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Accountability in Health Systems and the Potential of mHealth

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Summary

The rapid spread of information and communication technologies (ICTs) (and of mobile phones in particular) across low- and middle-income countries (LMICs) has generated considerable excitement in development circles regarding their potential to revolutionise service delivery in health systems. Broadly speaking, such innovations, widely referred to as mHealth, make possible new ways of collecting, collating and managing health and health service-related data, and novel means of communication between and among citizens, civil society, health service personnel and government actors. This can empower citizens to better understand, care and advocate for their own health; health workers to deliver improved services; and government actors to enforce or build health policies that uphold the health rights of all citizens, including poor and marginalised groups who are often systematically excluded from health systems.

As mHealth is in its infancy, and most projects to date have been small in scale, this potential is still being tested. Furthermore, most research has focused on the extent to which mHealth has improved service delivery and/or health outcomes in the short term. There has been little explicit attention given to whether and how mHealth might improve accountability for public health services – that is, to what extent mHealth can enhance citizens' abilities to demand improved services from providers and government in line with their rights, and/or augment the capacity and willingness of providers and government to respond to citizens' needs and demands – both in the short and the long term.

This Working Paper aims to begin to fill this gap by exploring literature on accountability in health systems and on mHealth and to build theoretical and empirical bridges between them. In so doing, we lay out a clearer understanding of the role that mHealth can play in accountability for public health services in LMICs, as well as its limitations. At the centre of this role is technology-facilitated information which, for instance, can help governments enforce and improve existing health policy, and which can assist citizens and civil society to communicate with each other to learn more about their rights, and to engage in data collection, monitoring and advocacy. Ultimately however, information, facilitated as it may be by mHealth, does not automatically lead to improved accountability. Different forms of health care come with different accountability challenges to which mHealth is only variably up to task. Furthermore, health systems, embedded as they are in diverse political, social and economic contexts, are extremely complex, and accountability requires far more than information. Thus, mHealth can serve as a tool for accountability, but is likely only able to make a difference in institutional systems that support accountability in other ways (both formal and informal) and in which political actors and health service providers are willing and able to change their behaviour.

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Acknowledgements

1 Introduction

Accountability – or the relationship between states and citizens and how citizens get access to state resources – has long been the subject of theoretical and empirical investigation. In relation to liberal democracies, the essence of this contract holds that states are accountable for providing services and upholding the rights of an empowered citizenry, which is able to make demands on a responsive state. For this relationship to work, enabling conditions and mechanisms for accountability (including transparent information made available to citizens regarding the state and its duties) are necessary to ensure that citizens are guaranteed their rights, including rights to health.

Recent innovations in information and communication technologies (ICTs) and digital technology have introduced new possibilities for strengthening accountability between states and citizens. In digital health, for instance, a range of eHealth and mHealth[1] innovations offer new potential to radically reshape health systems. Defined by the World Health Organization (WHO) as 'Medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants, and other wireless devices' (WHO Global Observatory for eHealth 2011: 6), mHealth initiatives are widely regarded as having the potential to enhance accountability in health systems in low- and middle-income countries (LMICs) because of the growing ubiquity of mobile phones in these contexts. While there has been much excitement regarding the potential of mHealth, there have been few concerted efforts to interrogate the assumptions underlying this enthusiasm – namely that mHealth interventions can and do lead to improved health services and accountability relationships in health systems.

A Web of Science search looking at the periods from 2004–5, 2009–10 and 2014–15 yielded zero published articles with the terms 'accountability' and 'mHealth' in their titles. A topic search of the same time periods and using the same terms yielded only five articles from 2014–15, which themselves did not explicitly take on this challenge. In beginning to fill this gap, this literature review explores the emerging relationship between accountability, health systems and mHealth initiatives. Accountability in health systems, especially in low-resource contexts, comes with a unique set of challenges due to the low capacity of states and the nature of health rights, health services, and patterns of health-seeking behaviours among citizens. mHealth initiatives, which have been introduced in a number of contexts, usually aim to improve access to health services, the work of service providers and the quality of the services they provide. By interrogating the relationship between health systems and mHealth through an accountability lens, this paper seeks to go beyond these first-order aims of individual mHealth mechanisms to identify areas requiring further development (Brinkerhoff 2004). What follows is a review of health systems and accountability, and an investigation of the scope that mHealth initiatives may have for improving accountability and transparency in health systems.

2 Accountability in health systems

The right to health, although variably interpreted, is recognised by a number of international human rights treaties[2] and enshrined into the constitutions and laws of many nations.

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[1] Digital health embraces both eHealth and mHealth. The term 'eHealth' covers a wide range of technologies that can facilitate access to health and health systems. This includes telephones, computers, and wireless communications. 'mHealth', which refers specifically to mobile phone or other handheld devices, is a subset of eHealth.

[2] The earliest articulation of the human right to health in the international arena appeared in the 1946 Constitution of the World Health Organization. This was followed by the 1948 Universal Declaration of Human Rights and the 1966 International Convention on Economic, Social and Cultural Rights. This right was also affirmed by the 1969 International Convention on the Elimination of All Forms of Racial Discrimination, the 1979 Convention on the Elimination of All

In order to provide for this right, governments are obligated to make health services available, either directly (through secondary agents) or by regulating markets of health service options. Most nation states are involved in the provision and/or regulation of health services in some capacity and find it necessary and desirable to ensure functioning health systems, as health care is particularly vulnerable to market failure (Castro-Leal *et al.* 2000). Markets tend to undersupply 'public goods' such as sanitation or vaccination, and thus cannot ensure the positive externalities (such as individual immunisation positively benefiting others) that stem from these and other health services. Furthermore, markets also fail to insure against the possibility of significant health risks and do not address inequalities in access to health services (Bloom, Standing and Lloyd 2008). Public health systems are thus the mechanisms through which governments use of public funding to ensure good health of national populations through the delivery of quality health services to all citizens. This is achieved through a combination of appropriate financing mechanisms (public and private), specialised, well-trained workforces, regular and good information to inform financing and decision-making, and sophisticated systems of facilities and logistics.

LMICs face particularly steep obstacles in providing appropriate, efficient, quality health services for their citizens as they experience low institutional capacity in conjunction with multiple, often dire national health issues. Nonetheless, health systems in LMICs receive significant budgetary allocations; they are comprised of highly specialised staff who have 'significant power to affect people's lives and well-being' and are often characterised by inefficiency, corruption, service failures, access problems, poor quality provision and so forth (Brinkerhoff 2004: 371). This makes strengthening accountability relationships vital for improving standards and procedures, and minimising misuse, mistreatment and corruption while promoting efficiency and performance.

Accountability, as a concept, is difficult to capture analytically (Brinkerhoff 2004; Loewenson 2008), and scholars have offered wide-ranging interpretations and definitions of it. According to Edwards and Hulme, it refers rather mechanistically to 'the means by which individuals and organisations report to a recognised authority, or authorities, and are held responsible for their actions' (1996: 9). However, this is somewhat limiting in its emphasis on accountability to an upwards, immediately identifiable 'authority'.

Accountability also helps ensure that decision makers – those in conventional positions of power – observe publicly agreed standards, norms and goals. For Brinkerhoff, 'the essence of accountability is answerability; being accountable means having the obligation to answer questions regarding decisions and/or actions' (2004: 372). This brings anyone vested with responsibility, including authorities, into the fold of accountability. Indeed, accountability is a key element of the social contract between a government and its citizens as it emphasises the relationship between the duties of the state and the corresponding entitlements of citizens, through the provision of certain goods, services, rights and protections.[3] Accountability also helps identify specifically 'who' has a responsibility to act to ensure that specified rights are fulfilled 'to whom' (UN 2013). And while answerability of those responsible is essential, transparency and enforceability also comprise key components of accountability; for somebody to be accountable for their actions they must answer for them, but there must also be reliable and timely information about what has been done along with enforceable consequences for inadequate performance (Goetz and Jenkins 2005; Moore and Teskey 2006; Akpanuko and Asogwa 2013).

Forms of Discrimination against Women, the 1989 Convention on the Rights of the Child, and the 2006 Convention on the Rights of People with Disabilities. All nations have recognised the right to health through the ratification of at least one international human rights treaty (OHCHR 2008).

[3] When focusing on the provision of public services as a duty of the state, less tangible rights such as protection from discrimination, safeguarding of freedom of speech and access to information, the right to vote, the right to assemble, etc. often get overlooked. And yet such rights are necessary precursors for citizens, particularly poor and marginalised people, to demand accountability from government services.

Accountability in health systems refers to a system of checks and balances on power and discretion achieved through a range of different mechanisms. It involves the provision of information (on budgets, activities, outputs, etc.) alongside explanations and justifications (why certain things are being done and not others) and sanctions for failure to perform. This might happen 'horizontally', in that different government bodies monitor each other in processes internal to the state (O'Donnell 1998), 'vertically' and thus unfolding between the state and citizens, or through mutually reinforcing independent or hybrid measures (Goetz and Jenkins 2001).

Given that citizens should be the ultimate beneficiaries of state services and protection, scholars and practitioners have argued for the importance of strengthening accountability relationships between citizens and the state through citizen-centric mechanisms, especially in contexts where accountability processes internal to the state are weak (Fox 2015). This 'social accountability' approach emphasises the role of citizens themselves in holding governments and providers to account. Some emphasise the centrality of citizen-led collective action as necessary for transformative social accountability (McGee and Gaventa 2011; Joshi 2013), while others take a more generous interpretation. Malena, Forster and Singh (2004), for instance, define social accountability quite broadly to encompass a wide range of mechanisms, from bottom-up citizen initiatives such as community monitoring efforts (Björkman and Svensson 2009) or protests, to state-sponsored initiatives inviting citizens into policymaking and performance monitoring spaces such as the participatory health councils of Brazil (Coelho 2006; Cornwall and Shankland 2013).

Social accountability, also termed 'bottom-up accountability', is particularly significant in relation to poor and marginalised people and communities who are often overlooked by the state, and frequently lack the capacity to make demands (Sirker and Cosic 2007; Ringold *et al.*; Srinivasan 2012; UN 2013). It can facilitate a number of processes: as it encourages citizens to claim their entitlements, it has the potential to empower poor and marginalised communities; it can promote constructive engagement between individuals and communities and those who are responsible to provide specified goods, services and protections; it can put pressure on duty-bearers to justify and explain their actions; and it can expose absenteeism, corruption and violations, and potentially trigger disciplinary mechanisms already embedded in the state. However, it is not a given in poor communities and 'steps should be taken to lift the barriers' (UN 2013: xiv) that prevent them from mobilising or from making use of accountability mechanisms already in place. Yet, putting these steps in place is challenging and, as McGee and Gaventa (2011) indicate, fraught with assumptions, risks and unpredictability. This is particularly challenging in health systems for a number of reasons. Take, for instance, the high power asymmetries that can exist between poor patients and health service providers who may see these health service users as passive beneficiaries – ill-equipped to make health-related decisions – and who should be grateful for any level of care (Lodenstein *et al.* 2016). This, along with many other contextually varying factors (expanded on later), can breed resistance among providers to respond to demands from below. Indeed, scholars have observed that successful social accountability initiatives are often predicated on some support from state actors to apply complementary pressure or reform from above (Joshi 2013; Peixoto and Fox 2016).

At their heart, social accountability mechanisms rely on information in order for citizens to know exactly what services and entitlements should be provided, and whether or not they are being adequately addressed. Because digital technologies have provided new ways of generating and accessing information, they have been seen as ideal in promoting and implementing social accountability mechanisms (UN 2013). mHealth, for instance, can harness the potential of mobile phones for real-time information transfer between citizens and the state. For example, citizens might be enabled to monitor service providers' absenteeism, to report poor service or corruption, and to share this information with each

other. However, it is important to remember that the increasing ubiquity of mobile phones does not erase, and may even exacerbate, existing structural inequalities (Gorman 2015). Digital literacy and access to technology – necessary for engaging with ICT-enabled accountability mechanisms – may be much lower among marginalised groups.

Before moving to a more in-depth discussion of the role of digital technologies for accountability in health systems, the following sections explore some theoretical considerations and the multitude of factors that can have a bearing on accountability in health systems. Such variables range from the (un)democratic characteristics of political regimes, to the way formal institutions are designed, function and are affected by informal social norms, to the inherent characteristics of health services and citizen demand for them. Service provision and accountability are also complicated by the fact that health systems, especially in LMICs, are frequently (at least partially) marketised. They do not rely exclusively on the state and are, in fact, made up not only of public services but also involve a patchwork of private actors including informal healers, traditional birth attendants and private clinics. Out-of-pocket payments, even for ostensibly 'free' public services, may also be commonplace. Bloom *et al.* thus argue that in LMICs, health systems operate in 'environments characterised by high levels of unorganised markets in health services and commodities, porousness of boundaries between public and private health care sectors and lack of state regulatory capacity' (2008: 2076).

Such messy and complex realities, conditions of low institutional capacity, and limited democracy, social trust and citizen participation can make it highly challenging to develop and sustain effective mechanisms and relationships for accountability. Even seemingly well-designed policy and accountability measures may not correct the perverse incentives felt by providers and public officials when it comes to on-the-ground implementation (McGee and Gaventa 2011). And limited resources can dash the good intentions of even well-meaning policymakers and create unavoidable tensions. There can be, for instance, considerable divergence in the interpretations of accountability between governments and private sector interests. There are tensions between government demands for a minimum level of care for all, and user and private sector incentives to seek the maximum amount of care for specific people's needs. Tensions also exist between accountability at policy level (which seeks to ensure that resources are appropriately distributed and used) and at service level (which aims to ensure that each patient receives the health care they need). Furthermore, monitoring health provider performance is not straightforward and may require sophisticated medical knowledge as well as detailed information tracking procedures on a wide range of factors, including budgets, fees, medical stocks, vehicles, medical surgeries and personnel arrangements (Brinkerhoff 2004). And as more advantaged citizens can exercise voice and pressure politicians more effectively, the distribution of health resources is likely to favour their needs to the exclusion of marginalised groups (Fox 2015). Thus, measures for greater accountability and enabling conditions for citizens from *across* the social spectrum to participate in creating and sustaining them are necessary – but the likelihood of such measures emerging may be lessened by the same weak institutional capacity and limited resources which also strain the provision of adequate health services. This makes it imperative that existing resources and institutional capacity are harnessed and their efficiency maximised, while citizen voice – especially that of poor and marginalised groups – is upheld and supported.

3 Theoretical conceptualisations of health systems and accountability

Theoretical explorations which examine accountability in health systems borrow from the disciplinary traditions of political economy, sociology, economics and managerial studies. Such explorations offer ways to evaluate health systems, identify points of weakness and failure and, most importantly, provide the analytical foundations for increasing accountability, and thus improving health services. This section explores literature on accountability in health systems by presenting ideas in two broad and complementary conceptual veins, which offer different approaches to the evaluation of health system accountability challenges and reveal where measures for accountability, such as those made possible by mHealth, might be introduced or strengthened.

The first conceptual theme examines institutions and accountability, and focuses on a range of overlapping considerations, namely: the formal architecture of the state, including how policies shape incentives, constraints and accountability relationships; the character of the state, such as the degree of centralisation, democracy, citizen participation, stability, and overall capacity for effective governance; and the informal social practices that affect, and are affected by, the formal institutional environment. This allows for an assessment of the ways in which health systems and institutions can facilitate and enhance accountability.

The second conceptual theme shifts the analytical lens to address the political implications of the inherent characteristics of health services and use. Characteristics once thought of as relevant only to economistic or managerial concerns – such as how frequently citizens use services – are recast and shown to have profound implications for accountability within health systems (Harris *et al.* 2014). When considered within particular political and institutional contexts, points of weakness and potential intervention are revealed.

Taken together, these two perspectives offer a comprehensive picture of the accountability challenges and opportunities for health systems in LMICs against which the potential and limitations of mHealth interventions can be weighed.

4 The role of institutions

One way to assess accountability in health systems is by foregrounding institutions – here referring broadly to formal and informal rules and practices (North 1990) – and how these affect dynamics of accountability and thus the quality and outcomes of health systems overall. Laying out the basic requirements for accountable relationships is a starting point from which institutional analysis can begin. Camargo (2011) and Camargo and Jacobs (2011), while applying institutional analysis to the provision of public health services in LMICs specifically, have echoed the World Bank in using a principal–agent framework to explore accountability relationships. The 'principal' usually refers to citizen users of health services or those who represent them, such as the state or, on occasions, sections of civil society. The 'agent' refers to those performing a service for the principal. This usually means service providers, but the state is also an agent insofar as it performs a service for citizens in holding service providers to account on their behalf.[4]

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[4] As earlier discussed, states must also perform the work of protecting the less tangible rights of citizens which while not directly linked to specific services, enable citizens to actively participate in holding both the state and service providers to account.

Beyond the links between citizens, states and providers, many principal–agent relationships can be identified in health systems. Indeed, as Brinkerhoff suggests:

> the accountability landscape is filled with a broad array of actors with multiple connections; in some cases these actors are both accountable to one set of actors while simultaneously exercising accountability with regard to another set… These connections create layered webs of accountability with varying degrees of autonomy and sources of control/oversight.
> (Brinkerhoff 2004: 377)

As discussed further below, depending on the particular accountability problem that needs to be addressed, different relationships are more or less salient and worth investigation and reform.

The five essential components of accountable principal–agent relationships as outlined by the World Bank (2004) and Camargo (2011) are as follows:

- *Clear mandates*. Responsibilities of agents must be clearly defined, or there is scope for abuse.
- *Adequate resources and mechanisms for financing*. Agents must be supplied with the resources necessary to carry out their mandates.
- *Information-gathering mechanisms*. Information collection on service outcomes and agent performance should be conducted consistently. Data should be easily accessible by principals to determine whether the mandate is being adequately met.
- *Monitoring mechanisms*. Active and transparent monitoring of this information should be in place.
- *Enforcement mechanisms*. Sanctions and disciplinary actions against agents who fail to perform must be available, enforceable and effective.

As indicated, principals and agents must be able to carry out particular responsibilities. Ideally, the principal provides adequate resources and a clear mandate for, oversees the performance of, and sanctions when necessary the agent, who in turn acts responsively (World Bank 2004: 47). Thus, formal institutions must be designed to strike a careful balance of incentives among state actors, service providers and citizens to support coherent functioning between these different elements.

In reality, however, the basic configurations of these 'accountability relationships', which should ultimately benefit citizens, can be profoundly complicated and skewed by institutional factors. They may cause distortions in the incentives and constraints of public officials and service providers in ways which mean that citizens – especially the most vulnerable – are not necessarily the actors to whom the former feel accountable. Camargo's framework (2011) invites consideration of the components of accountable relationships within health systems. First, if mandates and responsibilities of public officials and/or health service providers are not clearly defined, discretionary power – of which health providers inherently have a lot – can be abused, and failures cannot be easily attributed. Second, the ways in which health services are funded and health workers are paid can influence the direction of accountability 'upward' to managers or the state rather than 'downward' to users. If services are funded by taxes or user fees, and health worker pay and career advancement are reliant on patient satisfaction, the incentive to deliver quality service may be stronger. Conversely, if services are largely funded by donors – as is the case in many LMICs – and provider pay is not linked to performance, the incentive for accountability to citizens may be weaker (Berlan and Shiffman 2012). It may also be the case that there are simply not enough resources (financial or otherwise), and/or that the available resources do not get to their intended destinations having been siphoned off or rerouted along the way (see, for example, Gauthier and Wane

2009); both scenarios affect health providers' morale (through, for example, delays in the payment of wages) and their ability to deliver services (through inadequate supplies).

Other institutional factors which skew accountability relationships are related to information, monitoring, sanctions and enforcement. Weak institutional capacity or corruption might mean a lack of effective and transparent data-gathering mechanisms, which inform authorities and/or citizens on provider performance. Transparent information is essential for accountability as, in the absence of reliable and timely information, there can be no basis for demanding answers or enforcing sanctions (Moore and Teskey 2006). Even where information-collection mechanisms exist, however, they may be calibrated for ensuring efficient spending and use of resources by providers rather than determining how well they are meeting the health needs of patients and the communities they serve (Madon, Krishna and Michael. 2010; Smith *et al.* 2008). Furthermore, even if the data collected are geared towards improving services for patients, information – even if publicly available – does not always lead to action for accountability (Ringold *et al.* 2012; Kolstad and Wiig 2009). The state (or citizens or civil society) may not have the capacity to effectively monitor that information, demand answers or enforce sanctions against providers when necessary (Camargo 2011). Moreover, citizens are less likely to take an active role in monitoring or 'sounding the alarm' if they do not believe their actions will lead to change (Joshi and Houtzager 2012).

Finally, sanctions (when available) may range from more concrete legal action, such as fines or the revocation or suspending of medical licences, to 'softer' measures, including reputation-damaging publicity and exposure – but it is their *enforceability* and effectiveness that is the lynchpin of strong accountability (Brinkerhoff 2004). Informal institutional practices of clientelism and patronage, or a highly centralised political structure and conditions of weak democracy, can reduce the capacity or likelihood of sanctions being applied or enforced, and thus ultimately being effective (Camargo and Jacobs 2011; Stremlau, Fantini and Gagliardone 2015; Devarajan, Khemani and Walton 2014). Another type of soft sanction is the self-policing of professional medical communities through codes of conduct, which promote standards of quality and patient care, and appeal to an intrinsic sense of professional pride and social responsibility (Sullivan 2000; Bloom *et al.* 2008). However, reliance on such self-policing mechanisms in LMICs is 'insufficient for improved accountability in the absence of transparency, informed health service users and regulatory enforcement' (Brinkerhoff 2004: 373; Harris *et al.* 2014).

Due to the range of potential institutional pitfalls for accountability, some of which are outlined above, Camargo (2011) and Camargo and Jacobs (2011) suggest identifying points of accountability failure whether related to mandates, resources, information, monitoring, sanctions and/or enforcement. Reform can then be targeted at these 'key institutional junctures' either through the 'long' or 'short' accountability routes (Camargo 2011; World Bank 2004). The long accountability route is the relationship which extends between citizens and the state and, in turn, between the state and health service providers, while the short accountability route relates to the relationship between citizens and providers directly. Depending on the incentives and constraints generated by institutional arrangements, both present distinct opportunities and challenges for improving accountability in health systems.

4.1 The long accountability route

In the long accountability route, the state, in its role as 'agent', ideally ensures that appropriate health services are provided. Broadly speaking, two key steps are required for this to happen. The first involves making the health needs and demands of citizens known to policymakers so they can be incorporated into policy. Traditionally, this is captured partly in political electoral platforms and the ways in which political parties compete for votes, and partly in the compilation of health statistics and population-level health needs. In some

circumstances, participatory forums, civil society engagement or other citizen-focused social accountability mechanisms might also capture and communicate citizen voice regarding health needs (Coelho 2006; Mahmud 2007). Accountability here refers in part to the processes by which citizens have a say in the public provision of health services, and whether they have the ability to react to and to discipline policymakers when and if they fail to address issues of poor, inadequate or missing services (Camargo 2011).

The second step of the long accountability route involves the processes through which public authorities design and implement policies, regulations and sanctions to shape the incentives of health-care providers to address the health needs of the population as interpreted by the state. From this perspective, the state takes on the role of the 'principal' to whom providers are then 'agent' and accountable to carry out the mandate to deliver health services. While this step does not concern citizen participation directly and rather relates to relations between the state and providers, policymakers' actions comprise a vital part of social accountability; they create the incentives and processes that drive individual staff and provider organisations to respond to citizen demands and act in accountable ways on more localised levels (Ringold *et al.* 2012).

Pursuing the long accountability route can be very challenging, especially in countries with weak state structures, as there are substantial institutional requirements. Citizens must be able to effectively articulate their needs, either as individuals or collectively, which states must then adequately capture and respond to (Camargo 2011). Too often failed by the ballot box, the needs of poor and marginalised groups are frequently ignored or de-prioritised. States' tendencies to exclude these groups have been counteracted through forms of social accountability (discussed earlier) to elevate 'citizen voice' through formal and informal mechanisms by which citizens express their preferences, opinions and views and demand accountability from power-holders. As Goetz and Gaventa (2001) suggest, these mechanisms can include complaint, organised protest, lobbying and participation in decision-making, product delivery or policy implementation.[5] However, in situations where democracy is restricted – such as in states with centralised decision-making structures and authoritarian leanings – citizen voice may be totally disregarded by policymakers, or opportunities for exercising voice may be unequally distributed across social groups. Informal institutional norms, such as tendencies towards clientelism (Camargo and Jacobs 2011) or cultural interpretations of which voices are valuable, can deepen this crisis of voice (Couldry 2010) and reinforce the invisibility of the least advantaged groups to those in the higher echelons of power.

Even when states are more politically receptive to democratic processes, they may not have the institutional capacity to encourage citizen voice such as by setting up participatory channels, or to respond to voice even when actively exercised by citizens. Ultimately, the institutional space required for this multi-tiered relationship – which exists between citizens, between citizens and the state, and between the state and providers[6] – to work is expansive, expensive, and requires adequate incentives and resources. This involves many different political and bureaucratic actors in a chain of command that can be subject to frequent upheaval and high turnover of public officials in key decision-making roles. It has been

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[5]   According to Goetz and Gaventa (2001), voice matters for four related reasons: (1) from the perspective of civil and political rights, voice has intrinsic value – it is good for people to have the freedom to express their beliefs and preferences; (2) if people do not speak up, there is little or no chance that their preferences, opinions and views will be reflected in government priorities and policies; (3) voice is an essential building block for accountability – for a power-holder to respond, s/he must be answering an expressed need or desire. However, this is a two-way relationship in that accountability can also encourage voice by demonstrating that exercising voice can make a difference; (4) the interaction between groups and individuals who exercise voice helps communities arrive collectively at the standards, values and norms of justice and morality against which the actions of others will be judged.

[6]   Relationships between citizens, the state and providers are not the only ones that matter. Indeed, there may be many accountability relationships among different state-based organisations that provide checks and balances for one another (O'Donnell 1998). The functioning of these internal accountability processes is also important to overall accountability in health systems.

argued that the long route to accountability is thus difficult to sustain, taking a long time for issues – including urgent health crises – to move towards resolution, and offering little opportunity for citizens to witness the results of their expression of needs or desire for change.

4.2 The short accountability route

The difficulties and possible logjams associated with various forms of state failure in the long accountability route have led to arguments for strengthening the short accountability route (World Bank 2004). This approach, emphasising the 'demand side', sees citizens directly interacting with local-level public officials and service providers to insist on improved service delivery through either market exit, or the exercise of voice (Camargo 2011).

The market exit theory – that citizens can apply pressure to poorly performing public providers by opting instead for market alternatives – rests on assumptions that, for reasons explained earlier in this paper, cannot be taken for granted in health systems in LMICs. This strategy requires that viable market alternatives exist, that citizens have sufficient knowledge to know when providers are being negligent, and that they are able to absorb the costs of switching. These and other market failures mean that this is not always an available tactic, especially for poor people (Bloom *et al.* 2008). And should there be options, there are numerous challenges to regulating health markets in LMICs, and to ensuring that such markets work for rather than exploit or exclude poor and marginalised populations (Bloom *et al.* 2012).

The second short route tactic – arguably a more viable one in the context of health systems in LMICs – is the exercise of citizen voice, which has been discussed earlier in the context of social accountability and citizen voice strategies as related to the long route. Once again, however, this strategy requires that citizens are both sufficiently empowered to exercise voice, and that service providers have incentives to listen and respond. Ultimately, both these variables hinge on the wider political and institutional environment as discussed in the long route, including the degree of democracy in the political system, the centralisation of decision-making, the institutional incentives for public officials and providers, and the capacity of citizens to exercise voice. Even if providers are incentivised to respond, the unequal distribution of voice due to social, economic, cultural and political marginalisation may mean that the needs of the vulnerable remain unheard and unaddressed (McGee and Gaventa 2011).

Thus, in practice, initiatives based on short route accountability – understood as the localised targeting of providers and officials through citizen voice initiatives alone – have not proven a panacea. Government failures must also be addressed, and efforts must be made to ensure that initiatives do not themselves reproduce local power structures that exclude the poor (Devarajan *et al.* 2014). Furthermore, if poor people do not believe that exercising voice will result in change, they are unlikely to take on the effort and costs necessary to do so.

Recognising the limitations of 'society-side' interventions singularly focused on bolstering citizen voice to target providers, Fox argues for '"sandwich strategies" of mutually empowering coalitions of pro-accountability actors in both state and society' to 'trigger the virtuous circles of mutual empowerment that are needed to break out of "low accountability traps"' (2015: 347). Such strategies aim to simultaneously strengthen both 'voice' (citizen capacity to effectively communicate demands) and 'teeth' (the ability of states to enforce sanctions on providers). This entails creating enabling environments for collective actions for accountability and coordinating citizen voice initiatives alongside institutional reforms that bolster public sector capacity and responsiveness at various vertical and horizontal planes of government. This more holistic and strategic approach holds more promise for sustainably addressing institutional incentives, and ensuring that the concerns of poor and marginalised groups are meaningfully taken on board.

5 The characteristics of health services

Although it is widely recognised that politics affect public service performance, very little research attempts to analyse the political implications of the nature of services themselves. In contrast to the institutional perspective described above, the service characteristics approach refocuses the lens onto the nature of health-care services and citizens' use thereof to assess challenges to and opportunities for accountability.

Batley and Mcloughlin focus on the interaction between public services and politics to emphasise how overlapping and intersecting market-related, demand-related and task-related characteristics of particular services affect, and are affected by, political dynamics relevant to accountability. These dynamics include the incentives for politicians to commit to health services, the ways in which control and monitoring is managed by service providers and public officials, and the scope for, and voicing of, citizen demand for improved services (Batley and Mcloughlin 2015).

Harris *et al.* (2014) explore the implications of these characteristics in the health sector specifically, pointing out that different types and subtypes of health care have diverse characteristics and politics that, in turn, have varying implications for accountability. They distinguish between *curative* and *preventive care*. Curative care includes subtypes that range from emergency care to non-critical routine health visits (such as for a rash or stomach complaint), to chronic long-term care. Preventive care encompasses public health efforts that promote more diffuse positive externalities. Primary health care that is not curative – such as regular check-ups and vaccinations for children, routine breast cancer screening and even maternal health care – are technically preventive, but as they are accessed individually, they have much in common with the curative care category.

Critical and emergency health care, also in the category of curative care, present the greatest challenges for accountability. Relating to demand, these services are required in moments of crisis when decisions to receive care are literally life or death situations. This inevitably undermines accountability mechanisms that rely on citizens having adequate time, bargaining power and information to consider alternative providers or treatments should these options even be available. Furthermore, emergency care is usually sought in hospitals serving very large geographical areas, and patients' needs are highly variable – sometimes focused on individual problems (broken limbs, stroke, heart attacks, accidents) and sometimes on communal crises (such as earthquakes, epidemics and other natural disasters). Thus, when seeking emergency care, users who arrive at hospital from diverse locations lack shared experience and opportunities for collective action. During health disasters experienced at community or regional levels, users are focused on immediate individual and family needs, rather than on collective health priorities despite perhaps having similar health issues. The potential for user mobilisation for improved care is higher when services are 'used regularly, predictably and within a certain territory' (Batley and Harris 2014: 9).

While accountability issues are most acute in emergency services, such dilemmas are also faced to a lesser degree in other forms of curative health care. Most curative care, such as would be sought in a primary health facility, also tends to be infrequently required, making it difficult for users to evaluate service providers. As Chaudhury *et al.* state, when comparing accountability in health systems to that of education:

> If a teacher does not show up regularly, a class full of pupils, and potentially their parents, will know about it. On the other hand, it is much harder for patients, who presumably come to health care centres irregularly, to know if a particular health care worker is absent frequently.
> (2006: 97, cited in Harris *et al.* 2014: 3)

Moreover, patients often lack adequate knowledge about health conditions, potential treatments, and thus what appropriate care might look like. Their lack of health-specific knowledge when compared with specially trained health-care professionals creates a situation characterised by a high level of information asymmetry. This asymmetry limits patients' ability to judge quality and performance of health-care professionals; people may not know what the 'right' kind of health care is, or what conditions shape the need for this or alternative care (Brinkerhoff 2004; Ringold *et al.* 2012). This information asymmetry (Bloom *et al.* 2008) and the highly variable nature of health conditions that citizens seek care for are key characteristics of health services resulting in high discretion of frontline staff. This makes it difficult not only for patients to evaluate care, but also for managers and public officials to monitor provider performance, which clearly has implications in terms of who holds who accountable and how assessments of 'appropriate' distribution of health services are made.

Information asymmetry also interacts with socioeconomic inequalities in ways that mean less-educated members of society will likely have even less information about their health conditions and what constitutes appropriate care (Loewenson 2008). This may create perverse incentives for service providers and politicians to channel better services and care to users who are better informed, while less-informed users will not have sufficient information or political power to challenge poor service. This could potentially lead to a vicious circle where services remain stagnant for the least informed and most marginalised groups while they continue to improve for better-informed groups. And when the more advantaged citizens simply opt out of public health-care provision in favour of private options, such as (for example) in Brazil (Do Rosário Costa and Vaitsman 2014), political support for stronger public services is diminished as it is no longer of direct relevance to politically influential citizens. Publicly provided services can then become mired in low accountability traps.

Preventive care, in the sense of broader public health initiatives, like emergency care, also suffers from particular accountability challenges. The positive health externalities of say, vector control measures, needle exchanges for drug users, or critical levels of child vaccinations are not easily attributed to the efforts of politicians. Rather, elected politicians are incentivised to support those aspects of services that are more visible and which can be easily linked to their efforts (Eldon, Waddington and Hadi, 2008). Building hospitals or clinics, for example, is far more visible and immediate than making investments in public health, the benefits of which are diffuse and may take a long time to become evident. Less visible measures associated with health care generally, such as the establishment of internal mechanisms and reforms to increase provider capacity and accountability, likewise suffer from this dilemma of political non-commitment.

In contrast to emergency and preventive public health care, longer-term chronic care, such as for people with HIV, diabetes or other chronic conditions, may facilitate accountability more readily. As these patients need to manage their conditions, are regularly in contact with the health system and experience more or less standardised visits over time, they may develop a sense of appropriate care. Advocacy and patient support groups may also facilitate networking that further enhances patients' knowledge about their health conditions and what constitutes quality care. These spaces may also create opportunities for collective action and the exercise of citizen voice, although further investigation into these possibilities is warranted (Harris *et al.* 2014).

As repetitive encounters with health systems create opportunities for patients with chronic illnesses to become familiar not just with each other but with their conditions and appropriate care, it follows that linking patients with similar concerns may hold promise for similarly overcoming information asymmetry, even when the health concerns in question are not matters of chronic illness. Linking community members around issues of maternal and child health concerns may, for example, create opportunities for collective action to improve

accountability, and thus health (Papp, Gogoi and Campbell 2013). Such citizen groups, supported by civil society, might directly lobby providers and local officials for better services to incentivise them to perform, seek to actively monitor information and health outcomes, and/or work strategically with state actors and even international actors in mutually reinforcing 'sandwich strategies' (Fox 2015).

6   mHealth and accountability

In light of the accountability challenges presented by institutional factors in LMICs, and the unique characteristics of different types of health services themselves, where and how have mHealth initiatives worked to strengthen accountability?

Mobile phones and mHealth have made citizens who were previously remote and difficult to access far more contactable (Hall *et al.* 2014). Much of the excitement of mHealth has been focused on its potential to improve health system delivery. This includes using mobile phones to: report on pharmaceutical stock-outs (Ringold *et al.* 2012); develop reliable statistics on pregnancy, birth outcomes and corresponding health services; enhance citizens' health-seeking behaviours and educate them on desirable health-related lifestyle choices (Labrique *et al.* 2012; Hall *et al.* 2014). mHealth thus has the potential to enhance health systems through the dissemination of health information, through helping patients manage their own health conditions and reducing their dependence on health service providers, and by improving the quality of health care through improved data collection (Lucas 2015).

Labrique and colleagues have argued that mHealth strategies should be considered integral to health systems, and not as 'siloed, standalone solutions' (Labrique *et al.* 2013: 160). Mobile phone applications (or apps) are changing, and have the potential to radically enhance health information dissemination in many areas, including: behavioural change; remote monitoring of patients' conditions (using mobile-based diagnostic tests); the maintenance of registries; data collection; the provision and accessibility of patients' health records; health system decision-making (through the application of algorithms, protocols and checklists); human resource management; supply chain management; health system planning and scheduling; and service provider training and communication between different providers (Labrique *et al.* 2013). As Loewenson argues, mHealth and other forms of information technology have also made possible more direct scrutiny of health systems' allocations, prioritisations and other decisions. This in turn has raised questions about whether the allocation of resources is equitable, about whose interests are being met and about the legitimacy of decisions around these issues (Loewenson 2008). In order to assess the role of mHealth in relation to health systems and accountability, the following section draws on the approaches outlined above, exploring the role of new technology in relation to institutions (both long and short routes for accountability).

6.1 mHealth and the long route to accountability

mHealth has been particularly influential in maternal and neonatal health, an area in which, in LMICs' health systems, reliable data does not always exist. This has implications for accountability. The highest mortality burden occurs when mothers give birth at home with no skilled midwife in attendance. However, countries have not, to date, been able to routinely collect reliable information and statistics on pregnancy and have not included this in health management information. Health systems have instead relied on analytical models derived from population samples and household surveys. This lack of information, poor health system infrastructure and the socioeconomic conditions experienced in rural and remote areas has hampered the delivery of routine antenatal care and prevented data collection that could 'make every death count' (Labrique *et al.* 2012: 113).

mHealth offers radical new possibilities in terms of the potential to collect information in timely, accessible ways and across wide, often remote, contexts (Labrique *et al.* 2012). In LMICs (where, until recently, mHealth data-gathering services have not been available), the inaccessibility of rural areas, the existence of multiple databases, and degraded paper-based systems are among the challenges that inhibit the collation of good, reliable data for maternal and neonatal health. The information that has been relied upon has often been based on specific subpopulations, containing suspect, outdated data. This has made it difficult to identify trends and performance patterns, and has, in the past, led to late and ineffective health system responses. This lack of data means that 'accountability coverage becomes the point of entry for mHealth interventions' (Mehl and Labrique 2014: 1285).

mHealth applications have massively enhanced the potential of the state as agent in an accountability relationship (Brinkerhoff 2004) to ascertain the health needs of its citizens. mHealth apps have, in recent years, been used to facilitate civil registration and vital statistics (CRVs) mechanisms, generate population-level data, and generate national electronic medical records (EMRs), overcoming the challenges of inaccessibility and of outdated and multiple data-collection systems. These data can be collected in multiple, connected ways. For instance, community members can use their mobile phones to provide information on births, enabling registration and certification of babies. Increasingly, health workers use mobile phones or tablets that are connected to national EMR registers, and which have a series of apps enabling them to keep and access individual patients' health records; this means they can offer better health services and the data can also generate information that can be used to predict epidemiological trends (Labrique *et al.* 2013).

Using mHealth apps in relation to maternal health has facilitated the collection of national-level data, for example, in Uganda, Bangladesh and South Africa. The development of 'well-designed, community-based pregnancy surveillance and registration systems' and the provision of population-level data on maternal health needs and the extent to which these are (un)met, 'make it possible for accountability to be enhanced and resource/service delivery gaps to be identified' (Labrique *et al.* 2012: 114; Batavia and Kaonga 2014). mHealth has been shown to generate improved and expanded health statistics, which enable states to be better informed on the health needs of their populations, including poor and frequently overlooked groups, and which, in turn should (politics permitting) facilitate the design of better and more appropriate health policy and allocation of resources.

In this sense, mHealth does make a significant contribution in the form of information-gathering mechanisms that can be made transparent to citizens and can help states to design policy that addresses specific needs and to measure performance against stated goals. However, while this enhances the capacity of states to ensure functioning health systems through better and more accessible information, it does not meet all the conditions of accountability. As McGee and Gaventa (2011) argue, information alone does not counter the perverse incentives felt by politicians, public officials or service providers if it cannot trigger disciplinary action when necessary. Moreover, the vast majority of mHealth initiatives have been pilot studies that have not been successfully applied at scale, have been disconnected from national-level initiatives and have, more often than not, increased governments' workloads without adequate returns (Franz-Vasdeki *et al.* 2015).

Over the past couple of years, however, large-scale and/or national-level mHealth initiatives have begun to emerge in LMICs such as Rwanda (Ngabo *et al.* 2012), Uganda (Cummins and Huddleston 2013; Franz-Vasdeki *et al.* 2015), Ghana (Otto *et al.* 2015), Tanzania (Mangone *et al.* 2016) and elsewhere. In 2014, South Africa introduced a national, free mHealth service for all pregnant women and new mothers in order to reduce maternal and

child mortality (Seebregts *et al.* 2016).[7] MomConnect uses mobile phones and SMS messages to provide pregnant women and mothers with regular information and advice on their pregnancy and/or newly-born children. It was developed by a team of experts in health, mobile communications and maternal and child health communication, and implemented through a public–private collaborative partnership, with non-profit and private organisations working directly with the National Department of Health (Waldman and Stevens 2015). This mHealth programme aims to: (a) enroll all pregnant women in South Africa, providing each with a unique registration number, through even the most basic mobile phones; (b) develop South Africa's first national electronic pregnancy register; (c) use SMS messages to encourage behavioural change, improve clinical outcomes and identify high-risk behaviour; (d) offer a helpdesk which enables women to ask questions, evaluate and report their experiences of health services; and (e) provide health staff with regular updates and clinical information that helps them and facilitates their reporting to higher-level managers (Peter, Barron and Pillay 2016; Waldman and Stevens 2015).

More than 34,000 health workers were trained to register women on MomConnect, and more than 500,000 women were registered in its first year. Nearly 80,000 women completed surveys ranking their first antenatal visit in terms of cleanliness, friendliness, privacy and the length of time they had to wait. 'Over 3,000 mothers complimented the services and 500 complained, a ratio of six compliments to every complaint. More than 180,000 questions were answered through the help desk' (Peter *et al.* 2016: 1). There is widespread support for MomConnect, with 98 per cent of the 10,000 women surveyed in 2015 saying that the SMS messages were helpful and 78 per cent reporting that they were better prepared for childbirth. Yet other constraints were raised: even in urban areas, not all mothers had mobile phones or electricity to charge phones, and those that did were not always able to use their phones in ways which enabled them to benefit from MomConnect; many were illiterate and not able to read the SMS messages and, despite being offered in six languages, not all women were able to understand the health messages (Wolff-Piggott and Rivett 2016). These realities highlight how ICTs, while full of potential, are not a panacea for poor or marginalised groups and can even reproduce socioeconomic inequalities. Furthermore, clinic staff saw the time required for MomConnect registrations as an additional distraction, preventing them from completing more important work (rather than a means of saving time) and as undermining their professional status (rather than enhancing their capacity for professional service) (Wolff-Piggott 2016). Moreover, the compliments and complaints channel was something which made clinic staff uneasy.

MomConnect has 'drawn global attention due to its innovative features and its avoidance of many of the common pitfalls when implementing digital health projects at scale in low-resource settings' (Seebregts *et al.* 2016: 125). In doing all of the above, it has also massively enhanced the scope for long-route accountability. It has revolutionised the National Department of Health's database and overcome challenges of interoperability, making up-to-date information readily available to health officials and policymakers who can now assess questions of need and distribution (cf. Goetz and Jenkins 2005; Moore and Teskey 2006; Akpanuko and Asogwa 2013). It has made it possible for the South African Department of Health to reach far more pregnant women and mothers of young children than ever before, and to stay connected with them on a regular basis. It has also: promoted early antenatal care; facilitated the delivery of health information to pregnant women; reminded them to visit local clinics for check-ups at critical moments; helped identify potential complications (such as hypertension, HIV/AIDS and diabetes) early on; provided a way for mothers to ask questions of health service providers; and enhanced the state's ability to track migrant and mobile mothers, massively improving South Africa's electronic database and medical registry (cf. Bateman 2014). Moreover, it has provided an avenue – albeit limited –

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[7]   South Africa's maternal mortality rate (MMR) was estimated at 155 deaths per 100,000 live births in 2013 and the National Department of Health has a target of 100 or fewer deaths per 100,000 live births for 2020.

for citizen voice as women and mothers were consulted in the design phase and through the feedback system.

MomConnect is not the only example; there are others, usually on a smaller scale, in which mHealth has shown its potential to address accountability challenges of this sort. For example, the government of Malawi used child nutrition indicators, submitted by community health workers to a central server through SMS messages and automatically analysed, to identify cases of malnutrition and send responses, thereby omitting the usual delays experienced when relying on paper-based systems. Pilot mHealth initiatives in Uganda, Senegal and Brazil, which provided mobile phones and appropriate apps to health workers, showed birth registration improving to nearly 100 per cent (Hall *et al.* 2014).

In addition to facilitating better information flow on the health needs of the population, long-route accountability also involves a second step: the creation of appropriate incentives to ensure that the health needs of the population are addressed by providers. Here, the state acts as the principal, providing resources, and putting in place mechanisms and processes to incentivise and/or discipline health service providers who act as the responsible agents.

mHealth can also play a role in this process. The South African government has published the main complaints received through MomConnect on its website and presented summaries of negative feedback in high-level, political speeches (namely inappropriate treatment of patients by service providers; extended waiting times; and drug shortages); it has identified the clinics or health institutions where problems have occurred, and has either explained what action has been taken to address these problems or how it plans to address them (Motsoaledi 2015a). While to some extent, these complaints or problems had already been acknowledged (Motsoaledi 2015b), MomConnect has facilitated the identification of 'key institutional junctures', or what Camargo (2011) and Carmargo and Jacobs (2011) would term 'points of accountability failure', and has sought to address these. However, in this and similar contexts, as it is a government exercising discretion over what comments are published, and what information is presented to the public, the possibility of the same government undertaking meaningful accountability may be reduced. It could also be using an ostensibly 'neutral' technological platform to make the government appear to be acting accountably while actually doing very little.

mHealth innovations have also offered creative new ways of addressing key institutional junctures where accountability failures occur such as by focusing on community health workers, frontline workers, community birth attendants or other community-based workers. For instance, in Pakistan, an mHealth campaign reported enhanced tuberculosis (TB) detection rates. This combined a wide-scale health information campaign encouraging people who had a persistent cough to visit medical facilities with the training of community members who assessed visitors' potential TB risk using a mobile phone-based algorithm. These workers were then incentivised through immediate financial rewards for positive identifications (Hall *et al.* 2014).

mHealth initiatives which address the availability of health resources and stocks have relied on mobile phone-based innovations combined with financial incentives (Shieshia *et al.* 2014). New financial arrangements are also being used to 'reduce the time to distribute compensation, performance incentives and/or travel reimbursements' to health workers who would previously have suffered from delayed and intermittent payments, boosting their morale and reducing the need for informal payments (Batavia and Kaonga 2014: 12). mHealth initiatives are also increasingly being coupled with developments in mobile phone banking, to leverage better health gains (Mehl and Labrique 2014; Labrique *et al.* 2013). In Zanzibar, Tanzania, for example, successful and safe births are rewarded through financial perks for relevant birth attendants who use a particular mHealth app to register pregnant women, undertake risk assessments and offer birth planning information. The same mobile

phone app transfers funds to the birth attendant to transport pregnant mothers to medical facilities for safe childbirth, and distributes financial incentives to those attendants that perform well (Batavia and Kaonga 2014: 12).

As mentioned, mHealth apps and innovations are in their infancy, and many of the examples cited above are pilots. Research has not yet caught up with practice and it is difficult to say with certainty at this point to what extent these innovations are actually transforming accountability, and making health services work better not only for already advantaged citizens, but also for poor and marginalised groups. Long-term effects and unintended consequences remain underexplored. Nevertheless, as demonstrated here, it is clear that mHealth has much potential for enhancing the long route to accountability. It can provide 'accurate, population-based numerators and denominators [which] can help to improve accountability of the health system to provide expected routine antenatal and post-natal care, as well as emergency support and referral, as needed' (Labrique *et al.* 2012: 113) as well as offering creative incentives and processes that encourage a range of health service providers to heed the needs of their populations in ways that overcome some previously experienced challenges.

In addition to acting as a tool for better information collection on the health needs of the population, often through the discretion of community-based health workers and staff, some mHealth platforms also directly connect patients to the state and providers, allowing them to report on their own experiences of the health system. All this new and more accurate data can then be used by the state to more effectively design policy, allocate resources and generally improve its administration to health service providers. However, while mHealth can dramatically enhance the transfer of information from citizens to the upper layers of the state, and offers new and creative tools that can be used to incentivise and discipline providers, it does not necessarily guarantee that such information or tools will be effectively translated into more accountable relationships and better health outcomes. As discussed further below, contextual politics and power relations also play a significant role and may ultimately determine the impact of mHealth initiatives in any given setting.

6.2 mHealth and the short route to accountability

Accountability, as envisaged through the short route, puts patients directly in touch with local service providers and emphasises patients' and others' ability to demand appropriate and decent health services directly from them without engaging state actors at a higher or national level. Enhancing service provision at the local level is an area where mHealth may have great potential, although few mHealth initiatives are exclusively and directly focused on accountability. Instead, mHealth focuses on improving health outcomes through a wide range of opportunities leveraged through new technologies. Again, many of these mHealth initiatives are pilots which have not – for a variety of structural, institutional, financial and other reasons – been delivered at scale, even though they may have proven to be successful in terms of meeting their primary aims (Otto *et al.* 2015). mHealth potentially enhances service provision and thus has implications for accountability in the areas of: the marketability of health provision; health information dissemination; finding ways to provide health services to remote rural communities; and health worker training and support. Each of these is discussed in turn below.

The availability of health *markets* can provide an effective means of short-route accountability, with citizens simply choosing other providers when they are not satisfied. While this is not often a viable strategy in health systems for reasons discussed above, mHealth is creating new health markets that will, in the long term, shape health systems.

> According to a report from MarketsandMarkets, the global mHealth market is predicted to grow from $6.21 billion in revenue in 2013 to $23.49 billion by 2018 at a compound

annual growth rate (CAGR) of 30.5 percent over the five-year-period from 2013 to 2018. The mobile fitness and wellness market is expected to grow at a CAGR of 36.7 percent from 2013 to 2018. This rising mHealth market threatens changes in the way significant amounts of health data will be managed, with a paradigm shift from mainframe systems located in the facilities of healthcare providers to apps on mobiles and storage in shared cloud services. This trend is paralleled by a new openness in which devices that were once only available in hospitals become widely available to individuals while flexible mHealth applications tempt clinicians away from the hospital-based systems they used in the past. This popular market will disruptively challenge traditional approaches by being cheap and accessible.
(He *et al.* 2014: 1)

While most of this growth is occurring in high-income countries (HICs), there is substantial evidence of private sector interests in mHealth markets in LMICs as well (Akter, Ray and D'Ambra 2013). As Bloom *et al.* have argued, formal and informal private sector markets have become increasingly significant in the health systems of LMICs:

> This has been both a formal process, sanctioned by the state through contracts with not-for-profit providers and legislation allowing the development of the private health care market, and an informal process with burgeoning numbers of unlicensed practitioners, pharmacists and drug pedlars increasingly providing services.
> (Bloom *et al.* 2008: 2079).

In LMIC contexts of pluralistic markets, there has been considerable exploration of the viability of mHealth to market lifestyle and health-related products, with little regulatory oversight (Ahmed *et al.* 2014; Lucas 2013). In Bangladesh, for example, all mobile phone companies offer added-value content to subscribers through the provision of health helplines, which offer both telephonic advice and SMS messaging. The first of these, established by Grameenphone in 2006, charged premium rates for a three-minute consultation with a medical doctor, conducting 11 million such consultations between 2006 and 2011 (Ahmed *et al.* 2014). mHealth helpline or hotline services have become increasingly popular in LMICs and are available in different formats in India, Mexico, Bangladesh and South Africa (Akter *et al.* 2013).

Similar initiatives have been witnessed in other countries, sometimes in partnership with governments and sometimes not. In Kenya, the country's largest mobile phone operator, Safaricom, has partnered with a private company, Changamka Microhealth Ltd, to provide health-related finance products for poor citizens (Otto *et al.* 2015). This follows a recent focus on mHealth as a product marketable to the poor – or to those at the 'bottom of the economic pyramid' – and in the 'low income electronic markets' experienced in LMICs (Akter *et al.* 2013). Sarwar warns that, in Bangladesh, a new form of health market system may be looming, which involves private companies in the 'conceptualisation, marketing and financing of health services'. He asks whether this signals 'a transformation to new market systems for health service delivery' and whether this may have negative implications for people living in poverty (Sarwar 2015).

The accountability aspects of such market-related mHealth innovations remain nascent, with little theorisation or empirical evidence to date. And while it is too early to posit with any certainty, such market transformations may offer poor people opportunities to 'shop around' for quality alternative health provision with the assistance of mHealth, but may also result in further financial exploitation through the sale of sub-standard, inappropriate or ineffectual medical drugs and solutions. It may also undermine health systems' 'public goods' aims, and lead to low accountability traps with decreasing political commitment to improving public services when and if larger proportions of the population opt for private care. Such emerging market-based arrangements also beg questions about private sector motives and

accountability in relation to data collected through mobile phone-based health apps. Proprietary rights to population health data can undermine and even undercut state efforts to improve publicly provided health services, while companies might attempt to profit from the sale of these data to other private or public entities, or use the data to exploit poor people.

Another area where mHealth can excel is in *health information dissemination*. Digital technology, the ubiquity of mobile phones and the relatively low cost of SMS messages have provided novel ways of broadcasting health information and of encouraging behaviour change (Labrique *et al.* 2013). Picked up by governments to ensure 'targeted, timely health education and actionable health information', this technology goes a long way towards making access to health information and health service provision easier, better and more satisfying (Labrique *et al.* 2013: 161). In Rwanda, Kenya and Tanzania, for example, governments have introduced SMS-based health communications programmes, entitled m4RH (or Mobile for Reproductive Health), which provide government-approved contraception and family planning information through SMS messaging to young people. In Tanzania, when promoted as part of a national family planning programme, m4RH sent messages to 50,000 people in a three-month period.

There is evidence that m4RH may be able to address a longstanding health systems concern, namely young people's lack of access to clinics and inadequate contraceptive knowledge (Otto *et al.* 2015; Vahdat *et al.* 2013; Mangone *et al.* 2016). Aponjon, or MAMA (Mobile Alliance for Maternal Action) is another, oft-cited example from Bangladesh, which focuses on ensuring the delivery of appropriate maternal health information to pregnant women, new mothers, their husbands and other influential people (such as mothers or mothers-in-law). This public–private initiative works with community health workers to encourage women to subscribe and then to receive stage-appropriate information through either SMS messaging or instant voice-recorded messaging. In March 2014, 1.2 million subscribers were registered with Aponjon, which aims to reach 2 million mothers in order to ensure financial viability.

As is the case in m4RH in Rwanda, Tanzania and Kenya, or MomConnect in South Africa, the government of Bangladesh is an official partner and the messages sent out are approved by 'an expert panel consisting of Bangladeshi physicians, researchers and communications professionals' (Sarwar 2015; Rajan *et al.* 2013). As with many other mHealth initiatives, Aponjon claims to demonstrate positive health outcomes, such as improved antenatal attendance at clinics and increased breastfeeding, but long-term outcomes and improved national health statistics are not yet available. Furthermore, as stressed above, due to the relative infancy of mHealth technologies, interventions and related research, reports of positive outcomes – especially from small-scale pilot projects – should be treated with skepticism until more critical, long-term assessments can be made.

While targeted programmes such as Aponjon and m4RH are intended to make patients more knowledgeable about their conditions, treatment and care (WHO Global Observatory for eHealth 2011), the express intention is not to reduce information asymmetry and to help patients make judgements about the kinds of treatments they receive but to enhance adherence to medication or use of health services (Labrique *et al.* 2013). There has, to date, been little assessment of how health information dissemination can address information asymmetries inherent in health systems. The 'informed patient' model, which has become increasingly prevalent in HICs, in which patients (provided with up-to-date information and medical evidence) actively engage in determining their treatment regimens (Detmer *et al.* 2003), remains absent from LMIC mHealth information dissemination programmes. The notion that patient knowledge of health, acquired through mHealth technologies, helps address accountability issues remains underdeveloped.

mHealth initiatives have also made it easier for people to search for health information themselves – whether accurate or not. As Hampshire *et al.* and Batchelor *et al.* make clear, much of this searching does not involve consulting with members of the health sector. Instead, mobile phones are being used to connect families, relatives and other social contacts, and for a widened scope of health information-seeking, which includes not just understanding the nature of a particular illness but also identifying appropriate health services and exploring what resources are available for treatment (Hampshire *et al.* 2011; Hampshire *et al.* 2015; Batchelor *et al.* 2015). Technological innovations have also made it possible for mobile phone owners to access the internet, creating a myriad of possibilities for individuals to seek health information. Some of this may happen through non health-related social media websites or forums where this information (or sometimes, misinformation) is shared and accessed, but there have also been many online initiatives specifically related to health. For instance, many of these have been directed at young people and sexual health (Waldman and Amazon-Brown 2017). While most of these initiatives are targeted at individuals who use their mobile phones to interact with specialised online knowledge providers (for example, by asking questions, sending opinions or completing surveys), a few seek to create online communities with peer-to-peer interaction. Such initiatives offer potential to bring people together collectively, but are characterised by privacy and anonymity (influenced as they are by the sensitive topic of sexual health), by the exclusive transmission of health information rather than a focus on service delivery and, on occasion, by the depoliticisation of health. All of these factors reduce the scope for these online mHealth communities to generate collective voice and articulate accountability concerns. Yet, mobile technologies have also been used to survey young people and to create forums in which they express their opinions in relation to policy. For example, in 2014, Zambian youths' views on sex education were solicited through mobile phones and presented to representatives from health systems, governments, and international donors at the Adolescents' Sexual and Reproductive Health Rights, Gender-Based Violence and HIV in Africa Symposium (Waldman and Amazon-Brown 2017).

mHealth has also provided innovative solutions to overcome the challenges of *geographic remoteness*, poor transport routes and other financial and infrastructural deficits in rural areas in LMICs. Here, ICT is being used to 'extend the reach of health facilities into the community and into clients' homes', sometimes simply through the connectivity offered by mobile phones, but sometimes through linking mobile phones to other external devices that enable sophisticated medical assessments and data collection (Labrique *et al.* 2013: 163). For example, the Ghana Medical Association instituted a system which allowed physicians across the country to phone each other and communicate without having to pay for the cost of the call. The Mobile Doctors Network (MDNet)/Medicareline programme, or MDNet for short, allowed all registered doctors to use this service, enabling them to communicate with others during emergencies, get peer advice and, as a later addition, receive SMS messages about national health issues (WHO Global Observatory for eHealth 2011). In so doing, it offered (in theory and providing that doctors used it as envisaged) an improved health service delivery to rural patients.

A more sophisticated example is the Reseau en Afrique Francophone pour la Telemedecine or RAFT initiative, conceptualised by Geneva University Hospitals, which uses digital technologies to increase the potential for doctors in isolated areas to connect to regional hospitals (Otto *et al.* 2015). It provides opportunities for medical practitioners to discuss and assess 'complicated cases', at times using sophisticated technology such as tele-ultrasonograpy or tele-cardiology, and thereby to avoid costly medical referrals or having to evacuate patients. RAFT also actively promotes South-South collaboration, continuing distance education for health professionals, and generates a sense of community among practitioners despite their remote locations. Having initially begun in francophone Africa, RAFT is becoming increasingly global and the network, consisting of 60 active sites, now links health professionals in Latin America, the Middle East, South Asia and Africa, using

French, English, Spanish and Portuguese (Bediang *et al.* 2015; Bagayoko *et al.* 2014). Other examples are more targeted and focus on particular medical conditions. For example, in Zambia, the Cervical Cancer Prevention Programme utilises trained nurses and mHealth technology to screen women in resource-constrained rural clinics. The screening, same-day treatment and decisions about referral are done by nurses who visit the clinic every three months. These nurses can, if necessary and if they wish to, use mobile phones and other technologies to consult with doctors (Mwanahamuntu *et al.* 2011; Parham *et al.* 2015). Parham and colleagues (2015) argue that this use of mHealth has resulted in more than 200,000 women being screened between 2006 and 2015, representing a massive increase in the identification of cervical cancer and follow-up treatment. Such initiatives are significant in terms of their potential for: preventive care, helping to ensure early diagnosis and treatment; reducing complications which stem from delayed diagnosis and which require expensive and sophisticated medical attention; helping people be served in their local settings and avoiding long and expensive travel arrangements to hospitals and other medical facilities. As suggested above, improvements in service delivery, facilitated by mHealth, indirectly address some accountability issues as more people are brought into the health system and providers' capacity to deliver services is bolstered. These initiatives do not, however, put citizens directly in touch with local government officials or service providers in ways that create space for citizen voice to reflect on the governance of health provision.

mHealth technologies are also being utilised to remotely manage patients' health conditions and offer them opportunities to manage their own conditions. This, in keeping with the mHealth health information dissemination innovations discussed above, may go some way towards shifting the balance between patient and service provider as what was previously a one-way monitoring system (in which the service provider holds all the information) becomes a more reciprocal exchange of information (Mechael *et al.* 2010). For example, Medinet, an mHealth intervention in the Caribbean, provides diabetic and cardiovascular patients with the opportunity to manage their own conditions. The idea is that patients use mobile technology to take relevant readings (blood glucose, blood pressure, etc.) which are in turn communicated to health-care providers through an online web portal, enabling them to track individual patients' progress and assess data across a cohort. The information is also presented back to patients through myDR ('my Daily Record'), which provides feedback on the last reading, offers additional information on disease management, and has a help feature. MyDR aims, not to focus on the patients' willpower, but rather to help patients develop new eating and exercise habits, and to be able to regularly see the results of these in their medical readings (Sultan and Mohan 2013; Sultan, Mohan and Sultan 2009). In Brazil, such systems have been complemented by using mobile devices to create 'body area networks with various sensors that capture real-time data of patients' (Iwaya *et al.* 2013: 289). This continuous tracking of vital statistics (five-minute intervals) is connected to hospital wards for monitoring (Murakami *et al.* 2006).

Personalised mHealth monitoring initiatives have the advantage that patients can continually track their conditions without needing to wait until they visit a doctor to discover whether they have made progress (in reducing cholesterol levels, for example) and, in the event of little or no progress, that they have to take urgent corrective action (Sultan *et al.* 2009). They also enable medical staff to monitor patients' conditions in case an intervention is urgently needed. The primary aim, however, is again not to address information asymmetry, but rather to ensure that on a day-to-day basis, a patient is provided with sufficient knowledge to manage (but not diagnose, confirm treatment and prescriptions or make other high-level medical decisions) his or her condition. As such, it is the accountability of patients, and the partial shifting of responsibility from health service providers to patients, that is being promoted (Sultan *et al.* 2009) rather than the kind of accountability described earlier, which emphasises the responsibilities of government actors, authorities and/or service providers to be accountable to citizens (Camargo 2011). While this increases the potential for positive health outcomes on an individual basis, contributes to comprehensive health information

databases, enhances the capacity of providers to serve populations and contributes to patients becoming more knowledgeable about their own conditions, there is a danger that this is seen as sufficient to address a wide range of accountability failures, while ignoring aspects such as collective voice, distribution of resources, exclusion of certain populations, etc. Indeed, a striking feature of these apps is their individualised – and often personalised – nature. This enables specific individuals to ask and know whether they are getting the treatment and services that they need. What it does not allow for is an assessment of collective experiences of health service delivery, unless such information is collated and presented publicly (Peixoto and Fox 2016), nor the identification of key institutional junctures where accountability failures occur (Camargo 2011).

Health worker training and support is an area well-populated by mHealth interventions. Using mobile phones and apps to replace paper systems enables community health workers to document people's conditions and health needs, and to report this information digitally to supervisors. This facilitates real-time data collection, enhanced supervisory support, and offers potential to monitor and respond to specific health needs. mHealth has also promoted ongoing training for community health workers, and novel incentive mechanisms and payment schemes that overcome the challenges of delayed and irregular payments, and help ensure compliance with health standards (Mehl and Labrique 2014).

There are numerous examples of mHealth initiatives directed at community health workers (see, for example, the inventory produced by Batavia and Kaonga 2014). Many initiatives focus on improving their ability to deliver quality care by providing them with relevant information and mechanisms to ensure 'end-to-end patient management'. These include tools such as registration, assessment and monitoring mechanisms, work plans, learning modules, checklists, clinical decision support, improved incentives and cost reimbursements (Batavia and Kaonga 2014: 12). A classic example, often upheld as a success story, is the Ananya programme, implemented in certain districts in Bihar, India, in 2011, which was scaled up across Bihar state and launched in Odisha state two years later (Chamberlain 2014). Aiming to improve reproductive, maternal, newborn, child and adolescent health, Ananya implemented a range of interventions. It focused on frontline health workers' professionalism and productivity, assuming that 'improved interactions would increase uptake of key health behaviours' and on using digital technology to facilitate improved service provision (Borkum, Rotz and Rangarajan 2015: 1). Using mobile phones, Ananya health workers were able to plan home visits, monitor beneficiaries and keep up-to-date health records. Health workers' mobile phones also provided animated videos and counselling messages that could be played to pregnant women, as well as interactive checklists, lists of children requiring immunisation, and learning modules for health workers themselves, including new ways of interacting with supervisors (Batavia and Kaonga 2014; Borkum *et al.* 2015).

While many mHealth interventions help health workers improve their work, some specifically focus on enhancing their medical knowledge. In Senegal, for instance, a mobile phone approach offered ways to improve health workers' understanding of contraceptive use and related side effects, which helped challenge misperceptions among patients. Using a combination of interactive voice response (IVR) and text messaging, health workers completed a refresher training module lasting eight weeks. After a three-hour orientation meeting in which their phones were set up and they were trained on navigating the course, they were able to pursue their learning remotely, in their own time and at their own pace. The course posed questions and offered multiple possible answers, identified the correct answer and then provided additional detailed information on the kinds of situations health workers might encounter (Diedhiou *et al.* 2015). The Senegalese government has endorsed the use of mobile phones, enacting a national Frontline Health Worker Plan to ensure that all health workers are provided with mobile phones and mHealth apps (Batavia and Kaonga 2014).

As shown in this discussion, mHealth has considerable potential to improve health system functioning, particularly in hard-to-reach areas, through improved performance, new forms of low-cost delivery, the use of technology to facilitate enhanced diagnosis and management of disease, expansion of health information dissemination, and novel forms of health worker training and support. Overall, mHealth can:

- improve the capacity of the state and its institutions to assess health needs, deliver and monitor health services;
- positively address on-the-ground service providers' capacity to offer timely and appropriate services;
- provide mechanisms that enhance patients' capacity to interact with the health system in ways that enhance health outcomes.

These activities are all very important components of health systems and have a significant bearing on accountability issues. Yet, underlying all the initiatives discussed above is the assumption that, as service delivery is improved and as mechanisms facilitate and enable the state to monitor and enhance health offerings in rural areas, accountability issues are being addressed and resolved. However, as seen in the above discussion, the vast majority of mHealth programmes focus on individuals and their personal health needs. Herein lies the second assumption – that individuals can and will address accountability issues as necessary. While there is evidence that individuals will make some use of mHealth complaint mechanisms, this is a long way from a version of accountability that creates and supports enabling environments for citizens to exercise voice.

Current promotions of mHealth do not provide opportunities for individuals to come together to engage in accountability and they do not 'lift the barriers' (UN 2013: xiv) or promote social accountability among people living in poverty or marginalised from mainstream society (cf. Goetz and Gaventa 2001). Existing contextual gradations in access to internet and mobile devices, and digital literacy – reflecting urban/rural, class, gender and other inequalities – are likely to be reflected in *who* uses and thus benefits from mHealth. Furthermore, mHealth has not, beyond individual complaints of poor service, supported situations in which citizens – and particularly disadvantaged citizens – have a collective voice in the assessment and articulation of health needs and in the public provision of health services (cf. Camargo 2011).

Rather, most mHealth initiatives focus simultaneously on multiple activities such as: increasing patients' knowledge of their conditions; offering organisational tools that help community health workers to better plan their daily routines and manage their patient populations; enhancing those workers' health knowledge and delivery of services; facilitating improved links with management and enhancing supervisory support; ensuring adequate medical stock supplies; offering immediate reimbursement for health workers' out-of-pocket expenditures; and guaranteeing regular and timely salary and incentive payments for health workers. All these activities have the potential to enhance service delivery if used as intended over the long term, yet do not create the contexts for what Fox terms 'sandwich strategies' (2015). Mobile phones and mHealth technologies do not automatically create coalitions of people who actively engage with the government to address low accountability traps. And despite their potential to deploy a wide range of service-enhancing activities, most do not go beyond the short and long route dichotomy to add both 'teeth' and 'voice' to accountability (Peixoto and Fox 2016; Fox 2015). There are, however, disease-specific initiatives that bring patients together in particular ways, as discussed in more detail in the following section.

6.3 mHealth and the characteristics of health services

As already discussed, the service characteristics approach poses questions about how accountability in the health sector might be shaped by overlapping and intersecting market,

demand and task-related characteristics and by political dynamics (Batley and Harris 2014; Batley and Mcloughlin 2015). Different types of health care produce different kinds of citizen-service provider interactions and thus different accountability issues. In this section, we draw on Harris, Batley and Wales' (2014) distinction between curative and preventive health care. Having discussed many forms of preventive mHealth examples (particularly maternal and child health) in relation to routes of accountability, in this section we explore mHealth examples from curative care (one chronic and one emergency) to assess their contribution to accountability. We begin with emergency care and how mHealth has been used in relation to the 2013–15 Ebola outbreak in West Africa before turning to mHealth for diabetes.

Emergency health services are required at critical and urgent moments, and sought when people do not have the time to make informed or carefully rationalised decisions, and when emotions are paramount. They are individualised, highly irregular and do not usually bring people together to collectively assess their health needs and how these are being met. As such, they are, as Batley and Harris (2014) argue, not ideal for promoting accountability mechanisms. Indeed, the 2013–15 Ebola outbreak was characterised by delays in, or an absence of, 'robust measures for accountability' (Moon, Sridhar, Pate, Jha, Clinton, Delaunay, Edwin, *et al.* 2015: 2205). Mobile phones and mHealth have, however, great potential in relation to emergency health situations. This potential was realised in the Uganda Ebola outbreak of 2000 (Borchert *et al.* 2011) and in the 2011 Haiti earthquake (WHO 2011). All the countries affected by the Ebola outbreak, and their neighbours, have flailing health systems, inadequate health infrastructure and lack the necessary medical and human resources to deal with large-scale public emergencies (Amankwah-Amoah 2016; Moon *et al.* 2015). During the Ebola outbreak, there were concerted efforts to use mobile phones and mHealth to meet collective 'public goods' associated with the lessening of risk of infection (cf. Smith 2003).

Mobile phones offer two kinds of communication useful for emergency health situations, namely: SMS messages, which are actively produced by users; and call detail records (CDRs), in which information about the call (the time, the caller's unique identifier, the cellular tower location, etc.) is passively recorded. This latter information produces enormous datasets that are owned by tele-companies. SMS messages are used to inform populations about emergencies and appropriate behaviour, to collect information about the emergency itself and for people caught up in the emergency to ask for more information (Cinnamon, Jones and Adger 2016; Amankwah-Amoah 2016). CDRs offer information about the location and movement of people who respond to emergency calls for information, surveillance or who are looking for information themselves. Together, these offer the potential 'for improved data availability and accuracy, more rapid detection/response, and increased efficiency' (Cinnamon *et al.* 2016: 257).

All the countries affected by the Ebola outbreak (Sierra Leone, Liberia, Guinea, Nigeria) and others at risk (Ghana) used mobile phones in one way or another to aid the response (Adokiya and Awoonor-Williams 2016; African Business 2015; Kangbai 2016; Kuehne *et al.* 2016; Borchert *et al.* 2011; Cinnamon *et al.* 2016; Eyres, Brown and Rohan 2015). In Sierra Leone and Guinea, mobile phone technology was used for surveillance purposes during the Ebola outbreak and for contact tracing and case identification. In Moyamba district, Sierra Leone, community members were urged to call the District Health Management Team surveillance hotline and to give the names of suspected Ebola cases. Callers provided their details (name, phone number, and place of residence) as well as that of suspected victim(s). Suspected cases were then investigated by community health officers and Ebola contact tracers, who ensured further tests or that safe burial procedures were carried out (Kangbai 2016; Chen *et al.* 2016). Sierra Leone also used an open-source SMS system, termed RapidPro, to monitor the availability of Ebola prevention supplies in schools and to rapidly replenish dwindling stocks (Cinnamon *et al.* 2016).

In Monrovia, Liberia, because it was not possible to use conventional means of data collection, Médecins sans Frontières used mobile phones to better understand what people were doing in terms of health-seeking behaviour during the Ebola epidemic, and to assess the death rate resulting both from Ebola and other causes (Kuehne *et al.* 2016). Similarly, the World Food Programme (WFP) developed a monthly SMS-survey applied across Sierra Leone, Guinea and Liberia, which enabled people to report local food shortages and prices resulting from the Ebola crisis (Cinnamon *et al.* 2016). In Nigeria, the use of mobile phones for surveillance and fast-tracking of potential Ebola cases was seen, by some, as the main reason for the country's success in containing the disease. They allowed officials to reduce reporting time from 12 to 6 hours for Ebola cases and to document visits to particular households during the campaign (African Business 2015).

CDRs – owned as they are by telecoms companies – are more difficult to access and use during emergencies. Companies may be reluctant to release this information, while data protection regulations – if indeed they are in place – may complicate such releases. While companies in Guinea and Sierra Leone released CDRs during the Ebola outbreak, Liberia, which had stricter protocols on the use of personal data, did not (Cinnamon *et al.* 2016). Although the international mobile phone association, the Groupe Speciale Mobile Association (GSMA), which represents the interests of the private sector, had produced privacy guidelines determining how CDRs might be released and used prior to the Ebola outbreak, these guidelines were designed for researchers' use of big data, not for governments' use in national emergencies (Eyres *et al.* 2015). After negotiation with relevant companies, big data was used during the Ebola outbreak, to help Sierra Leone, Guinea and Liberia determine where to allocate resources, to keep health professionals informed on current prevention and control measures, and to decide which areas might require isolation (Amankwah-Amoah 2016). For example, in Sierra Leone, the National Ebola Response Centre (NERC) processed up to 700 calls per hour in peak periods. CDRs revealed the locations of these callers, and of the mobile response teams, and were used for the dispatching of rapid response teams. This also allowed for the weekly synthesising of patient call records and CDR data, and the presentation of maps showing how call volumes for a particular area increased or decreased over time. This information fed into NERCs planning, and was used to update district Ebola response centres, which instructed district surveillance officers to investigate areas of high call volume (Eyres *et al.* 2015). CDR information was further analysed after the outbreak, providing greater understanding of the kinds of people who made surveillance calls – an important consideration in remote, hard-to-reach places that rely on community members for surveillance – and enabled the visualisation of social networks in relation to suspected Ebola cases (Kangbai 2016). While the use of CDR proved useful in the Ebola response, the practice comes with potential ethical dilemmas around privacy, caller identification, data protection, and the degree to which callers know and approve of their data being used (Vayena *et al.* 2015).

Large-scale emergency health situations underscore the need for, and challenges associated with, clearly defined accountability practices. These challenges affect all aspects of the health system and, as noted by an independent review of the global response to the Ebola outbreak, more work needs to be done to develop a 'framework of norms and rules operating both during and between outbreaks to enable and accelerate research, govern the conduct of research, and ensure access to the benefits of research' (Moon *et al.* 2015: 2204) – work that should involve governments, donors, United Nations organisations, private companies, the media, researchers and civil society. mHealth is of relevance here, given the public–private partnerships that underlie it and the simultaneous potential uses of patient information for commercial enterprise and/or public good. This raises questions about the roles of these companies as the gatekeepers of information, about new information asymmetries and about 'the ways in which power is being orientated away from citizens and governments towards corporations' (Cinnamon *et al.* 2016: 262). It also raises questions about how health-related public goods are dealt with given that, while government health information messaging aims

to improve population-level health, and thereby to benefit all citizens, private sector investors may be drawing on the same data for advertising purposes. As Vayena *et al.* point out, 'the former aims at fostering a public good (health); the latter at generating a corporate profit' (2015: 3).

None of the mHealth initiatives promoted or used during the Ebola outbreak sought to explicitly address accountability issues, nor did initiatives seek to put members of civil society in touch with each other. Given the nature of the disease and its spread and the scale and urgency of the response, this is not surprising. However, this does not negate the need for accountability initiatives nor the possibilities of both inclusion and exclusion raised by using mHealth innovations in emergency responses. While there was considerable attention to the positive use of mobile communications in the Ebola outbreak, this does not guarantee comprehensive coverage. In Sierra Leone, for example, 30 per cent of the population did not own mobile phones in 2014 (Kangbai 2016). Not only do these people lose out in relation to health information communication, but perhaps more importantly, for accountability, 'their voices will not be heard and they miss out on the ability to shape agendas and resource decisions' (Cinnamon *et al.* 2016: 260).

The characteristics and politics of chronic care, although also a form of curative health, are radically different from those of emergency care. Interactions between patients and between patients and health service providers are more regular and sustained, and the mHealth innovations and questions of access to information are more personalised and less politicised, with different and perhaps less insurmountable accountability challenges. People diagnosed with diabetes, for example, become increasingly familiar with their illness and the health system as they participate in the lifelong management of their condition to maintain quality of life and to avoid complications (such as loss of sight, coronary heart disease, stroke or kidney failure), disability and death. This management involves 'a complex interaction between patients, physicians, the health care system, and society' (Singh *et al.* 2016: 68). Yet many LMICs lack the resources and infrastructure to deal with the growing incidence of diabetes, particularly in hard-to-reach rural areas where there are very few health service providers trained to deal with diabetes and its complications. In addition, many people with diabetes are not able to pay for treatment, and struggle to make the lifestyle changes required of them (reduce food intake, increase exercise, stop smoking, regularly self-monitor and use medication appropriately).

mHealth offers 'a new delivery system' for people with diabetes, which includes remote training of health-care service providers, improved technology and information dissemination for patient self-management, regular medical reminders to ensure that medication is taken at appropriate times, better monitoring of patient records and information processing, upgraded patient–provider communications and, as a consequence, improved health service delivery (Patnaik, Joshi and Sahu 2015; Singh *et al.* 2016). For example, in India and Pakistan, the CARRS Trial used electronic health records (EHRs) (which collated and personalised data, sent out prompts and reminders, scheduled appointments, etc.) and decision-support software, coupling patients with non-physician staff who offered monitoring and support, and who reviewed patients' EHRs and used algorithms to make treatment prompts to physicians (Shah *et al.* 2012). Similarly, in India and Tanzania, the Step-By-Step programme trained nurses and doctors to recognise lower limb complications and provided an algorithm for the management of patients' feet (Singh *et al.* 2016). In Brazil, diabetes patients received weekly IVR calls that offered support and monitored their progress (Piette *et al.* 2014). In Honduras and Mexico, diabetes patients also received automated support calls that provided an opportunity to discuss their condition and self-care problems while also alerting clinicians and care-givers (both formal and informal) of the patients' progress and offering suggestions for further support (Singh *et al.* 2016). In Iran, Bangladesh and Iraq, SMS messages were used to enhance diabetic patients' knowledge of their condition and, in Bangladesh and Iran, to

help them maintain normal glucose levels (Goodarzi *et al.* 2012; Haddad *et al.* 2014; Shariful Islam *et al.* 2015).

Harris and colleagues (2014) argued, in assessing the characteristics of health services, that the conditions associated with longer-term chronic care might facilitate accountability. This idea was based on the creation of advocacy and patient support groups that promote both improved medical knowledge (reducing information asymmetry) and networking, thereby potentially creating spaces for collective action and citizen voice (Harris *et al.* 2014). mHealth diabetes programmes in LMICs have used EMRs or tracking procedures to promote 'standardized guidelines and treatment algorithms' and to augment health service delivery by 'informing health care professionals what is expected of them and ensuring more reproducible care of patients by different health care workers' (Singh *et al.* 2016). Digital technologies have improved knowledge about diabetes both among patients and health-care staff, have created better access to health information and services for patients, and have provided new mechanisms to increase support either from health system representatives or from community members. These activities all indirectly address accountability issues in relation to the characteristics of chronic care. First, the enhanced focus on service delivery is important and significant, given the resource-constrained contexts in which diabetes is tackled in LMICs. mHealth diabetes interventions make it easier for patients and health system staff to manage and monitor the illness, promote greater standardisation of treatment and relieve some of the burden on community health workers and others. Second, diabetes programmes go some way towards addressing information asymmetries as there is evidence that mHealth technologies have enhanced patients' knowledge of their condition.

What mHealth initiatives in diabetes have not done, however, is build networks or spaces for collective voice and action. Almost all mHealth initiatives have focused on individual diabetics and their personalised interactions with the health system. One exception is in South Africa, where women with diabetes were brought together for weekly sessions in which they shared a meal and received information on diet, physical exercise, management of diabetes, problem-solving, managing emotional upheaval, and coping strategies. Mobile phones were also used to link these women in a peer support system and to question them about their daily behaviour (Rotheram-Borus *et al.* 2012). However, underlying these examples are assumptions similar to those discussed in relation to long- and short-route accountability. These are, first, that accountability is primarily needed to address service delivery inadequacies and that improvements in delivery therefore resolve accountability challenges; and second, that a focus on individuals is useful for accountability and can bring about positive social change.

Yet, addressing diabetes involves moving beyond individual patients and health systems and addressing a range of things such as the local environments in which people live, the availability of health foodstuffs, widespread knowledge of and support for diabetes, and appropriate policies to minimise risk factors. This requires multidisciplinary and multi-sector collaborations that include communities, local governments, NGOs, the private sector, the food industry, physicians and other health professionals, national steering committees to adapt and promote international guidelines, local diabetes care groups, community health workers, peer educators, advisory panels, and more (Singh *et al.* 2016). All these relationships and factors are embraced within a broader accountability lens. Bringing together diabetes patients to discuss these wider issues, in relation to questions about self-management and health system access, creates the possibility of collective actions to improve accountability.

One mHealth diabetes initiative, MoPoTsyo in Cambodia, has explicitly sought to create collective spaces and to address health system constraints. MoPoTsyo included many of the

above-listed aims – including a focus on patients' self-management of diabetes[8] – but went far beyond this to tackle political issues such as the lack of affordable medicines, access to a broader range of health-care services, and to influence national policy processes. It offered people diagnosed with diabetes the opportunity to become peer educators, which involved successfully completing a six-week training programme in Khmer, being tested on their knowledge and skills, being equipped with handheld devices to measure glucose levels, being linked into a network of peer educators, and the obligation to form new patient groups in their respective communities. MoPoTsyo also challenged pharmacists on the provision of drugs, fought for the provision of generic medicines at fixed prices, and even sourced bulk medical supplies on the international market to be distributed by pharmacists (with a profit-sharing agreement). It also developed its own laboratory facilities in response to the lack of government facilities and has worked with the Minister of Health to expand its peer education model into the National Strategic Plan for Prevention and Control of Non-Communicable Diseases (NCDs) 2013–20 (van Olmen *et al.* 2016). Mobile devices were used in this initiative, but much of the activity around building and demanding accountability and improved care occurred offline. Technology – while enabling patient care and peer communication – cannot be credited alone. Rather, deliberate decisions were made to embed more politicised objectives into the institutional design of the programme, which by virtue of the nature of diabetes as a chronic condition, lent itself more readily to sustained engagement by patients in a collective manner.

7 Politics and power in mHealth accountability

This report has highlighted the accountability challenges in health systems in LMICs from two distinct perspectives and has sought to situate mHealth innovations within these debates. The broader institutional environment, including the nature of the state and its formal and informal rules and practices, shapes the incentives and constraints of public officials, service providers and citizens to supply and demand accountability. These incentives and constraints are further mediated by the characteristics and nature of different forms and aspects of health care, their particular political dynamics, and thus specific accountability challenges. Taken together, the approaches suggest that institutional incentives must be carefully calibrated to support the necessary components for accountability between principals and agents (mandates, resources, information, monitoring and enforceability) while considering the distinct political challenges presented by health services. And while it may appear fairly straightforward to accomplish this – tweaking the rules or designing initiatives to activate existing mechanisms – efforts to increase accountability occur in dynamic political contexts in which powerful interests have stakes in maintaining the status quo. Any such attempts to shift the balance of power are frequently contested and difficult to implement.

Pressure for change might come from within the state (or perhaps from international bodies or donors) on the 'supply side', from citizens and civil society on the 'demand side', or a combination of actors, and occur along short, long or more holistic hybrid routes. Citizen participation in social accountability processes – often supported by donors, NGOs or other development actors – is particularly important for the most marginalised groups in society who are too often failed by traditional democratic and bureaucratic institutions (Joshi and Houtzager 2012). However, citizen voice operates best in the context of enabling environments, democratic structures and transparent information made readily available to citizens. But even in these ideal conditions, there remain challenges to reaching out to more

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[8] For instance, peer educators host weekly gatherings in their homes which, in effect, become patient information centres. Here, community members can get tested for diabetes, learn about the illness and have their conditions monitored.

marginalised groups and ensuring accountability of health services for people living in poverty. And, as discussed earlier, citizen voice for demanding better health services is constrained by a wide range of factors, including geographical location and remoteness, infrequency of use of particular health services, variability of citizens' care needs, information asymmetry, socioeconomic resources, gender and other social hierarchies and – perhaps the most critical in terms of accountability – the fact that most health services are used privately and not collectively.

Taking all these factors into consideration, improving accountability for better health services becomes a very complex task and invites questions as to what effective efforts might actually look like and what their goals should be. Scholars have warned of the limitations of thinking about accountability initiatives simply as technical interventions or 'widgets' through which particular inputs lead to particular outputs and act as ends in themselves (Joshi and Houtzager 2012). This obscures the complex political and social contexts in which accountability initiatives unfold and the power relations through which they are mediated and which they ultimately seek to change. Moreover, such thinking does not invite consideration of broader long-term objectives or the potential to situate individual mechanisms within multi-stranded collective strategies that seek to deepen democracy, empower citizens and advance developmental goals (McGee and Gaventa 2011). Thus, the extent to which accountability initiatives, including those in the mHealth category, have real 'impact' depends not only on whether and how individual mechanisms work to achieve their technical objectives (e.g. collecting user feedback on a particular health service experience) but also on whether and how they advance challenges to inequitable power relations and reconfigure politics to the advantage of the marginalised groups.

In the context of mHealth and in light of the dearth of research focusing on how mHealth can facilitate accountability, it is vital to give greater consideration to power and politics. There is little evidence that mHealth initiatives are currently addressing the adverse incentives felt by politicians to support only the visible/attributable aspects of health care, or those which meet the needs of elites. Indeed, mHealth might even create opportunities for state actors to 'perform accountability' in ways that oversimplify complex issues and allow them to overlook politically inconvenient or unpalatable issues. Yet, might mHealth initiatives in the future be able to address these issues?

mHealth is an innovative and powerful tool that can enhance the reach of government communications; the positive benefits of SMS messaging, for instance, have been repeatedly shown. But might a reliance on mHealth create new categories of marginalisation that have negative ramifications for health service delivery and accountability? Furthermore, while mHealth gives patients more information about their conditions, only in isolated instances is it being used to challenge the distribution of health service provision or existing patterns of exclusion and inequality? Does this mean that mHealth initiatives are primarily reinforcing existing power relations, and are they 'normalised and bureaucratised' in ways that undermine their potential to bring about social change (Cornwall and Brock 2005: 1050)? Or is it possible that mHealth might be shifting power away from citizens and governments towards private sector companies and thus structurally undermining the space for citizens to engage in accountability initiatives? And while mHealth has promoted ICT-enabled citizen voice platforms for health issues – mostly in the form of channels through which citizens can report on the quality of service – there is little evidence that these automatically generate spaces for citizen voice to take on issues requiring greater accountability. There is also little consideration of how digital technology and mHealth might affect, and be affected by, politics.

While there has been much speculation on the potential of mHealth, less consideration has been given to its limitations. Kumar and colleagues point out, for instance, that a review of 47 publications on the use of EMRs in low-resource settings showed that 'political, ethical or

financial considerations were rarely reported' (Kumar, Paton and Kirigia 2016: 975). This review suggests that we should also think about the limits of mHealth, particularly in relation to accountability. First, the defining feature of mHealth initiatives is the centrality of the mobile phone. The technological nature and the potential it brings should not be taken for granted, and questions around power and access must be acknowledged: specifically, *who* has access to mobile phones and what might this access entail? Who collates the data provided through mobile phones and who uses these data to think about community or population-level rather than individualised health problems? Who has access to collated data and who has the space to question whether these data are used in appropriate ways? Second, although not alone in this limitation, what scope does mHealth (often undertaken in partnership between government and the private sector) have for bringing to the table health issues that are politically and socially unpalatable? Issues such as sexual health services and advice for minors or sexually marginalised communities and issues of illicit drug use may be sufficiently socially and politically taboo that they remain squarely off the agenda. Those in need of services related to these issues may have little recourse, and mHealth initiatives, as subject to the politics and power dynamics of the contexts in which they operate, may be no better placed to improve access to such services or accountability for these people. Alternatively, social enterprise or market-driven initiatives may offer mobile-accessed internet mHealth platforms that provide information, but which are unsupported by governments and are not linked to any in-country service delivery.

8 Conclusion

This paper has laid the analytical foundations for understanding how mHealth innovations have begun to, and will continue to, reshape health systems through an accountability lens. By taking an institutional approach to accountability, and emphasising the five elements of mandates, resources, information, monitoring and enforcement, we have shown that mHealth has the most potential for impact in the long route to accountability through its innovative provision of information. Radically improving the flow of health-related and service use-related data from citizens to the upper layers of government dramatically increases decision-makers' capacity to design better policy, allocate resources more effectively (including paying health workers more efficiently) and monitor service providers. Whether or not this translates into effective gains for health-related accountability depends, however, on the wider political environment, and on how actors in government and service provision are incentivised or discouraged from acting in the best interests of the population. In short, mHealth technologies cannot automatically and independently address accountability issues; proponents must take into account political and social arrangements, and aim to design mHealth initiatives to complement or bolster 'offline' interventions such as formal sanctions already embedded in government structures.

In the short route to accountability, mHealth holds promise for connecting citizens to alternative health services through new markets, and while market competition may incentivise government providers to improve, it may also mean that poor people are subject to new forms of exploitation and low-quality care. Furthermore, growing access to health markets may also leave public services languishing in low accountability traps. mHealth has, to date, shown less potential in relating to the other dimension of the short accountability route – namely citizen voice, and the engagement of citizens directly with service providers on a local level. Although some mHealth apps have features allowing citizens to give feedback on their experiences of services on an individual basis, this does not encourage collective action unless this feedback is aggregated, made publicly available and actively monitored by citizens and civil society who then choose to act on it. Positive change and responsiveness on the part of providers or public officials on the basis of this feedback is

also predicated on whether they are incentivised to act upon it by the institutional architecture of the health system and character of the state.

mHealth does demonstrate tremendous potential for increasing the capacity of health service providers to do their jobs by helping them reach more patients, offer better care, and provide resources and tools to assist in diagnosis, treatment, patient health monitoring and communication. From an accountability perspective, these types of mHealth apps can be thought of as resources that greatly enhance the capacity of health workers to carry out their mandates at the level of implementation. mHealth also holds promise for helping patients overcome some of the information asymmetry inherent in health care, and to know more about their conditions and what constitutes appropriate treatment and quality care. This is especially the case for patients with chronic conditions, such as diabetes, who are repeatedly in contact with health services. Apps can help these patients improve their self-care through information provision and medication reminders, but also enhance their interaction with health services through patient monitoring, appointment reminders and communication. Some apps also include features through which patients can interact with and support each other, which may have more scope for potential collective actions for accountability.

In contrast, emergency and preventive public health care lend themselves less to accountability although for different reasons. Desperation in emergency situations, whether individual or communal, urgently requires accountability but does not allow for patients to come together and reflect on the characteristics of the health system and their experience of health care. In cases of epidemics or natural disasters, mHealth is most useful in its ability to facilitate better response by governments and providers through quick information transfer – only one (albeit crucial) element of accountability. More work needs to be done on whether mHealth can facilitate accountability for more individualised patient emergencies. More empirical and conceptual work also needs to be done on whether and how mHealth can challenge inequitable distribution in health systems and raise questions of governance of health services, thereby addressing accountability failures. Finally, it is necessary to interrogate mHealth technologies in greater depth – to look at the political economy of the algorithms, the coding of the platforms, the processes of harvesting data, long-term consequences and the 'solutions' being proposed – to critically assess what kinds of behaviours are being promoted, whose health needs are being included, and whose are being excluded and thus rendered invisible in relation to LMICs' health systems.

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