects (Iqbal *et al.* 2013).

In the face of significant shortages of highly trained health care personnel, there has been a growing interest in the possible ways that ICTs, in particular the use of mobile phones (m-health), can improve access to safe, effective and affordable health services and advice in low- and middle-income countries. The Royal Tropical Institute (2013) categorises the relevant m-health applications as follows:

- Education and awareness (disease prevention, educational programmes, health promotion, community mobilisation)
- Point of Care Support and Diagnostics (support in diagnostics, screening and clinical care)
- Patient Monitoring (treatment adherence support and appointment adherence)
- Disease and Epidemic Outbreak Surveillance (real-time tracking of cases of infectious disease)

- Emergency Medical Resource (emergency obstetric care, disaster management)
- Health Information Systems (supply chain management, procurement information)
- Human Resources for Health (distance training and continuous professional development)
- Health Financing (smart cards or vouchers using mobile payments)

The following section describes the spread of ICTs in Bangladesh and their use in the health sector.

2.2 Digital Bangladesh: a vision of a technology-enabled future

Computers were first introduced to Dhaka in 1964. Internet connectivity began in the early 1990s. In June 1998, the Bangladesh government decided to lift import duties and value-added taxation on all computer hardware and software, making technology and information more accessible to middle-class people (Rahman 2003). That same year the earliest telemedicine project was launched by Swinfen Charitable, which established a link between the Centre for the Rehabilitation of the Paralyzed in Bangladesh and the Royal Navy Hospital in Gosport, UK (Vassallo *et al.* 2001). The Bangladesh Ministry of Health and Family Welfare (MoHFW) also undertook its first e-health initiative that year. In 1999 the privately owned Telemedicine Reference Centre Limited (TRCL) was established. It was the first to use mobile phones for health care delivery.

In 2002, Bangladesh adopted a National Policy on ICTs which sought, by 2006, to develop a country-wide ICT infrastructure (MHFW 2008). Collectively, these developments have generated a lot of optimism about the potential of Bangladesh's telecommunication sector for addressing a range of development issues, including health. This is reflected in two recent documents, the *National ICT Policy – 2009* (Ministry of Science and Information & Communication Technology 2009) and the *Outline Perspective Plan of Bangladesh 2010–2021* (Planning Commission 2010). The latter document includes a chapter entitled 'Building Digital Bangladesh' and one of its stated objectives is that: 'Quality healthcare will be provided to all citizens through innovative application of ICT' (*ibid.*).

A number of authors have emphasised the potential of ICT-mediated interventions for providing 'practical and effective enhancement of the economic and social well-being of villagers...' and '[delivering] information on, for example, farming methods or practices, basic health practices, environmental awareness, access to market pricing education or training' (Anwer 2007 cited in Ashraf *et al.* 2008). They see ICTs as playing 'an indispensable role in promoting openness, accessibility, accountability, connectivity, democracy and decentralization – all the "soft" qualities so essential for effective social, economic and political development' (Rahman 2003, no page number given) while also ensuring a voice for the poor and marginalised (Mahmood and Babool 2009). ICTs have also been described as creating significant momentum for women's equality in Bangladesh. As Tandon argues '... more and more women are taking up new opportunities for economic and social development, with far-reaching implications for household, community and market relations' (Tandon 2006: 5).

There are similar optimistic views of the potential contribution of ICTs to improvements in health. 'Having recognised the potential of ICTs to contribute to improvements in health and education' – and given the acute shortages of medical professionals in rural Bangladeshi health care – Bangladesh 'is implementing ICT projects across the country' (Ansari 2010: 332). The growing use of mobile phones is substantially increasing the potential access to the benefits described above.

2.3 The rapid spread of mobile phones

By 2003, Bangladesh was reported to have a market for 13 million mobile phones, with over 32,000 village phones operating in 52 districts (Ashraf *et al.* 2008). In 2008, Bangladesh claimed to have the cheapest mobile phone call rates in the world (MHFW 2008). A World Health Organization (WHO) report in 2011 suggested that mobile phone coverage had reached 98 per cent of all Bangladeshi adults (WHO 2011). In June 2013, there were 105 million active mobile phone subscribers.¹ Estimates from the Bangladesh Demographic and Health (DHS) surveys of 2007 and 2011 indicate that household ownership of mobile phones increased from 32 per cent to 78 per cent, varying from 75 per cent in rural areas to 89 per cent in urban (NIPORT 2009, 2013).

As noted by James (2013), subscription and ownership indicators are not good proxy measures of the value of the technology, since they do not indicate the range of purposes for which different population groups are using phones and do not provide any means of assessing the benefits resulting from that use. In addition, these high rates of mobile phone subscription and ownership do not indicate universal access. In any country, the number of subscriptions is substantially higher than the number of users and the ratio of subscriptions to total population size in many countries is well over 100 per cent, even in some middle-income countries (ITU 2013). More affluent individuals often have multiple telecommunications devices, particularly if they use them for business purposes. Also, many poorer users have multiple phone numbers on different networks, both because intra-network calls tend to be less expensive and because companies make 'special offers' to attract new customers in a highly competitive market (Bullen 2013). In addition, estimates derived from data on 'household ownership' of mobile phones can be difficult to interpret. Mobiles are often seen as the personal property of an individual household member, usually a male, rather than as a shared household asset. It is estimated that in South East Asia, 37 per cent fewer women than men own a mobile phone, a 'gender gap' almost twice that for all low- and middle-income countries (GSMA 2010). The mobile may not be available simply because the owner is away from home or because not all household members are permitted to use it. If use of the mobile is made available, there may be restrictions relating to the cost of the call, the person or agency contacted, the privacy of any communication or the information that may be conveyed. On the other hand, the widespread availability of mobile phones, even in rural areas, means that lack of ownership will often not imply lack of mobile access, which may be provided by a relative, neighbour or local agency, either free or for a minimal fee.

Whatever the measurement issues, the high prevalence of mobile phone availability raises clear opportunities in terms of health care provision, which may bring benefits on the assumption that a variety of other conditions are in place. Though rarely discussed, an important application of mobile technology is the use of the telephone to seek health advice, either from a provider or from a trusted individual, such as a family member or friend. In a recent study involving interviews with some 38,000 rural women in Bangladesh, Labrique *et al.* (2012) found that 20 per cent reported using a mobile phone to seek emergency health care. Of these, 15 per cent were in households without a mobile. However, those who owned phones were almost three times more likely to make such a call. Similar findings were obtained as part of a longitudinal study on malaria which involved surveillance of a population of some 22,000 in a remote hill tract in Bandarban district (Prue *et al.* 2013). Amongst the 23 per cent of households who owned a mobile, 56 per cent said that they had

¹ www.btrc.gov.bd/index.php?option=com_content&view=article&id=768:mobile-phone-subscribers-in-bangladesh-january-2012&catid=49:telco-news&Itemid=502.

used one for medical purposes, the great majority (84 per cent) to seek emergency assistance. In this example, because the project made malaria treatment services available and provided a contact number, the population also made substantial use of their mobiles to report malaria symptoms, to the extent that over time a majority of diagnosed cases originated from mobile phone reports.

3 E-health and m-health initiatives in Bangladesh

A recent scoping study by some of the authors of this report identified 26 e-health and m-health initiatives (Table 3.1) in Bangladesh. A subsequent study of innovations for health in Bangladesh provided more detailed information on a number of these initiatives (Bloom *et al.* 2013). The following sections describe these government and private initiatives.

3.1 Government e-health and m-health initiatives

The MoHFW has assigned responsibility for implementing the health component of Digital Bangladesh to the Director General of Management Information Systems, in the Directorate General of Health Services (DGHS). It is implementing an ambitious strategy for integrating ICTs into the government health system (Azad 2013). This work has been funded through the development framework agreed between the government and development partners. The government has also begun to establish a regulatory framework.

Table 3.1 E-health and m-health initiatives in Bangladesh

Managed by:
Public DGHS District Health Information System Version 2 (DHIS-2) DGHS Office Attendance Monitoring System (OAMS) DGHS Telemedicine DGHS Mobile Phone Health Service (MPHS)
Private (for profit) Medinova Telemedicine eClinic24 (Chakaria Project) by TRCL AMCARE by TRCL Health services for expatriates in Singapore by TRCL Breast Cancer Finding via mobile by Amader Gram JBFH Telemedicine Friendship by mPower MHSBC by mPower Grameenphone Health Line Banglalink Airtel Citycell Robi TeleTalk
Private (not for profit) mCARE by JHSPH mTIKKA by JHSPH MJiVitA by JHSPH SAJIDA Mobile Telemedicine
NGO CRP Telemedicine infoLADY by DNet Aponjon (MAMA Bangladesh) by Dnet BRAC m-health

The DGHS has launched four major programmes as part of the overall government Digital Bangladesh strategy (Azad 2013). It has invested considerable resources in strengthening its management information systems using ICTs, seeking to ensure that all *upazila* (or district) health complexes have access to computers and wireless modems for internet access, and anticipating that the management information system will 'use all possible ICT equipment' as a means to gather, channel, process and distribute health information (MHFW 2008: 91). It has also been developing a website for the DGHS to act as an information warehouse for health organisations, services and programmes and is moving to a web-based database. The DGHS vision for its management information system in health is that it will 'develop itself as the fastest possible health information gathering and delivery source of Bangladesh for the best use in evidence based decision making considering the limitation of resources, user skill and attitude' (MHFW 2008: 91).

In 2012, the MoHFW reported that it had been 'applying innovative strategies for improvements in their various functions ranging from good governance of the service-delivery systems, collection and archiving of health-related data to the adoption of new technologies, like eHealth and mHealth, for greater coverage and better quality of services to the people' (MHFW 2012). E-health activities are also incorporated under the Digital Bangladesh Vision 2021. These plans include the aspiration that the management of government health services would be automated (and almost paperless) by 2016 at national, sub-national and grass-roots level. This encompasses electronic collection and distribution of all data through online databases; and the creation of a secure, robust, 'never-sleep' data centre with a range of protective mechanisms to ensure against hacking, fire, humidity, power failures and other technical issues. Other social issues, such as privacy and confidentiality, do not as yet appear to be addressed. A real-time data backup system operates and the Ministry is undertaking further work to develop data backup systems in remote rural locations (MHFW 2012). Digital Bangladesh has also received its share of accolades on the global stage. The Secretary-General of the International Telecommunication Union, when visiting Bangladesh in 2010, announced that 'Bangladesh should teach digital health to the whole world', because of its progress in e-health. In 2011, Bangladesh received the United Nations Digital Health for Digital Development Award' (MHFW 2012, front pages), and in January 2012, Bangladesh hosted an 'ICT in Health' Colloquium in which the 'government's strategic policy guidelines for Digital Bangladesh were highly appreciated by global and national experts' (*Daily Star* 2012).

As part of the government initiative to develop an ICT-informed health system, a mobile phone health service which involves government-run *upazila* health complexes and district hospitals using mobile phones as a local 24-hour call centre has been developed. Local communication channels are being used to create awareness and inform people of the relevant numbers. Residents can phone, free of charge, and the doctor on duty will provide free medical advice. Plans are in place to expand telemedicine in hospitals and to provide oversight of quality, regulation, disease surveillance and so forth. Finally, a Short Message Service (SMS)-based pregnancy advice service, initiated in March 2010, offers guidance on safe pregnancy. Pregnant mothers have to register in order to receive antenatal, delivery and postnatal advice. There is limited data as to the utilisation or impact of the scheme thus far, though one small-scale assessment was generally favourable (Afroz 2012).

3.2 Private sector e-health and m-health initiatives

The NGOs involved in the e-health and m-health sectors now include (i) the mobile telephone operators; (ii) for-profit and not-for-profit companies specialising in health-related added-value content for mobile telephones including SMS messages and telephone advice

lines; (iii) producers and distributors of health-related commodities such as pharmaceuticals, food supplements, products for babies and so forth; (iv) service delivery NGOs which are integrating ICTs into their work; and (v) university research departments which are developing new applications in response to prizes and challenge funds. The development of a wide variety of e-health and m-health innovations has been stimulated by funding from a number of channels which include bilateral support to NGOs, special donor programmes for supporting e-health and m-health, and challenge funds operated by large foundations. In addition, the mobile phone operators have been actively seeking new sources of revenue as they compete in a market with very high levels of mobile phone coverage.

3.2.1 Health advice lines

Grameenphone (owned by the Norwegian telecommunications company, Telenor), one of the large mobile phone operators in Bangladesh, launched the first telephone medical advice line in 2006, in collaboration with the Telemedicine Reference Centre (TRCL). The latter is a company established in 1999 by a Bangladeshi clinician, whose aim was to create a company capable of using ICTs to substantially improve access to competent health services. Callers were charged 15 Taka (around US\$0.20) for a three-minute call to a qualified physician. Between 2006 and 2011 the medical advice line provided 11 million phone consultations, for which they charged a premium rate.

In 2011, TRCL and Grameenphone ended their collaboration. One issue between them was how to share the revenue from the charges to users. There would appear to be tension between mobile phone operators, whose aim is to create new value-added services, and medical service companies whose aim is to build a reputation and thereby expand its business. Grameenphone, which has taken over the management of the telephone medical advice line, Miaki, describes itself as part of the telecommunications industry specialising in creating value-added services. It provides SMS messages covering several sectors, as well as managing the medical advice line. As a result of a government ruling, all Bangladeshi mobile phone operators can now provide access to this call centre through a single agreed number.

The managers of these advice lines say that they face several constraints to further development of these services. First is the decision by the Bangladesh Telecommunications Regulatory Commission to set fixed charges per minute for all value-added services, including medical advice lines. This has meant that they have very limited funds to pay the doctors. Second is the law which limits the right to prescribe drugs to licensed medical doctors, on behalf of their patients. This means that the advice lines can only advise callers to purchase an over-the-counter preparation or consult a doctor, whereas in the current context people can buy drugs from informal drug sellers without needing a prescription and access to formal doctors remains expensive.

From a for-profit private sector perspective, m-health is described as a value-added service (VAS). These are activities designed to increase the revenue flows to both the company providing the communications network and the company providing services. Provision of a health advisory service, as described above, seems an obvious candidate as a VAS, alongside a multitude of other possibilities including weather forecasts, news updates and market price bulletins. In the fiercely competitive mobile phone network market in Bangladesh, it seems possible that many such services will be introduced, although concerns that the returns on VASs will be less than anticipated imply that many will be short-lived. The key concern from a public health perspective is that competition may lead to cost-cutting, for example using less qualified staff to respond to callers, or unethical pursuit of additional revenues, for example by recommending the use of facilities that are helping to fund the service or recommending more expensive drugs in return for a share of the profits.

There is clearly an important role for government in this context to establish a regulatory framework that will inhibit such behaviour.

3.3 Partnership with service providers

In 2009, TRCL, in collaboration with the not-for-profit Diabetic Association of Bangladesh (DAB), established AMCARE, a subscription-based membership organisation that aimed to use a telephone call centre to encourage compliance with diabetes management protocols and provide a link to qualified doctors and nurses, which may in turn result in referral to a facility certified by DAB. Depending on the services required, membership fees were US\$0.60–US\$20 per month. The TRCL Medical Portal is thus intended to act as a central database, maintaining patient records and details of all AMCARE transactions. This collaboration is meant to build a strong partnership between TRCL and the formal health care system (personal communication). It has taken a long time to launch the service and it still is not in operation.

3.3.1 Websites and text messages as sources of health information

Within Bangladesh, there has been considerable exploration of the ways to use mobile phones as a means of providing relevant information to poor people. The simplest example has been the use of SMS messages as part of a government health education programme. The Bangladesh Telecommunication Regulatory Commission has the power to request that mobile phone operators broadcast the government's SMS messages at no additional cost to the government or the mobile phone users (WHO 2011). This enables the Department of Management Information Systems, which resides within the Ministry of Health, to design SMS health campaigns and send out bulk messages to an estimated 55 million telephone users. Formally, these text-based health messages have not yet been evaluated, but the Ministry has reported widespread responses to health campaigns such as immunisation. This facility – of sending bulk SMS messages for free – has also been used by the Ministry of Health to inform its 100,000 staff members of urgent health information. Recently, the Ministry has launched a health SMS subscription service which regularly advises its subscribers – of which there are a few hundred – about healthy lifestyles (WHO 2011).

Another recent example is Aponjon, the Bangladesh arm of USAID's Mobile Alliance for Maternal Action (MAMA), a global public–private health information service, involving Johnson & Johnson and Babycentre, an American online community, which sends SMS messages to registered pregnant women and parents of young children. Babycentre is a member of the Johnson & Johnson family of companies, and it provides links to an online shop which offers the company's products to its members, largely in the USA. Through MAMA, Babycentre is making these SMS messages available for adaptation to a low-income country, such as Bangladesh.

In Bangladesh, Aponjon is managed by the social enterprise Dnet, which was established to use ICTs to alleviate poverty. It has developed a website and is encouraging poor people to register and then receive a series of messages relevant to different stages in their pregnancy. They can receive the message as either a text or voice message. Registered members pay 5 Taka per message, significantly less than the full cost. The Aponjon website mentions three local partners: a large pharmaceutical company; a retail chain and a seed company. Aponjon has also established links with BRAC, the largest NGO in Bangladesh and which specialises in international development, and it is publicising its SMS service through its large network of community health workers. A preliminary evaluation of Aponjon found that many women valued the messages, but they were concerned about the cost and they also experienced difficulties in receiving the messages because they did not always have access to the phone (see Section 4 for more discussion of women's access to

mobiles). It is impossible to predict the trajectory of development of Aponjon. Will it follow the example of Babycentre, and create a service for potential customers of its corporate partners who sell drugs, commodities for babies and seeds? If it expands, will this mean that it will be able to provide access to relevant information through SMS and voice messages to poor people at a very low cost? The answers to such questions depend on a thorough evaluation of the intervention.

Several websites and online newspapers provide health-related information. One example comes from Square, a major Bangladeshi producer of pharmaceuticals, toiletries and sanitary products, which is creating a website called 'Supermom' to provide information and access to a telephone advice line. Square is supporting a campaign to overcome the stigma attached to menstruation and aims to substantially increase the use of sanitary products. This is both a corporate social responsibility effort, but also an attempt to create a sizeable new market.

Individual NGOs and health system research institutes have also been experimenting with the use of SMS messages as an inexpensive way of providing health information. As they do not have the government's power to require mobile phone operators to send a bulk SMS at no cost, they either have to fund the messages themselves or recipients have to pay for them.

3.3.2 The use of smartphones to enhance the capacity of health workers

BRAC has introduced the use of smartphones in its Manoshi Project for improving slum dwellers' access to maternal, neonatal and child health. It uses female community health volunteers to visit families and provide basic maternal and neonatal health services. These volunteers have been equipped with mobile phones to collect vital patient data and also to assess risk on the basis of an embedded algorithm. BRAC is also organising a telephone hotline, where pregnant women can seek advice or emergency assistance.

JiVitA is a long-term project of the Center for Human Nutrition of Johns Hopkins University. It operates in 19 unions in rural north-western Bangladesh and initiated an m-care programme in 2011, which combines mobile phone and database technologies to register and monitor pregnancies and neonatal and postnatal care. The m-care programme is designed to provide a network that links community health workers, their clients and health facilities. Initial findings report increased prevalence of mobile phones and benefits arising from mobile phone use by pregnant women mothers.

3.3.3 Intermediaries in a complex market

The spread of ICTs is creating a wide variety of opportunities for a variety of organisations to play a brokering role between individuals as consumers and citizens and the organisations that supply health-related goods and services. This can take the form of direct marketing to the population through websites and online shops, the so-called 'info-ladies' who provide health-related advice, assisted by tablets with access to the internet, or village doctors, who can telephone several doctors for advice when they have a difficult patient. It can also provide mechanisms to make health service providers more accountable to the community, by supplying information on their performance and/or providing mechanisms to register and act on complaints.

Managers of several Bangladeshi companies spoke of positioning themselves as brokers within the health system. TRCL is creating electronic patient records, which it sees as a central organising mechanism for ensuring good quality care and also feedback from referrals. A new company, HealthPrior21, is offering to provide a brokering service between

patients and doctors, by arranging appointments online. It also suggests that it will organise e-learning opportunities for private doctors. As the use of smartphones and access to the internet grows, it is likely that the number and type of intermediaries will also grow. They are likely to have an important influence on the performance of health markets. This, however, raises a series of regulatory issues which are currently not being considered.

3.4 Regulatory issues

The MoHFW has developed draft guidelines for Bangladesh e-health standards and an interoperability framework, to reduce duplication of effort and facilitate linkages between m-health initiatives. So far, the guidelines focus on data collection and management. There has been much less progress on creating a regulatory framework with regard to non-government actors. To date, there are no agreed standards on the kinds of services a company can provide, the qualifications of people providing advice, the ownership of companies (to reduce possibilities of conflicts of interest), or the pricing policies.

The review by Qiao *et al.* (2012) of the global m-health industry concluded that one of the biggest challenges for taking these services to scale is the negotiation of relationships between the telecoms and health sectors. This is certainly the case in Bangladesh, where the Telecommunications Regulatory Commission plays a leading role in setting charges for SMS and for VASs, including health advice lines. The managers of telephone health advice lines complain that these charges do not take into account the cost of employing doctors to provide advice and make it difficult to create a viable business model for the advice lines. There is an interesting contrast between the experience in the health and financial sectors. In the latter, the Bangladesh Bank issued a directive, which stated that banks had to be the lead agency in the development of mobile phone banking and that the mobile phone operators would simply provide the communications vehicle. It also limited the charges that mobile phone operators could make for their services. According to a policy paper by the Bangladesh Bank (2012), this created a framework for the banks to take forward their plans, with negotiations about the nature of relationship still under way.

Within the health sector, the health regulatory agencies have not issued such a directive and there are few restrictions on mobile phone operators. In consequence, these operators have a degree of negotiating power in the health sector and view health advice lines as simply another VAS.

In summary, a significant number of interventions exist in Bangladesh, which are promoted by a variety of actors with differing motivations. Interesting partnerships have emerged between companies that supply products such as pharmaceuticals and health-related commodities, mobile phone operators, companies specialising in the provision of health-related information and health service delivery organisations (both for-profit or not-for-profit). The government is investing in the integration of ICTs into its public health services, but it has made relatively little effort to steer or regulate the development of the private sector. This raises questions about how the poor are encouraged – or indeed enticed – into using services and whether these services can indeed meet their needs without increasing their expenditure on health.

4 Health information-seeking behaviour by the poor

Turning the question of ICTs and health around, this section focuses on poor people, who are often envisaged as the end users of the digital health pathway, in Bangladesh. It examines how and in what ways the spread of the mass media and the very high level of mobile phone use is changing the way that poor people seek health-related information and advice. The information presented here is drawn from scoping studies undertaken May–August 2013 in Kutub Pur Village and Market, a rural area with good transport links, and Shat Tola, an urban slum in Dhaka. It explores how people learn about new sources of information and advice; what problems residents experience in finding reliable and trustworthy information regarding health problems and how technology aids this process.

The research discussed in this report draws on a select number of household interviews (carried out separately with married men and women), key informant interviews (with a village doctor, phone kiosk owner, a business man and health workers) and focus group discussions (with mothers, young men and older men). Interviews and focus group discussions were undertaken in Bangla and recordings were subsequently transcribed into English.

Most adults interviewed in both Kutub Pur Village and Shat Tola slum carried mobile phones and reported that all the adult household members in their families had their own mobiles. Mobiles are owned by both women and men irrespective of whether they were sister-in-laws or distant family members. In the household interviews, the massive saturation of phones was evident. Every household had at least one phone. Only occasionally were there wives or elderly women, such as husbands' mothers, who did not own their own phones. In addition, all households in Kutub Pur had a television and access to satellite television. Computers were, however, rare and very few people understood what tablets were. The recent ubiquity of mobile phones and television was also noted by GRM International and SIDA, who reported that villagers described these as spreading 'like a virus' or as being a 'communicable disease' (GRM International 2010: 25).

Residents of Kutub Pur Village and Shat Tola slum used their phones to pay their electricity bills in addition to keeping in contact with their families. People liked the accessories that came with the phone, particularly the torch and clock. Young men listened to music on their phones and often had several Subscriber Identity Modules, more commonly known as SIM cards, in order to maximise connectivity and utilise cheap rates on different mobile phone networks. Occasionally they would take advantage of special deals to access the internet. They used the phones for Yahoo and 'theme-ing' movies. Some young people used their phones for Facebook, while others argued that it cost too much and that typing in messages wasted time. Instead they would do this at computer shops in Mizapur. GRM International and SIDA also reported negative associations with mobile phones, as young men used their phones to harass young women, download pornography, put pressure on their mothers – or steal money from their fathers' pockets – to finance their phone-related activities, as well as displaying a new reluctance to share any of their own income (2010: 25).

People reported using their mobile phones to call and secure appointments with doctors, but they did not generally use their phones to seek medical advice or information unless they had personal connections. Thus, one business man used his phone to call his sister-in-law who is a medical doctor to ask for advice. Most people navigated the health system and sought information through their social networks and word of mouth. Thus, while people in Kutub Pur Village and Shat Tola slum were very aware of the phone helplines (see

Section 3.2.1), very few people had actually used them. They had seen the advertisements for health information and products on television and had written down the relevant telephone numbers (although none of the people interviewed could recall the numbers offhand). When they were unwell, rather than contact the helplines, they sought information from friends, neighbours or families who had had similar symptoms and recovered. Based on recommendations from trusted people, either new doctors were approached or they used their regular doctors.

Married women's use of mobile phones and ability to seek health information was restricted by men's preferences and men's control over women's mobiles and finances.² In one instance, a wife had previously owned a phone, but her husband had stopped her from using it due to excessive costs. Another woman explained that she had a weekly budget for her phone that her husband topped up for her, which probably limited her use of it. Women primarily used their phones to call their husbands or their natal parents. If they were ill, they would phone their husbands who would then make appropriate plans. Thus women reported that they used particular health providers and facilities because their husbands told them to do so, and because this source was already trusted by their families. Similarly, husbands decided which community clinic their wives would use for their antenatal treatment and pregnancies.³ All the women interviewed or participating in focus group discussions in Kutub Pur Village reported that they first sought advice from their husbands. Thereafter, they would either approach the pharmacy, maternal and child health doctor, the doctor or the community health worker, targeting different people depending on the nature of the problem. Similarly in Shat Tola slum, married women did not start the health information-seeking process with their mobile phones. Rather, they consulted their neighbours and health workers who resided close by. In their information-seeking, they were looking for people who had had similar symptoms and had been cured. When someone is cured – particularly a child – the doctor's details are spread through word of mouth. Women take note of this information and use it when they are trying to identify who to approach for help. In addition, older women or anyone who worked in the health sector would help by giving advice and suggestions about who to visit. Once a place had been recommended, the women would go there. People who worked within the health industry, such as community health workers, were particularly trusted for their information and because they are believed to have direct access to the providers and hospitals.

Some people reported trying different doctors and responding to health information and these people tended to be men. One shop owner used different sources of health information, in conjunction with his social networks, depending on the nature of the problem. For his mother's asthma he sought advice from a relative who was also a traditional healer. This relative suggested that he see a medical doctor, phoned a specific doctor and made the referral. For his wife's swollen feet, he spoke to his mother-in-law and she suggested a specific doctor practising in a hospital. For his own, confidential men's health problems or sexually transmitted infection, he discussed the situation with friends. One friend gave him the address of a doctor in Dhaka, which he tried; he also saw some stickers advertising doctors at the village doctor's premises which he followed up after the original doctor's treatment failed to cure him. After undergoing blood and urine tests, and receiving some medication, he felt better. But once he stopped taking the medication, his problems came back. He is still trying to find a way to deal with this.

² GRM International and SIDA report that 3–5 per cent of household income is spent on mobile phones (GRM International 2010). This is double what is spent on electricity and often about the same as sending a child to school.

³ Choosing between their village or others in neighbouring villages, which could be closer to their homes given the layout of the villages.

Overall, most people used multiple sources of 'knowing' in order to decide what to do in health-related incidents – going first to friends, neighbours or families who have had the same symptoms and recovered to find out which doctor cured them. They then triangulated information, symptoms and advice from different people before deciding which doctor to approach. The other source of information is the doctor they know, and use regularly, who in turn knows them. For this reason, leaflets and helplines are not followed up. If someone is interested in following up on information like this, the opinions of known health workers, village doctors or pharmacists are sought first. People used the village doctor because he (or sometimes she) was known to them, because he lived close by and the families knew and trusted each other. At times, when village doctors were not felt to be appropriate or good enough, people went to the hospital or the medicine stores or the clinic, but were usually guided by friends, neighbours and others they trusted as well as by evidence of cures. Even the village doctor in Kutub Pur Village relied on this system of triangulation before giving medication to his own child. He reported calling two or three doctors and made a decision based on alignment between the doctors' advice.

M-health and the use of mobile phones to seek health information, such as Grameenphone, was not well received in our study sites. As mentioned above, although many people knew about the helplines and had noted the numbers, very few people tried to use these. Nonetheless, there was a general sense among interviewees and focus group respondents that these phone lines were not helpful. This is in keeping with the research undertaken by GRM International and SIDA (2010), which found that most people saw these phone helplines as 'just a business', as expensive and as unsatisfactory, as well as having an urban bias. For some of the people we interviewed, tele-health lines could not be trusted because no one had used them. In other words, they were not inserted into the triangulation and social network system of health information described above. For others, mobile health lines gave only very general advice or recommended seeing a doctor. The lines were often engaged and it was hard to get through. Many people felt the cost of calling the helplines was too high, particularly if they had to wait a long time to get through. In addition, as one interviewee said, even if they did get to talk to a doctor, 'you will not get the proper solution, without seeing you the doctor will not get it clearly. They take a lot of money and it is hard to explain'. GRM International and SIDA recorded similar views in their 2009 research of the poor and their experience of primary health care. M-health was perceived to be very expensive, and while potentially useful, very few people had actually used it (GRM International 2010).

The use of SMS messaging to advance health information-seeking was similarly unpopular in the research sites of Kutub Pur Village and Shat Tola slum. Business men reported receiving SMS messages, but not having the time to read them. One man said that he received as many as 20 a day and simply ignored and deleted them. Another shop owner reported that he believed SMS messages were a means to entice a buyer in order to then sell further services at greater cost. He therefore never read his SMS messages, claiming he had no interest in the offers and packages because, if he were to respond, it would cost him far more than the advertised price. Another had to rely on his nephew to read the messages for him. One woman called a SMS-based pregnancy advice service out of curiosity and was requested to send an SMS: 'There were a lot of buttons to press. It took 10–15 Taka. Then I took the phone to my brother-in-law and he stopped everything.' These accounts, by residents of a rural village and an urban slum provide some indication of the ways in which mobile access to health is being received by poor people. There is some indication that residents are interested in the potential of these technological advancements, but this is outweighed by the difficulties of accessing and using technology to access health and by the ways in which information is presented as unmediated by trustworthy people or personal experience.

5 Conclusions

The title of the DGHS initiative, 'Health Service through Mobile Phones', can be seen as encapsulating often unrealistic claims as to what such remote advice services can deliver in Bangladesh. Given that a very substantial proportion of the rural population has little or no access to modern health care facilities and relies on informal 'village doctors', it is very tempting to assume that m-health and/or e-health interventions can bring quality health services to rural areas without the enormous resource costs that would be required to train, equip and incentivise qualified providers to work in these areas. However, if we accept that even a basic health care system should offer diagnostic, treatment and referral services that are of reasonable quality and appropriate in terms of the diverse range of socioeconomic, cultural and institutional contexts found in rural areas, it should be clear that access to advice from an unknown hospital doctor responding on a one-off basis to a somewhat vague description of symptoms by a possibly distressed caller or even by a village doctor is not a substitute.

Despite these reservations, the experience in Bangladesh has provided a 'proof of concept' for a number of potential applications of ICTs to health. It has shown that it is possible to organise a telephone advice line based on charges to mobile phone users. TRCL has also demonstrated the potential for using electronic patient records as a platform for improving services provided to people. A number of services provide SMS messages and TRCL have shown that at least some people are willing to pay for them. This differs from the people in our scoping study, none of whom had successfully or satisfactorily used a phone helpline. The findings in Bangladesh are similar to those in a general review of e-health and m-health interventions carried out by the World Bank (Qiao *et al.* 2012). They found a large number of initiatives, but very few have been able to go to scale and create a viable business model. The World Bank review did not specifically look at access by the poor. However, the findings in Bangladesh suggest that business models are more likely to target a better-off population, who can either pay a fee for the services, or enable a website to generate revenue from selling goods or services online. Although it is possible to conceive of the use of a platform to provide lower cost services to the poor, the only such models available in Bangladesh involve donor funding.

One important issue for the future is the relationship between a number of stakeholders. The example of mobile phone banking and the intervention of the Bangladesh Bank in discussions about charge structures suggest that something similar may be necessary in the m-health sector to ensure that the quality of services in meeting health needs is given priority. This raises questions about how different stakeholders are trying to shape the emerging m-health markets. The organised medical profession, for example, can play a role in ensuring the quality of services, but it also acts to protect its members from competition. Pharmaceutical companies and companies advertising and supplying other health-related commodities are responding to new opportunities. One already finds, in Bangladesh, alliances being formed in supporting a website and call centre. This raises important regulatory challenges for government in ensuring that poor people have access to safe and effective medical advice. These may concern the quality of information provided, potential conflicts of interest when providers of medical advice also supply pharmaceuticals, and issues of privacy and ownership of medical records. This is new territory, particularly in countries where people are increasingly joining the market economy, as new rural-urban migrants or as international migrants who remit funds to their family.

Questions of safety, reliability and regulation emerge as critical. What is the responsibility of a telephone advice centre for the quality of the advice it provides? Who should monitor quality? How can we differentiate between regulatory measures aimed simply at maintaining

professional monopolies and those to protect the public? What are the implications of these interventions for the poor in terms of access and use? These are pressing issues within Bangladesh, as well as beyond. For many, part of the power of ICTs involves the scope for extending beyond national boundaries. What are the implications of the recent TRCL initiatives to provide advice to Bangladeshi migrants in other countries? How can quality, safety and issues of conflicts of interest be addressed in services which cross international boundaries?

It is still early days and the full implications of the rapid increase in access to mobile phones and the internet on the Bangladesh health system are still to be realised and assessed. It is possible to envisage a number of alternative pathways of development in terms of the role and influence of different stakeholders and the degree to which the needs of the poor are addressed. The direction of development, the distribution of benefits and the diversity of approaches that emerge will be strongly influenced by the kind of regulatory framework that is put in place, by the existing context in which people seek health information in Bangladesh and by their strong emphasis on social networks and triangulation as a means to determine appropriate health-related actions. And, given the strong path dependency of health systems, decisions made over the next few years are likely to influence health system development for a very long time.

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