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development

Barriers to Digital Services Adoption in Bangladesh

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Questions

- *What are the barriers/ constraints for the poor and vulnerable in accessing technology-based services, particularly financial, education, and health services in Bangladesh?*
- *How can these barriers be removed / access enhanced?*

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1. Summary

This report uncovered many barriers to digital services in Bangladesh with a particular focus on access to digital connectivity, digital financial services, e-health, and online education. The 5 As of technology access were used as a framework to uncover barriers across these areas as well as connectivity. The report found significant barriers to the use of digital services regarding availability, affordability, awareness, ability, and agency across connectivity and the three digital service areas. The findings of the 5 As analysis are summarised below.

Availability: 97% of Bangladesh is covered by a mobile signal. However, not everyone has continuous access or access to the same speed (e.g. 2g, 3g, 4g). 17% of non-mobile phone users in Bangladesh cite a lack of network coverage as a barrier (After Access 2018a). Mobile networks and other infrastructure necessary for digital services (e.g. mobile money agents) tend to roll out in places with relatively high levels of buying-power where people are likely to have disposable income first which threatens to leave the most marginalised and poorest behind. Moreover, Intermittent access can also interrupt and adds friction to user experiences in digital services. Energy infrastructure is also important. About 24% of people in Bangladesh lack access to electricity.¹ A lack of electricity can hinder mobile phone usage and adoption of online education initiatives and m-health (e.g. by making it difficult for to run ICT equipment in classrooms).

The type of device people have access to matters. Basic phones have less functionalities than smartphones. Although 74% of people ages 15 to 65 in Bangladesh own mobile phones, only 18% own smartphones (LIRNEasia 2018). Some digital services are only available via the Internet and some require smartphone apps. When digital services are designed to only be accessed by more powerful devices, the poor and marginalised are left out. For example, basic phones are not sufficient to engage with Massive Online Open Courses which require video streaming capabilities and stable Internet connections or with humanitarian chatbots that rely on instant messaging apps.

A lack of content in Bengali is also a barrier. One study found that rural m-Health users in Bangladesh could not engage with an m-health initiative because the messages were in English (Khatun *et al.* 2016). Similarly, most Open Education Resources are only available in English. Efforts to translate online education materials to Bengali have been slow and incomplete.

Affordability: Mobile phone ownership and connectivity eat up a greater share of income for the poor. Although bKash, Bangladesh's leading mobile money providers is inexpensive when compared to mobile money providers in other countries and does not burden the poor with regressive pricing strategies, people living below the poverty line are still less likely to use it. 40% of non-mobile money users say they do not have enough money to transact to begin with (Financial Inclusion Insights 2018b).

Unless they are zero-rated or accessed through free public WFI, data intensive digital services (e.g. streaming online educational videos) require users to purchase data which remain too costly for the poor. Moreover, making use of digital services can require additional costs offline.

¹ <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2016&locations=BD&start=2011>

For example, mNutrition services may ask users to make dietary changes that is out of their reach financially.

Awareness: 67% of people in Bangladesh do not have Internet awareness (LIRNEasia 2018). Awareness is also low for digital services. 41% of people in Bangladesh do not know what mobile money is or what it can be used for (Financial Inclusion Insights 2018a). Effective implementation of pro-poor digital services will require awareness campaigns that target the poor. The poor are very unlikely to be aware of the potential benefits of m-health. Meanwhile, more educated and better off people are significantly more likely make use of m-health services (Bloom *et al.* 2017). Although Bangladesh Open University (BOU) has made significant efforts to make its resources available online in multiple formats to increase uptake, awareness remains low amongst students and tutors.

Ability: Not knowing how to use the Internet is the main barrier they faced by 67% of offline Bangladeshis. 27% of people in Bangladesh do not know how to use a basic mobile phone (LIRNEasia 2018). The ability barrier is even more pronounced for advanced mobile phone activities. 70% of Bangladeshis have full ability to make phone calls but only 9% can fully perform mobile financial transactions (Financial Inclusion Insights 2018a). Only 49% of people in Bangladesh have some ability to send and receive text messages which is essential for m-health services which are largely SMS based (Financial Inclusion Insights 2018b). A lack of offline skills and knowledge can also limit uptake of digital services. Only 29% of people in Bangladesh are considered to be financially literate (Financial Inclusion Insights 2018b). A study in rural Bangladesh showed that users largely ignored their text messages due to an inability to read them (Khatun *et al.* 2016).

Online learning could provide an unfair advantage to tech savvy users. Less tech savvy learners may find it difficult to keep pace with peers because they need to learn the course material while learning how to use digital technology. Moreover, online learning requires an extra set of Do It Yourself (DIY) skills that is not common the traditional classroom (Burns 2019). MOOCs can also place unrealistic expectations on learners with no or little formal education since many MOOCs are delivered at a university level. This may create a vicious cycle where only better off students already able to perform at top levels complete MOOCs.

Some users that may otherwise have the ability to set up a service may not have the ability to set it up. For example, the act of registering for m-Health requires users to deploy a significant degree of digital and language literacy, unless someone registers them on their behalf (GSMA and Frog 2017).

Agency and Gender: Women are less likely to be mobile phone owners and Internet users than men globally (ITU, 2017). This trend is especially pronounced in Bangladesh where 58% of women vs. 87% of men own mobile phones (a 34% gap) and 7% of women vs. 18% of men use the Internet (a 62% gap) (After Access 2018b). Women and girls are less likely to use digital technologies across all activities including mobile money, social media, surfing the Internet, accessing entertainment, playing games, instant messaging, banking, email, and for studying (After Access 2018b; Girl Effect 2018).

Although some argue that mobile money adoption empowers women (GSMA 2013), data suggests that mobile money adoption alone does not balance gender equality. Mobile money empowers

both men and women. Although women advanced users have more financial autonomy over household decisions than women non-users or basic users, men advanced mobile money users still have significantly more financial autonomy than women advanced users (Financial Inclusion Insights 2018b). Moreover, women who do use mobile money are less likely to use it for advanced activities like borrowing, saving, and receiving wages (Financial Inclusion Insights 2018a).

Bangladesh is a male-dominated society. This impacts whether women access digital technology and what they can do with it. Women are more likely to only access mobile phones through borrowing which is associated with lower levels of usage across digital activities including text and instant messaging, social media, digital services and even using the mobile phone's calculator (Croxson and Rowntree 2017; Girl Effect 2018). Women face gendered barriers to digital services beyond their household. Women in Bangladesh report being harassed or turned away by mobile money agents (Financial Inclusion Insights 2018b). Social norms also lead to negative images of female mobile phone users with the result that male family members limit their access to protect family reputation (Croxson and Rowntree 2017; Girl Effect 2018). It is unfair to expect to women and girls to instantly adopt digital technologies without facilitating cultural and value shifts. Girls going against the grain currently encounter serious threats including being beaten, grounded, married off, or being taken out of school (Girl Effect 2018).

2. Introduction

According to some estimates, the number of Internet users around the world quadrupled in just 12 years from 1 billion in 2005 to 4 billion in 2017; usage now encompasses 57% of the global population.² The spread of mobile phone use has been even more pronounced. Over two thirds of the global population are mobile phone subscribers.³ Although these numbers suggest that mobile phones and the Internet are being used by more people across the world at much faster rates than any previous technologies, over 2 billion people are still not Internet users, and a third of the global population still do not own a mobile phone.

Due to their rapid proliferation, digital technologies provide development actors with the opportunity to reach more people, faster, and at less cost (DFID, 2018). Actors across sectors, including government, the private sector, civil society and donors, are increasingly embracing digital technologies as a channel to deliver development-related services and information (Hernandez and Roberts, 2018). The potential for information and communications technologies (ICTs) to improve development outcomes is reflected in the Sustainable Development Goal (SDG) calling for the universal spread of the Internet (SDG target 9c). Beyond target 9c, increased use of digital technologies across all sectors in the economy and society means that the impact of ICTs and ICT-based applications are likely to be felt across all 17 SDGs (ITU, 2017; Unwin, 2017). However, whether the spread of ICTs will have a net positive or net negative impact on achieving the SDGs is unclear. There are several trade-offs between the spread of ICTs and several SDG goals (Hernandez, 2019; Unwin, 2017). One of these trade-offs is that of

² <https://www.internetworldstats.com/emarketing.htm>

³ <https://www.gsmaintelligence.com/>

the potential for ICTs to increase income inequality and development outcome inequality between those that have access to ICTs and those that do not as well as increasing inequality between those that are only minimally able to leverage ICTs to improve their well-being and those that are able to do so significantly (Unwin, 2017). The poorest and most marginalised have the least access to digital technology and are the least able to leverage ICTs to improve their well-being (Hernandez and Roberts, 2018; International Telecommunications Union, 2017; UNDP, 2016; World Bank, 2016). Thus, an uneven spread of ICTs threatens to limit our ability to achieve the overarching 'Leave No One Behind' SDG goal.

Although the statistics in the introductory paragraph paint a glossy picture about Internet and mobile phone usage, they use very broad definitions for what constitutes an Internet user or a mobile phone subscriber,⁴ and mask significant discrepancies between people in different countries and within countries. Four out of five people in developed countries were Internet users in 2018 (International Telecommunications Union, 2018). On the other hand, usage of digital technology beyond making phone calls is especially rare in many lower middle-income countries like Bangladesh. 74% of the people aged 15 to 65 in Bangladesh owned mobile phones as of late 2017, but just 13% had ever used the Internet and social media (LIRNEasia, 2018). Out of 18 developing countries studied by 'After Access', Bangladesh scored 3rd lowest in terms of internet awareness and usage rates (LIRNEasia, 2018). Within countries there are also disparities in connectivity between people living in different areas within countries. These disparities are especially pronounced between people from different socio-economic backgrounds, and between marginalised and non-marginalised groups (After Access, 2018b; World Bank, 2016).

The figures in the introductory paragraph divide populations and groups in half: users and non-users. All internet users and mobile phone subscribers are treated as equal users. However, access to digital technology is not binary. There are also discrepancies in mobile and Internet usage between those counted as 'users'. Rather than a neat digital divide between people continuously connected to the Internet via smartphones and laptops, and people without any access to phones or the Internet at all, there are many levels in between. For example, some people may only experience limited or intermittent/spotty network coverage from devices with only limited functionality like basic phones (Roberts and Hernandez, 2019). Even when someone uses a mobile phone or the Internet, they may face subsequent barriers after access that affect their ability to make greater use of these technologies, or to use them to improve their well-being (e.g. to access digital finance, e-health, and online education services). (Financial Inclusion Insights, 2018b).

There is a danger that an over-emphasis on providing services digitally may leave the poorest and most marginalised further behind. Tackling this danger requires development professionals to think past binary statistics of mobile phone users vs. phone users and online vs. offline. This report aims to help development professionals understand the multiple barriers that affect access to digital technologies and their subsequent usage to extract development gains. It does so using

⁴ Live Internet Stats counts anyone with 'available access' to an Internet connection point and basic web technology knowledge as an Internet user. Meanwhile GSMA counts unique mobile subscribers as the number of people who are subscribed to a mobile tariff or service (eg. SIM card rather than mobile phone owners).

Roberts and Hernandez's (2019) 5As of technology access framework.⁵ The framework highlights five different types of barriers (Availability, Affordability, Ability, Awareness, and Agency) that affect technology access. Access to mobile phones and the Internet can be hindered or mediated by these barriers. Furthermore, Access to mobile phones or the Internet does not assure their use for specific activities (e.g. text-messaging or social media). Thus, the 5As could be applied to specific digital applications or activities to get a better understanding of why they are not used or used more. This report uses the 5As to analyse barriers to adoption to both digital technologies in general (Internet and mobile phones) and for specific activities and applications, namely digital finance, e-health, and online education. Understanding these barriers is the first step in increasing digital adoption and increasing the use of digital technologies to achieve development gains, as well as to safeguard those at risk of being left behind. Further work is needed on how to overcome these barriers.

This report is divided into six main sections. This introduction is followed by a section focusing on barriers to connectivity in regards to mobile phone ownership and Internet usage. The connectivity section sets the tone for the sections that follow by providing an overview of barriers to connectivity (a prerequisite to being able to use digital services) in Bangladesh. Sections, three, four and five focus on barriers to digital financial services, e-health, and online education respectively and provide more in-depth evidence about barriers to each type of digital service in particular. The final section concludes the report and makes some recommendations based on its findings. This report was commissioned by DFID Bangladesh and thus tries to contextualise barriers in the Bengali context. However, many of the findings are likely to be relevant in other places. The barriers uncovered in this report are meant to be illustrative but not exhaustive. This report was limited to 8 days of secondary research and thus may have missed some key barriers. Primary ethnographic research would improve the chances of uncovering barriers further.

3. Connectivity

Classes of Digital Access

Differences in access to digital technology are not binary. Evidence suggests that there are 'classes of digital access' which tend to mirror socio-economic class and other forms of oppression (e.g. gender, caste, ect.) (Roberts and Hernandez, 2019). The poorest and most marginalised are most likely to be part of the ICT 'working class' and 'under class' (see Figure 1 below). This leaves already marginalised groups at a disadvantaged position and makes them less likely to gain from digital goods and services (e.g. digital finance, eHealth, and online education) compared to better groups due the multiple and often overlapping barriers they face in getting connected. As more public and private services, employment opportunities, and more aspects of life move online, those at the bottom of the ICT class pyramid (disproportionately the poorest and most marginalised) risk being left behind in a digital world (Hernandez and Roberts, 2018).

⁵ Although Hernandez (the author of this report) was a co-author on this article, Roberts created the framework and deserves full credit for its development

See: Figure 1: Classes of technology access and connectivity (Roberts and Hernandez, 2019: 8), <https://onlinelibrary.wiley.com/doi/epdf/10.1002/isd2.12084>

There are signs of this playing out in Bangladesh. Although 74% of people between the ages of 15 and 65 own a mobile phone in Bangladesh, only 45% of mobile phone owners own Internet friendly phones, and just 18% (24% of the 74% who are mobile phone owners) have smartphones which provide users with advanced functionality (LIRNEasia, 2018). Moreover, only 1% and 5% of basic and feature phone users in Bangladesh are internet users, whereas 64% of smartphone owners are (LIRNEasia, 2018). Only 2% of basic phone owners and 4% of feature phone owners in Bangladesh are social media users whereas, 62% of smartphone users use social media. Furthermore, although mobile phone ownership is high in Bangladesh, only 4% of people own a desktop or laptop. This is an important distinction since although the most advanced mobile phones offer increased functionality, their small screens and limited interfaces mean there are still many tasks and activities, like carrying out research or analysing data, that are more efficiently carried out on bigger more powerful devices (LIRNEasia, 2018).

Barriers of technology access or of access to a specific application of a technology (e.g. digital finance, eHealth, and online education) are more likely to be experienced by the poorest and most marginalised, whom are disproportionately represented in the ICT under and working classes. The rest of this section introduces each of the 5As in regards to access to mobile phones and the Internet more generally and includes examples of these barriers playing out in Bangladesh when possible. The 5As can be thought of as an illustrative but not exhaustive list of necessary but insufficient non-binary conditions for Access. Even when a 'user' is connected, any or multiple of the As may limit their ability to use digital technology more or for more advanced activities.

See: Figure 2: The 5As of Technology Access (Roberts and Hernandez, 2019: 4), <https://onlinelibrary.wiley.com/doi/epdf/10.1002/isd2.12084>

Availability

Availability refers to whether a given technology or technological solution (e.g. mobile money) is available in the market in a given geography or to a specific user. This refers to both the hardware (e.g. devices) and infrastructure (e.g. mobile network) needed to make use of a technology. Because mobile operators are mainly profit driven companies, they tend to build their telecommunications infrastructure in places with buying power first rather than in remote impoverished areas (World Bank, 2016). Like access in general, network availability is not binary. As newer generations of mobile connectivity emerge (e.g. 2G, 3G, 4G, 5G) providing faster and better connectivity, the newer infrastructure tends to be rolled out in wealthier areas first. In 2017, 97.1% of Bangladesh was covered by a 2G signal and 92.5% was covered by a 3G signal. However, only 10.8% of Bangladesh had 4G coverage.⁶

⁶ <https://www.mobileconnectivityindex.com/#year=2017&zoneISOcode=BGD&analysisView=BGD>

Although mobile network coverage of 97.1% may sound impressive. A lack of coverage disproportionately acts as a barrier to those who do not use mobile phones. In a recent survey, 17% of people that do not own mobile phones in Bangladesh suggested that mobile coverage is not available in their area (After Access, 2018a). Because infrastructure tends to be built in wealthy areas first, urban areas tend to be better connected than rural areas globally. The Urban-Rural mobile connectivity divide in Bangladesh stands at 7%, which is relatively low compared to other lower and middle income countries. However, the urban rural gap is much higher for more advanced digital activities including Internet and social media use at 38% and 40%, respectively (LIRNEasia, 2018).

Along with the presence of a mobile network, frequent usage of mobile phones requires the availability of other technologies (e.g. electricity to charge a mobile phone) or for specific users to make use of it (e.g. assistive technology for people with disabilities). According to World Bank data, approximately 76% of people in Bangladesh had access to electricity in 2016.⁷ In a recent survey, 19% of people in Bangladesh that do own a mobile phone mentioned not having electricity at home to charge their mobile phones as a barrier (After Access, 2018a). Moreover, users with only one or two power outlets at home will have to compete with other family members using other appliances to charge their phones (Evans et al., 2018).

Along with infrastructure and devices, ICTs may not be useful unless there is availability of locally relevant content online in a language that one can understand and engage with (Roberts and Hernandez 2019). At the time of writing, English constitutes for 54% of the language content on the internet and the top 12 languages (English, Russian, German, Spanish, French, Japanese, Portuguese, Italian, Persian, Polish, Chinese, and Turkish) make up over 90% of all content online. Meanwhile Bengali constituted for less than 0.1% of online content, and minority languages spoken in Bangladesh are likely to be even less represented online.⁸ A study of potential mobile internet users across Bangladesh and three other South Asian countries - people that do not currently use mobile Internet, but are most likely to use it based on their backgrounds - found that a 'lack of need and relevance' was their third biggest barrier (Croxson and Rowntree, 2017).

Affordability

When a technology is available, Affordability - and the other As - may still hinder users from being as digitally connected as the ICT upper class. To make use of digital technology, users must be able to afford both the device and remaining connected. Affordability of handsets was cited as the biggest barrier for mobile Internet in a GSMA (Global System for Mobile Communications Association) study of potential adopters in Bangladesh - users that are most likely to adapt the technology given their background (Croxson and Rowntree, 2017). 59% of non-users in Bangladesh cite not having enough money to buy a mobile phone as a main barrier to using one (Financial Inclusion Insights, 2018b). Like access in general, affordability is also not binary. For example, some users may only be able to afford small amounts of pre-paid data that they must use frugally, while others can afford post-paid plans that allow them to remain

⁷ <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?end=2016&locations=BD&start=2011>

⁸ <https://www.worldatlas.com/articles/what-languages-are-spoken-in-bangladesh.html>

connected continuously without interruption. Similarly, a poorer user may be able to afford a basic phone but a smartphone may remain out of their reach (Roberts and Hernandez, 2019).

Cost is a more restrictive barrier for the poor and marginalised since staying connected eats up a larger portion of their incomes. LIRNEasia (2018) finds that 89% of people in Bangladesh with above average income own mobile phones, while 73% with below average incomes and only 54% with no income do. Inequalities in usage between the poor and non-poor are even more pronounced for internet use. In Bangladesh, 25% of people living above the USD 2.50 per day poverty line report having used the internet in the last 90 days, while only 12% of the poor (USD1.25-250 per day), and just 3% of the extreme poor (less than USD1.25 per day) having used it (Croxson and Rowntree, 2017).

Moreover, other costs beyond the cost of handsets and connectivity need to be taken into consideration. Faith (2018) found that the costs of charging mobile phones, repairing them, and topping them up with credit create structural barriers to digital access for poorer women.

Awareness

Awareness refers to knowing that a given technology exists as well as knowledge about what the technology allows the user to do and the value the user can extract from its usage. Awareness is also not binary. There are 'levels of awareness about its functions and applications as well as critical awareness of the extent to which it is relevant to a person's life priorities and concerns' (Roberts and Hernandez, 2019: 4). In a recent survey, 67% of people between the ages of 15 to 65 in Bangladesh did not have internet awareness (LIRNEasia, 2018).

Beyond simply knowing what mobile phones and the Internet are, users also need to be aware about how they could use them extract value. This includes awareness of applications and services that can be accessed once online (e.g. search engines, streaming websites, e-books, etc.) and via mobile phone (e.g. text messaging, mobile apps, etc.). Awareness differs between different digital technology uses. For example, less than 25% of people aged 15 to 65 in Bangladesh are aware of e-commerce platforms where goods and services can be bought and sold. 23% are aware that it can be used to book tickets or appointments; 19% are aware they can hire taxis or transport online; 13% are aware the Internet can be used to hire help (e.g. platforms for hiring people to perform tasks like cleaning and fixing and installing things); 10% know they can use the Internet to book accommodation; and 16% are aware of microwork activities online (Galpaya and Amarasinghe, 2018).

It is important to note that like the other As, Awareness is necessary but insufficient for usage. Although a third of people aged 15 to 65 in Bangladesh are aware of the Internet, only 13% use it, and despite almost a quarter of people being aware of e-commerce platforms, the amount of Bangladeshis that use them are negligible (Galpaya and Amarasinghe 2018; LIRNEasia 2018).

Ability

Ability refers to having the necessary skills to make use of digital technology. 27% of people in Bangladesh do not know how to use a basic mobile phone (LIRNEasia, 2018). The ability barrier is even more pronounced for more advanced digital activities and applications. 67% of offline Bangladeshis say that not knowing how to use the Internet is the main barrier they face (LIRNEasia, 2018). Much of the content on the Internet - as well as the content necessary to reach other content - is mainly in written language or requires users to navigate content in written

language to reach it. A shortage of confidence in using digital technology and digital skills was the fourth most cited barrier for potential mobile Internet adopters in Bangladesh - people who are most likely to adopt mobile Internet based on their backgrounds (Croxson and Rowntree 2017).

Like the other As covered in this section, Ability is not binary. 'Digital skills exist in a continuum, from basic functional skills to high-level specialized ones' (UNESCO, 2018b: 4). While many users are increasingly becoming familiar with basic and smartphones, not all users have the ability to use all the functions, applications, and platforms that can be accessed on these devices. The ability to do one thing with digital technology does not necessarily translate into ability to do all possible things with a mobile phone. 30% of the population in Bangladesh does not have complete ability to make and receive phone calls on a mobile phone. 37% do not have complete ability to navigate a phone menu. 73% do not have complete ability to send or receive text messages. 84% do not have complete ability to use the Internet. 91% do not have complete ability to perform a digital financial transaction (Financial Inclusion Insights, 2018b).

Meanwhile, the ICT upper class manages to remain on the digital frontier and have abilities that allow them to leverage specialised software like big data analytics, and newer technologies like Blockchain, cryptocurrencies, the Internet of Things, and artificial intelligence to extract disproportionate gains from digital technologies (McKinsey Global Institute, 2015). Although the Internet makes the same information available to all people in theory, differences in offline abilities [or capacity] are often amplified online. Digital technologies allow users to leverage their existing knowledge and skills in ways that disproportionately benefit the already better off and increase relatively inequalities (Toyama, 2015a).

The skills necessary to be an effective digital citizen in the digital era are a moving target. Along with traditional notions of digital literacy - the ability to use computers and the Internet to find, produce and share information - being fully digitally literate at a given time includes the ability to adapt to emerging societal challenges arising from the use of digital technology, such as fake news and automation in the workplace (UNESCO, 2018b). Digital literacy will continue to evolve as new technologies emerge and their usage lead to new opportunities and challenges. 'A person possessing digital skills at a given time is likely to lose his or her mastery as a result of that evolution. This dimension must be taken into account in grasping the subject of digital skills: those skills must be not only acquired but constantly adapted and updated' (UNESCO, 2018: 4-5).

Agency

An individual's 'agency' refers to the degree to which he or she feels they can act in their environment and the world more broadly to bring about change (Chambers, 1983). Sen (1999) illustrated how 'some people who experience persistent deprivation suppress their aspirations and revise their expectations downwards resulting in a lack of aspiration or appetite for change' (Roberts and Hernandez, 2019: 5). Individuals marginalised by social norms like gender and ethnicity are often end up internalising a sense of powerlessness or lack of self-worth, which can then further negatively affect their sense of agency for change.

Self internalisation

Croxson and Rowntree (2017) studied mobile phone owners in Bangladesh with high potential to adopt of mobile Internet based on their backgrounds: literate young adults between 25 to 35;

living in places with at least 3G coverage; who are aware of the Internet and do not reject it, and come from lower and middle class backgrounds. They found that although most potential adopters in Bangladesh were aware of benefits linked to using mobile Internet and ascribe mostly positive, aspirational attributes to internet users, potential adopters tended not to relate to this image themselves and often said things like 'the Internet is not for someone like me' (Croxon and Rowntree, 2017). Similarly, Girl Effect (2018: 8) found that 'girls who experience a range of social restrictions appear more likely to internalise ideas that phones can be unsafe and girls cannot be trusted with the phone.'

Gatekeepers

Social norms often dictate what is seen as acceptable behaviour by different groups in society (e.g. gender, caste, ethnicity, social class, etc.). These norms also affect which people have access to digital technology and how they are able to use them. Those made more powerful by social norms often use their power to restrict rather than incentivise digital technology use by the less powerful (APC, 2018). 23% of people who do not own a mobile phone surveyed from Bangladesh said they are not allowed to use one. Thus, they are automatically locked out of any further financial, health, and education benefits afforded by mobile phones (Financial Inclusion Insights, 2018b). Amongst potential Internet adopters (both men and women), the need to ask permission from gatekeepers was the fourth most cited barrier in Bangladesh (Croxon and Rowntree, 2017). However, this ranking was for both men and women. If the ranking was isolated for barriers to access for women, this barrier would score higher. This barrier is 'almost exclusively [experienced by] women, as men rarely have to ask for permission to use the internet and did not feel they had to justify their use of mobile internet to others' (Croxon and Rowntree, 2017: 33). In Bangladesh, women and girls are seen as more susceptible to being 'led astray' or influenced by the negative side of the Internet, and thus more likely to cause their family reputational damage if they use the Internet. Social expectations often mean that men in Bangladesh are seen as the protectors of their family's interest and reputation, and thus have an incentive to act as gatekeepers to digital technology rather than enablers of access (Croxon and Rowntree, 2017).

In a survey of thousands of adolescent girls from 25 countries including Bangladesh, Girl Effect (2018) found that girls 'referred to a number of social barriers that they were aware of, or experienced themselves. These were primarily related to parental safety concerns resulting in fathers and mothers not allowing ownership In contrast a much lower proportion of boys identify social barriers to mobile access, suggesting that boys do not face the same social constraints as girls, or do not see these social barriers influencing them as strongly as girls do' (Girl Effect, 2018: 36). Going against these social barriers can be further disempowering for girls unless they are supported in going against the grain. In 'Bangladesh girls can experience strong negative social judgement for being associated with a phone, which often appears to echo the limited mobility that they experience in their daily lives ... girls also report that the consequences of parents' discovery of illicit access can be enormous. They include being judged by family and friends, beaten, and even married off' (Girl Effect, 2018: 56). Some girls also report being taken out of school for owning phones.

Gender norms embedded in culture can act as indirect gatekeepers, even when a girl or woman's immediate social circle is accepting of their use of digital technology. In male-dominated societies mobile agents are often men and are unwelcoming of women buying data. The result is that women are disincentivised from visiting them, and that husbands or another male family member tends to buy top-up for their wives/female family members, and they usually

end up buying credit for them in small amounts because they don't trust them (Croxson and Rowntree, 2017)

Fear of the Dark Side of the Web

According to Roberts and Hernandez (2019), *Appetite* for being or using specific digital solutions falls under Agency but is sometimes referred to as another A. Croxson and Rowntree (2017) found that in South Asia, fear of being disadvantaged by digital technology's dark side is the most cited barrier for new and potential mobile Internet users. To new and potential users, the Internet can be a double-edged sword. Potential and new users see its value as a tool for communication, learning, and entertainment. However, they also fear its potential negative side-effects: 'potentially addictive, a waste of time and money, a risk to an individual's safety because of scams, exposure to explicit content or cyber harassment, and potentially damaging to relationships. For Potential Adopters, the negative side of the web is often more front-of-mind than the positive' (Croxson and Rowntree, 2017: 8). In Bangladesh, the dark side of the Internet was identified as a barrier that affected women more than men. These fears start from a young age. Girl Effect (2018) found that girls worry more than boys about the risks they may be exposed to if they go online, especially social media. Globally, women are more likely to be harassed online than men (Fraser and Martineau-Searle, 2018).

Gender cuts across all the other four As

With a gender gap of 34% in mobile phone ownership and a gender gap of 62% and 66% in Internet and social media usage respectively, gender remains a significant barrier to connectivity in Bangladesh. Women are disproportionately challenged across barriers in comparison to men, due to social norms and unequal opportunities (Croxson and Rowntree, 2017). They are more likely to be denied access by gatekeepers (usually male), they are often more vulnerable to being negatively affected by the negative side of the Internet, they tend to have less purchasing power, they are often busier than men and have less free time than men to use technology or learn how to use it, have smaller social circles, and have been conditioned to have less confidence to learn digital skills. The result is that women and girls require more support to adopt digital technologies than men (Croxson and Rowntree, 2017). Girls are more likely to access phones through borrowing, only be able to use them in secret, or to have no access to them at all. This ultimately means that they have less opportunities to learn how to use them or to ask for help in using them (Girl Effect, 2018). Moreover, due to having greater agency in comparison to girls, boys are more likely to use their mobile phones for more diverse and sophisticated activities than girls, meaning girls are being left behind from digital gains (Girl Effect, 2018).

Girl Effect (2018) finds that girls tend to have less access to mobile phones in countries with higher gender inequality regardless if the country on a whole has high, medium, or low levels of mobile phone penetration. Moreover, a girl's environment affects her access to phones and how she perceives access. Girls living in households and communities that provide them with more freedom tend to have higher levels of mobile phone access. On the other hand, girls living in environments with less agency often have less access, use mobile phones less frequently for shorter periods of time and for less activities. Moreover, girls with less agency often end up internalising ideas that they shouldn't be using a mobile phone or certain applications (e.g. Facebook and Whatsapp) because they are girls or that it would be their own responsibility to prove that they are worthy of using a phone (Girl Effect, 2018)

Adolescent boys are 1.5 times more likely to own a mobile phone and 1.8 times more likely to own a smartphone than adolescent girls (Girl Effect, 2018). Moreover, because girls are more likely to access mobile phones by borrowing rather than owning, they are more likely to have their digital activities monitored and partially restricted than boys. 95% of girls surveyed in Bangladesh by Girl Effect (2018) borrow phones with brothers (42%) and fathers being the main sources of phones.⁹ The result is that girls in Bangladesh use mobile phones for less activities than boys including: making phone calls, sending text messages, playing games, entertainment, listening to radio, accessing the Internet and Facebook, chatting on Whatsapp, banking, homework, email, and even for use of the calculator and dictionary.

Gender norms around what expected after marriage especially hinder married women from using digital technology. Married women in male-dominated contexts are often expected to devote all of their time to their family doing childcare, housework, cooking, and sometimes paid work on top of all that. Rural women tend to have even less time to get acquainted with or use digital technology because they often spend hours tending to farmland on top of doing everything that urban women do and because errands and tasks that are easily completed in urban areas often take much longer for them to complete. Meanwhile men tend to have more free time after work for leisure and socializing. Moreover, men tend to have more financial autonomy and power to make decisions around handset ownership and Internet usage and thus tend to have more freedom (Croxson and Rowntree, 2017).

Moreover, adolescent girls often face barriers that the rest of population do not. although 98% of people in Bangladesh are believed to have the required documentation needed to register a SIM card (Financial Inclusion Insights 2018b), Girl Effect (2018) finds that SIM card registration is more problematic for girls in Bangladesh whom are less likely to have the required identification documents, meaning when they own a phone they are often unable to get it connected.

4. Financial Services

Digital financial services refer to ‘Financial services provided through an electronic platform (e.g., mobile phones, debit or credit electronic cards, internet)’ (Financial Inclusion Insights, 2017: 3). Thus, this definition includes but goes beyond mobile money. Digital financial inclusion ‘counts individuals who have an account in their name with a full-service financial institution that offers digital services (e.g., online account access, debit/ATM card, credit card, electronic cash transfers)’ (Financial Inclusion Insights, 2017: 3). While 18% of the Bangladeshi population experience digital financial inclusion via mobile money, 13% do through Banks, and 3% through Nonbank Financial Institutions (NBFI) (e.g. microfinance institutions) adding up to 28% of the adult population). InterMedia’s Financial Inclusion Insights (FII) programme finds that although mobile money is a key driver for financial inclusion in Kenya, Tanzania in Uganda, banks and microfinance institutions remain the primary financial inclusion drivers.¹⁰

Use of mobile money is low in Bangladesh. Only 18% of adults were registered mobile money users in 2018. However, 27% of the adult population also performed mobile money transactions

⁹ This figure includes girls that own a mobile phone (53%) but still borrow another one

¹⁰ <http://www.finclusion.org/about/>

using someone else's account. (Financial Inclusion Insights, 2018a). Like digital technology in general, access to digital financial services is not binary. The majority of mobile money users in Bangladesh are 'basic users' meaning they mainly use their accounts to transfer money to others or to deposit or withdraw cash. Meanwhile only 4% of adults in Bangladesh were 'advanced digital finance users' in 2017, meaning they used mobile money for more advanced banking functions like saving, borrowing, insurance, paying bills, investing, or receiving wages (Financial Inclusion Insights, 2018a).

The Government of Bangladesh has been actively promoting digital finance. It has rolled out several initiatives with aims to enhance digital financial inclusion including the Perspective Plan of Bangladesh 2010 to 2021—also known as Vision 2021 Digital Bangladesh—which aims to leverage ICTs to realise socioeconomic transformation (Financial Inclusion Insights, 2018a). Access to Information (a2i) is a public sector innovation agency seeking to enhance digital financial inclusion in Bangladesh through its Digital Financial Services (DFS) Lab in partnership with the Central Bank of Bangladesh (Financial Inclusion Insights, 2018a). Among other things, the lab provides financial literacy training programmes and hosts learning centres. One prominent DFS Lab initiative is a planned nation-wide payment system carried out in partnership with bKash, Bangladesh's leading mobile money provider, seeking to make financial services more readily available for poor and rural Bangladeshis.¹¹ The initiative seeks to safeguard against leaving the unconnected behind through the creation of 4,500 computer centres that people without mobile access can visit to be financially included. 1,200 of the computer centres seek to provide more advanced mobile financial services (apolitical, 2017).

The government has also introduced other reforms aiming increase digital financial inclusion. The government is currently promoting the use of 'agent bankers' (licenced agents acting as bank tellers) as a form of reaching customers in more remote areas. Moreover, the government has sought to promote mobile money registration penetration by tightening mobile money transaction rules to limit the use of mobile money by users that only access mobile money through the accounts of others (Financial Inclusion Insights, 2018a).

Access to a mobile phone is necessary, but insufficient, to use mobile money. In 2017, 81% of the population in Bangladesh used mobile phones to call someone yet only 13% used a mobile phone to complete a financial transaction (Financial Inclusion Insights, 2018b). 74% of people between the ages of 15 and 65 own a mobile phone in Bangladesh (LIRNEasia, 2018). Yet only 18% of the population between the ages of 15 and 65 are mobile money users and only 14% have active accounts.¹² A recent survey found that only 27% of people that own mobile phones in Bangladesh use mobile money and 3% use mobile banking (LIRNEasia, 2018). Using a mobile phone for financial activity still remains a relatively advanced use of mobile phones. The following analysis based on the 5As aims to help illustrate some of the barriers that limit mobile money use by other 73% of Bangladeshi mobile phone owners.

Digital Finance Availability

Mobile money is only available on mobile phones equipped with a mobile money enabled sim card. As of 2017, 76% of adults in Bangladesh reported owning a sim card and 84% reported

¹¹ This was meant to be launched in 2018, but I could not find if it actually was ever launched or not.

¹² <http://www.finclusion.org/topic/mobile-money.html#dataAtAGlance>

having access to a mobile phone either through ownership or borrowing (Financial Inclusion Insights, 2018a). Availability of network coverage can be a barrier even when someone owns a mobile phone equipped with a mobile money ready sim card. Where there is no network coverage, mobile money transactions cannot be completed. Moreover, mobile money transactions can be limited or untrustworthy when network coverage is spotty or unstable. Around half of mobile money users in Bangladesh have reported experiences where they visited a mobile money agent to transact only to find that the system or mobile network was down (Financial Inclusion Insights, 2018b).

Similar to how digital infrastructure tends to be built in places with buying power first, there is evidence that the prevalence of mobile money agents follows a similar pattern. Some of the barriers to expanding mobile money coverage to rural areas uncovered by Frydrych and Aschim (2014: 3) include 'more widely dispersed populations, lower literacy levels, less access to basic infrastructure, and lower and often sporadic household incomes' as well as a lack of formal documentation for rural residents. Thus, even when a particular geography is covered by a mobile signal, it still may not make economic sense for private mobile operators and their partners to further build the infrastructure necessary to provide 'pro-poor digital services' if it is disproportionately made up of people already at risk being left behind.

In 2017, 59% of adults in Bangladesh knew of a mobile money agent within 1 km from their home and 69% knew of a retail store with a mobile money kiosk within 1 km. On the other hand, only 35% and 28% were aware of a bank branch or banking agent within 1 km. When the distance is expanded to 5 kms, 77% and 76% of Bangladeshis knew where to find a mobile money and bank branch, respectively, suggesting that mobile money is more readily available closer to people's homes (Financial Inclusion Insights, 2018a). However, 5% of the population still claimed that the nearest mobile money agent was over 5 kms away in 2017. On the other hand, Automated Teller Machines (ATM) are rarer. Only 25% of adults reported knowing of an ATM within a kilometre from their home, and 14% of the adult population were aware of an ATM located more than 5 kms from their home (Financial Inclusion Insights, 2018a).

In Bangladesh, like many other countries, an official ID is required to register a mobile money account. On the surface, this barrier seems negligible since 98% of adults are reported to have the necessary ID required in 2017 (Financial Inclusion Insights, 2018a). However, 20% of unregistered mobile money users cite not having required identification documents as a reason for not obtaining their own mobile money account (Financial Inclusion Insights, 2018a). This barrier seems to be more restrictive for adolescent girls in Bangladesh who have cited lack of identification as barrier to getting a SIM card (Girl Effect, 2018).

How readily available mobile phones are also affects how likely someone is to use mobile money. People who own mobile phones are more likely to use mobile money than people who only borrow mobile phones. For example, adolescent girls that own mobile phones are more than twice as likely to use them for banking than girls that only borrow them (Girl Effect, 2018).

Digital Finance Affordability

Globally, mobile money pricing tends to be regressive rather than pro-poor (Holloway et al., 2017). Larger transactions usually incur less fees in percentage terms that are higher for smaller amounts. This means that the poor who are more likely to make smaller transactions end up paying more to make a mobile money transaction in percentage terms. However, it is worth

noting that when compared to five other prominent mobile money providers in other countries¹³, bKash (Bangladesh's most popular mobile money provider) was found to be the cheapest. 'For small amounts, it's much, much cheaper than any other comparable services around the world' (Amin, 2014). Unlike its peers, bKash does not charge to put money in and it charges a flat low percent fee regardless of the amount of money being withdrawn making it more equitable than regressive mobile money providers like M-Pesa in Kenya. However, there are still elements of regressive pricing since it charges a flat fee to transfer money to other accounts which would be higher in percentage terms for smaller amounts of money transferred.

Although bKash may be more pro poor than mobile money providers in other countries, Affordability is still a barrier to mobile money adoption in Bangladesh. People living above the poverty line in Bangladesh are 33% more likely to access mobile money than people living below the poverty line (Financial Inclusion Insights, 2018b). People living below the poverty line are 30% less likely to use basic mobile money services than people living above the poverty line (Financial Inclusion Insights, 2018a). The gap is even more striking for more advanced digital services. People living below poverty line are half (3% vs. 6%) as likely to use mobile money for advanced services than people above the poverty line, and significantly less likely (7% vs. 12%) less likely to access advanced digital services from a formal bank (Financial Inclusion Insights, 2018a).

There is no use for mobile money if people do not have money to spend. 40% of mobile money non-users in Bangladesh say they do not use mobile money because they do not have enough money to make transactions (Financial Inclusion Insights, 2018b). Moreover, seasonality and income security must be taken into account when thinking of mobile money affordability. People with irregular and seasonal incomes are significantly more likely to be non-users, unregistered users, and registered but inactive users than salaried users who are more likely to be active and advanced users (Financial Inclusion Insights, 2018b).

Digital Finance Awareness

Access to mobile phones more generally do not necessarily lead to the awareness or usage of any digital service or application. Although mobile phone ownership is high, 82% of people over the age of 15 do not use mobile money. A lack of awareness of mobile money and its usefulness is a major obstacle to financial inclusion in Bangladesh. 41% of mobile money non-users say they do not know what mobile money can be used for (Financial Inclusion Insights, 2018b). This lack of awareness also translates into a lack of demand. 54% and 48% of adults in Bangladesh say they lack the need for mobile money or prefer to use cash respectively (Financial Inclusion Insights, 2018b).

Moreover, awareness of where to go for mobile money services is also a barrier in Bangladesh. 17% of the population do not know where the nearest mobile money agent is (Financial Inclusion Insights 2018a). Regarding more general digital banking services, 32% of the population does not know where nearest ATM is.

¹³ The five other services and their respective host countries were: M-PESA in Kenya, MTN in Uganda, Vodaphone in Tanzania, GCash in the Philippines, and easypaisa in Pakistan

Digital Finance Ability

Only 9% of adults in Bangladesh have complete ability to perform a digital financial transaction and 7% have only 'some ability' to do so. Meanwhile, 78% of people have no ability to perform mobile financial transactions¹⁴ (Financial Inclusion Insights, 2018b). Along with ability to navigate digital device, effective use of digital financial services requires users to be financially literate. A survey in 2017 showed that only 29% of adult population in Bangladesh are financially literate (Financial Inclusion Insights, 2018a). Moreover, there are two sides to every transaction. 13% of mobile money users in Bangladesh have come across a mobile money agent that did not know how to perform a transaction (Financial Inclusion Insights, 2018b).

Digital Finance Agency

As mentioned earlier, social norms offline often lead to women being less likely to use digital technologies. This is also often true for specific applications and services which rely on digital technology such as mobile money. The Financial Inclusion Insights (2017b) programme found that non-users (both male and female) tend to have less influence, voice, and autonomy on personal and household financial decisions than advanced users. Whereas only 19% of female non-users (and 43% of male non-users) report having almost all influence on final decisions on household spending, 37% of female advanced users and 61% of male advanced users report the same. Thus, being an advanced mobile money user is correlated with greater financial autonomy.

Moreover autonomy increases for both men and women as they go through the 'user journey' from non-user, to unregistered user, to registered user to advanced users. However, the gender gap in financial autonomy between men and women remains significant at all stages suggesting that becoming an advanced user of digital financial services on its own does not close the autonomy gap between men and women. 'Progress on the customer journey from unregistered to advanced user is empowering for both men and women, but does not reduce the power differentials between genders the gender gap ... is no smaller for advanced than for unregistered user' (Financial Inclusion Insights, 2017b: 56).

Negative attitudes towards women having the autonomy to run errands and to handle their own finances can also act as a barrier for them accessing mobile money even after women are provided with autonomy by their immediate social circles. At least 12% of mobile money users in Bangladesh have reported coming across a mobile money agent that was dismissive of women (Financial Inclusion Insights, 2018b). This figure includes both female and male respondents. Thus, this stat is likely to under-represent the prevalence of mobile money agents discriminating against women because male respondents may be less likely to notice mobile agents being dismissive of women.

Access to digital finance in Bangladesh, like in other places, is gendered. Men are more than twice as likely (25 vs 11%) to be mobile money users (Financial Inclusion Insights, 2018b). This gap mirrors but is significantly larger than the gender gap between users of formal banks of 24 vs. 20% (Financial Inclusion Insights, 2018b). Women in Bangladesh less likely to use mobile money both through their own registered accounts and via the accounts of other people

¹⁴ This figure adds the 61% who said they had no ability with the 17% who said they did not know if they had the ability given the latter group likely has no experience doing so

(Financial Inclusion Insights, 2018a). They are also less likely to use it for the range of activities that mobile money can be used for, both basic and advanced. Whereas 15% of men in Bangladesh use mobile money for basic activities (depositing, withdrawing, and transferring money), only 6% of women do. Women (2%) are also less likely to engage in more advanced digital finance activities like borrowing, saving, insurance, etc. than men (5%) (Financial Inclusion Insights 2018b).

Along with gender, mobile money inequalities mirror other forms of oppression, specifically those relating to poverty and geography. Rural residents and people living below the poverty line are also less likely to be non-users than urban residents and people living above the poverty line. Moreover, trends show that rural residents (72%) and people living below the poverty line (76%) disproportionately make up unregistered mobile money users in Bangladesh (Financial Inclusion Insights 2018b). Furthermore, poorer and more marginalized users are less likely to use mobile money for more diverse and advanced financial activities. The percentage of adults using mobile money for advanced activities in urban areas (6%) is double the percentage in rural areas (3%). Likewise, 12% of people in urban areas access advanced services via a bank while only 7% do in rural areas.

5. e-Health

SDG 3.8 calls for universal health coverage ‘including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all.’¹⁵ Due to their rapid spread in lower and middle income countries, digital technologies, especially mobile phones, are seen as a potential tool for achieving universal health coverage. Digital technologies provide the opportunity to strengthen health systems through improving the management of health facilities and programmes, the flow of information and advice to patients and health workers and enhancing relationships between frontline health workers and highly qualified doctors (Bloom et al., 2017). Mobile health applications (known as mHealth) have been promoted as potential solutions to improve a range of health outcomes including but not limited to nutrition, infectious disease outbreaks, and immunisation tracking. mHealth applications typically involve the delivery of health information through voice channels (e.g. Interactive Voice Response (IVR)), text messaging (e.g. SMS) or through online content and apps (e.g. websites, Facebook or WhatsApp) (GSMA and Frog, 2017). Due to the actions afforded by digital technology, mHealth is expected to reduce health care delivery costs and burdens on existing health infrastructure (GSMA and Frog, 2017).

However, reviews show that very few digitally enabled health services successfully scale (Agarwal et al., 2016). Success, where it does exist, has been concentrated in interventions addressing narrow (rather multifaceted or systemic) health issues (e.g. improving the timeliness of routine immunisation). Only a few interventions have been shown to lead to improved decision making by the public or health workers. Very few e-health have been able to achieve impact on health services and outcomes at scale (Agarwal et al., 2015; Aranda-Jan et al., 2014; Bloom et al., 2017; Free et al., 2013a; Free et al., 2013b; Hall et al., 2014; Lee et al., 2016).

¹⁵ <https://www.who.int/sdg/targets/en/>

Similar to digital finance, m-Health has been put on the national agenda in Bangladesh through its inclusion in the country's ICT policy 'Vision 2021 Digital Bangladesh.' This is reflected in the prevalence of m-health projects in the country. According to GSMA's mHealth Tracker, there are currently at least 23 mHealth initiatives in Bangladesh (including initiatives both in the planning and deployment phases) as of April 2019.¹⁶ Despite a lack of evidence on the effectiveness of mHealth more generally, there are signs of mHealth users in Bangladesh extracting gains from them. Khatun et al. (2016: 51) found that villagers in rural Bangladesh that use mHealth services report benefitting from them: 'Participants who used mobile phones for healthcare were considerably enthusiastic of the concept, and were attracted by the speed and easy access through which they can contact medical expertise during an emergency and outside the usual health provider hours of business'. They found that mHealth users in rural Bangladesh see it as a source of easy access to qualified doctors in places where there are a shortage of them. It is also seen as a cost saver (both consultation fees and transport fees) and time saver. Participants expressed that mHealth could be especially beneficial for the poor in rural Bangladesh.

However, mHealth users tended to be the more educated and wealthy. Participants expressed concern that although the poor stand to gain the most from mHealth, the poor may be less able to benefit from mHealth because of a lack of access, and language and digital literacy (Khatun et al., 2016). As the rest of this section will show, although digital technologies can be leveraged to improve health coverage in Bangladesh, many people still face significant barriers. The Universal Health Coverage movement seeks to target the poor and marginalised, the same groups that are also less likely to be included digitally. Whilst poor people increasingly own and use digital technology, for the most left behind communities, digital technology as a means for health coverage can be like trying to transport medical supplies by truck to a rural village not served by roads. Until the universal digital coverage goal is met, the contribution of digital to the UHC goal will remain limited unless we simultaneously find ways to cover those that remain offline.

e-Health Availability

'Infrastructure is one of the principal challenges to scale and sustainability of mHealth initiatives ... especially with regards to network coverage, supply of electricity, and Internet access' (Evans et al., 2018). A lack of access to electricity can act as a hinderance to access to mHealth if users are unable to charge their phones. Moreover, infrastructure and its reliability may vary between and within different places in the same country meaning that a one-size-fits all m-health solution is unlikely to be effective everywhere. mHealth initiatives have the best chance of succeeding when they account for differences in regards to the technologies and devices used (Evans *et al.* 2018).

As mentioned earlier, network coverage is not binary. Although users with intermittent or spotty access should be able to get their messages eventually once they enter a place with coverage or their coverage returns, intermittent access can be a hinderance to registering to mHealth services in the first place. GSMA and Frog (2017) suggest that even when users are technologically savvy and literate, network outages or connection errors could mean that their mHealth registration fails. In their experience users will only try to register up to three times and then give up. Because of this, they recommend having staff members visit people to sign them up in person ensuring that any further technical difficulties will be taken care of as well as helping

¹⁶ <https://www.gsma.com/mobilefordevelopment/m4d-tracker/mhealth-deployment-tracker/>

less tech savvy users register. Similarly, Agarwal et al. (2015) found that poor network reception is common challenge for frontline health workers participating in mHealth service initiatives.

Although, some mHealth services utilise features supported by basic mobile phones like text messages and Interactive Voice Response (IVR), Internet enabled devices are needed to access many e-Health services that run on websites or apps. As mentioned earlier, although 74% of people in Bangladesh own mobile phones, only a small percentage (13%) of people in Bangladesh use the Internet and only 18% own smartphones.¹⁷ This means that the majority of the population in Bangladesh would currently be unable to access digital health services requiring Internet access or a mobile App. When mHealth services are designed only for the ICT upper class, the poor and marginalised are left behind. Tariq and Durrani (2018: pg. 20) suggest that mHealth initiatives should design for devices that people in the context are already using. 'if the devices are similar to the type of phones that the [user] already possess, higher adoption rates may be more achievable.' This sentiment is echoed by other scholars (Evans et al., 2018). Unsurprisingly, an mHealth study in rural Bangladesh, found that most people used basic phones without Internet capabilities (Khatun *et al.* 2016).

Moreover, some mHealth applications utilising 'frontier technologies' are only available on more powerful devices like smartphones and computers connected to the Internet. However, chatting to these bots requires the user to own a smartphone or computer capable of accessing messaging apps and Internet data putting them out of the reach of most people in Bangladesh where smartphone ownership and Internet connectivity is low. The same can be said about telemedicine initiatives seeking to use Artificial Intelligence to filter patients with mild illnesses that do not require hospital visits (GSMA and Frog, 2017). These services are not yet available on basic and feature phones.

As mentioned in the connectivity section, availability of relevant content in one's local language is often a barrier for Internet uptake (Roberts and Hernandez 2019). Khatun *et al.* (2016) found that many people in rural Bangladesh struggled understanding mHealth messages because they were in English, a language they didn't have sufficient proficiency in. Moreover, many people struggled to respond to messages that required them to use the English alphabet rather than an alphabet they were already familiar with. Similarly, Pitaloka (2018) found that mHealth messages in Indonesia often contained words in both the local language and English with users often being expected to understand technical health terms in English. Similar to how a lack of content available in one's language can act as a barrier to using the Internet in general, this is also true for chatbots. Languages spoken by Chatbots seem to mirror languages for which content is available online. 90% of Facebook Chatbots speak English.¹⁸

Moreover, some mHealth applications have made the mistake of promoting that their users take actions that are unavailable to them. For example, mNutrition applications may suggest that users eat food or buy a product that is not available in their local area (GSMA and Frog, 2017). Moreover, a survey of rural mHealth users in Bangladesh found that mHealth doctors sometimes

¹⁷ This figure was arrived at by multiplying the percentage of people who own mobile phones (74%) by the percentage of mobile phone owners that own smartphones (24%)

¹⁸ <https://venturebeat.com/2017/07/19/the-10-languages-chatbots-are-most-likely-to-speak/>

prescribe medicines over text message that are not available in the user's local vicinity (Khatun *et al.* 2016).

As mentioned earlier, some users can only access devices through borrowing rather than having access to their own device. The effects of sharing on usage patterns by borrowers has been analysed. Girls that borrow phones are less likely to use them for a diverse set of activities including to seek health advice (Girl Effect 2018).

e-Health Affordability

Even when users have access to a free or affordable m-health application and can easily understand the information being shared and recommendations the service makes, acting upon that information may be cost prohibited for the user to benefit from the recommendations (GSMA and Frog, 2017). For example, the application may suggest that the user eat more expensive food regularly.

The evidence base for mHealth data entry being more cost effective than paper based systems is still insufficient (Evans *et al.* 2018). For frontline health care workers, inputting digital data can often take longer than inputting data into paper which adds time needed for health care workers to complete their jobs, often without extra pay (Agarwal *et al.*, 2015; Tariq and Durrani, 2018). Tariq and Durrani (2018) found that the need to work overtime to input data without pay may led many female health workers in Pakistan to decide to switch job sites. Moreover, others have found that frontline health workers who do not see gains in efficiency from using mobile phones are more likely to disengage and lose motivation at later stages of the project (Evans *et al.* 2018). Moreover, being responsible for expensive devices that can cost more than a month of a health-workers pay can add new stress for frontline health workers. In Pakistan some even worried that family members with drug addictions might steal their devices for drug money (Tariq and Durrani 2018).

m-Health and e-health Initiatives tend to depend on donor funding which is unsustainable in the long-run (Bloom *et al.* 2017). Rather than a primary source of funding, GSMA and Frog (2017) suggest that donor funding should be approached as seed funds with mHealth applications seeking to establish [at least three] other funding channels to ensure sustainability. Establishing to what extent mHealth initiatives in Bangladesh are dependent on donor funding is beyond the scope of this literature review, but is something that should be looked into.

e-Health Awareness

A household survey of 800 households by Bloom *et al.* (2017) involving mainly lower income households showed that very few poor people in Bangladesh are aware of websites where they could seek health information or of SMS based health messages. On the other end, college students in Bangladesh—a group of the population that is more likely to come from more privileged backgrounds, be literate, and own mobile phones, and thus belong to the ICT upper class—were shown to be active users of the Internet for health information, particularly for sexual health information (Waldman *et al.* 2018). Similarly, Khatun *et al.* (2016) found that awareness of mHealth and its potential benefits in a rural village in Bangladesh were limited to the better off: the highly educated, community leaders, and healthcare providers. Meanwhile, community members with no or little formal education were found to have no awareness of existing mHealth initiatives. Similar to findings from the connectivity section, the study found that only the better off were aware of text messaging, a mobile phone activity that is often a prerequisite to engage in

mHealth. 'Only educated people and students were aware of text messages and frequently communicated with text messages' (Khatun *et al.* 2016: pg. 52). Moreover, mHealth awareness was found to be gendered with rural women being the least likely to be aware of mHealth services (Khatun *et al.* 2016).

Moreover, awareness can be an issue for designers of mHealth initiatives as much as users. Some mHealth initiatives have failed to consider how external—mainly western—concepts of health, medicine, and nutrition may be at odds with the beliefs and practices of the people they are targeted to. In some cases, a concept or similar word (e.g. Nutrition) may not exist in a specific language or culture (GSMA and Frog, 2017). Thus, designers and implementers of mHealth solutions must make sure they understand the context as much as possible including how people think about the issue, what people currently do about it and why. This requires spending time with users and having frequent contact and feedback from them. Furthermore, mHealth messages are typically written by external health experts living far away from target recipients with a limited understanding of local languages, dialects, regional nuances in language, or how widespread use of technical terms (e.g. calories) may be. Framing messages in ways that targeted audiences can understand can be challenging (GSMA and Frog, 2017). To overcome this barrier, it is necessary to test content with users involving them in the creation of content when possible and to never assume that users will understand any given message.

e-Health Ability

As mentioned earlier, a lack of language literacy—the ability to read and write—can be a barrier to effective use of digital technology. Khatun *et al.* (2016) found that rural Bangladeshis typically did not open their text messages or deleted them because they were unable to read them. Some respondents emphasised that they only know how to make and receive phone calls. Thus participants said they preferred to receive audio messages. The inability to read messages is especially an issue when messages are received in English. Moreover, health care providers surveyed were concerned that illiterate mHealth users may be unable to understand the name of the medicine they have been prescribed via text message (Khatun *et al.* 2016). Moreover, registering to an mHealth initiative can be difficult for users, especially those that are less technologically savvy (GSMA and Frog, 2017). GSMA and Frog (2017) suggest that in person registration should be used as an opportunity to introduce users to different features of the mHealth application and to teach people how to use it.

Frontline health workers [and users] with low literacy or writing skills are likely to have trouble with mHealth applications that are text heavy (Agarwal *et al.* 2015). Tariq and Durrani (2018) found that in a similar context—one where basic phones were most prevalent— female health workers had trouble adjusting to touch screen data entry keypads. Older people are less likely to have the digital skills necessary to make effective use of mobile phones (World Bank 2016). Tariq and Durrani (2018) witnessed a situation where an elderly female frontline health worker transferred health sites because of her lack of comfort with using a mobile device for data entry.

Even when frontline health workers own their own mobile phones and are able to use it effectively in their daily lives, this does not mean that these skills will necessarily translate to health worker being able to effectively use mHealth applications (Evans *et al.* 2018). Further training may still be required. A systemic review by Agarwal *et al.* (2015) found that when given proper training, frontline health workers were able to learn how to use mobile phones when provided. The amount of time required for training ranged from hours to a few weeks depending

on the front line health workers existing digital literacy and the scope of the m-health initiative. Training for frontline health workers may include an introduction of the functions of mobile phone, be provided with pictographic instructions on how to use mobile phones, be taught how to use accompanying software, and how to address technical difficulties when they arrive. Training of Frontline Health Workers has been shown to significantly decrease error rates in data entry. However training frontline health workers to implement mHealth interventions can often be a challenge in itself and often goes under-budgeted or not given sufficient time (Agarwal *et al.* 2015).

e-Health Agency

As mentioned earlier, social norms can affect whether or not marginalised groups of people have access to technology and what is seen as acceptable behaviour for them once they are connected (Croxson and Rowntree 2017; Girl Effect 2018). In a study of e-health initiatives in Bangladesh, Bloom *et al.* (2017) found that access to mobile phones mirrored gender relations and power dynamics within households. Women in Bangladesh often had their access to phones mediated by their husbands or fathers who also had control over their finance and social interactions with the ultimate result of limiting access to health information for women. As mentioned earlier, Khatun *et al.* (2016) also found that women were the least likely to be aware of mHealth services

GSMA and Frog (2017) suggest that mHealth interventions should be developed using user-centered design principles with ethnographic studies and/or interviews being carried out to learn how mHealth target audiences currently receive information, access services, experience the issue being tackled, and how they access to and use technology. Moreover, they suggest mHealth interventions design must go beyond understanding individuals but also understand how those individuals may fit into power relations in their environment, which actors in their community are most likely to be trusted sources of information or influence their decisions, and any social or cultural beliefs that may hinder behavioural change. Understanding the target user's context is especially important when they have little autonomy. 'Especially in rural settings, women often do not have access to mobile phones. They might not own a phone, be illiterate, or do not have the skills to use a phone. In these cases, they will rely on their husband, family or community to pass on information. When engaging only the intended target audience, and not all of the people who can contribute to behaviour change, it is unlikely that actionable change will occur' (GSMA and Frog 2017 pg. 25).

Moreover, gender norms can act as a barrier to female health workers trying to implement mHealth initiatives.

In many lower and middle income countries, citizens often do not trust the healthcare system or are may not be accustomed to relying on external health information. In some places, people have even encountered fake drugs in government clinics (GSMA and Frog, 2017). In these cases, previous experiences with ineffective, and even dangerous, healthcare in general may lead potential mHealth users to distrust in any outsiders approaching them with health advice. Meeting potential users face to face in the early stages (especially registration) is proposed as a way to build trust in such environments. Some of these concerns were echoed in a mHealth Study in rural Bangladesh. Some participants did not trust that the doctors they spoke to over the phone and those providing medicine prescriptions via text messages when using mHealth services were indeed qualified doctors and thus preferred to meet doctors face to face (Khatun *et al.* 2016).

On a positive note, participants in a mHealth survey in rural Bangladesh expressed that mHealth could make it easier for women speak to doctors about issues that may otherwise be taboo (e.g. sexually transmitted diseases and diseases related to the female genital tract) to speak to a male doctor face to face about (Khatun *et al.* 2016). However, given that social norms may negatively affect the agency of women to be connected and subsequently to use mHealth applications, the poorest and most marginalised women in Bangladesh are at risk of falling behind women with more agency in terms of having access to information concerning their health and even treatment.

6. Online Education

Students in Low and Middle Income countries are relatively disadvantaged compared to those in high income countries due to a shortage of good teachers and physical schools as well as prohibitive costs (travel, textbooks, uniforms, learning materials, etc.) to schooling. Some argue that the cost of traditional education is rising whilst, online Learning provides the opportunity to improve access to education in Low and Middle Income Countries while decreasing costs related to attaining (e.g. books, room and board, etc.) and providing (e.g. wages, physical space, administrative and utility costs, etc.) an education (Ally and Samaka 2013; Oluwatobi and Olurinola 2015). Moreover, they make the case that online education presents an opportunity to level the playing field by requiring fewer (if any) teachers and decreasing the need to visit a physical school and providing education free of charge (Ally and Samaka 2013). This section covers barriers to online education uncovered from a review of three types of online education initiatives: Massive Online Open Courses (MOOCs), mLearning, and Open Educational Resources (OER).

Massive Online Open Courses (MOOCs) are courses offered over the Internet to anyone who wishes to take them free of charge or for a very small fee (Liyanagunawardena and Aboshady 2017). Some MOOC platforms like Coursera and edX provide learners the opportunity to take a series of related courses that allow the learner to show mastery of the subject such as Coursera's 'Specializations' and edX's 'XSeries'. Along with being a potential source of high quality education from instructors from some of the world's top universities, MOOCs have been promoted as a tool to help equip the masses with knowledge on how tackle complex development problems and help equip learners with tools to respond to humanitarian emergencies (Liyanagunawardena and Aboshady, 2017). One MOOC titled 'Understanding the Ebola Virus and How You Can Avoid It' on Alison.com was translated into several languages and was used as part of a rapid response to train tens of thousands of people quickly about the emerging Ebola crisis including health workers (Liyanagunawardena and Aboshady 2017). Khan Academy is a famous free and open online learning platform for all ages that resembles a MOOC where learners can watch instructional videos, complete practice exercises, and access a personalised learning dashboard allowing them to study at their own pace.¹⁹ Grameen Phone and the Agami Education Foundation have partnered to translate Khan Academy's online online

¹⁹ <https://www.khanacademy.org/about>

personalised education tools (courses, lessons and practice) into Bangla and localise the content for learners in Bangladesh.²⁰

M-learning refers to the use of 'handheld technologies and mobile phone networks to 'facilitate, support, enhance and extend the reach of teaching and learning' et al., 2011). M-learning could prove particularly useful for users that are unable to visit a physical school or for whom a quality education is unattainable where they reside. For example, UNESCO (2018a) argues that mLearning may be a promising face to face educational compliment for refugees, especially those facing trauma and mental health difficulties. However, despite all its hype, there is a lack of evidence of effective m-Learning in practice with most reports and articles being descriptive or promotional (Pouzevara, 2015). Bangladesh Open University is among the increasing number of higher education institutions attempting to leverage m-learning to increase access to education. 'Recently BOU has developed mobile set compatible memory cards containing e-books and audio-visual materials for the learners. BOU have uploaded nearly 400 textbooks in the form of e-books of almost all its academic programs. It also developed multiple mobile apps and educational webpages for the learners as learning tools' (Islam and Numan, 2016: 1). This approach builds on their existing Open and Distance Learning (ODL) model which is meant to widen access to education for people with limited access to conventional education which they argue has the greatest impact for women and girls. Along with this initiative, BOU already makes all its learning materials available online in pdf format on its website and also uploads its audio and video programs to its website and YouTube channel.

OERs (e.g. education repositories) are free learning resources made available in the public domain that can be adapted, modified, or re-used by teachers to improve teaching or develop new courses. Although it was suggested that these resources would disproportionately benefit students in Lower and Middle Income Countries since they have more to gain from them, Gunawardena (2014) argues that OERs may contribute to increasing social divides due to access to barriers and a lack of relevant content for people in the global south. 'Poor people now have not only poor face-to-face education, but also poor access to high quality online courses and information' (Quote by Dutra de Oliveira Neto in Gunawardena 2014). There are now concerns that OERs may 'reinforce global, regional and national economic and social inequalities through a digital divide that benefits those with educational and technological access and skills, while bypassing those without' (de Oliveira Neto et al., 2017: 71). As the text in this section will illustrate, accessing these resources often requires a level of access to technology, disposable income, awareness of online educational resources, digital capacity and agency that not all teachers in Lower and Middle Income Countries countries enjoy. Moreover, similar trends have been uncovered for MOOCs, mLearning, and Online education more generally.

Unless the barriers below are reversed, online education may continue to mainly benefit better off students, the already educated and the highly connected despite visions that OER, MOOCs, and m-Learning would disproportionately serve the poorest and most vulnerable who otherwise lack access to quality education (Hillier, 2018).

²⁰ <https://www.grameenphone.com/about/media-center/press-release/khan-academy-now-available-bangla>

Online Education Availability

Access to hardware (computers, laptops, mobile phones, etc.) and connectivity (Wifi and mobile broadband) have been identified as necessary but insufficient for teachers in the global south to utilise OERs in the classroom (de Oliveira Neto *et al.* 2017). A lack of electricity in Rural Bangladesh and intermittent access to electricity in most cities in Bangladesh has already been identified as a barrier to introducing ICT in rural classrooms (Khan, Hasan and Clement 2012). Lack of reliable power in schools can also act as a hindrance to the use of OER by teachers (Mtebe and Raisamo 2014).

It was previously noted that the majority of students in MOOCs were from developed countries (Liyanagunawardena, Williams and Adams 2013). However, this seems to be slowly changing at least for some MOOC platforms. In 2017, 45% of the 24 million students using Coursera's platform were from Lower and Middle Income Countries (Cheney 2017). Many MOOCs are offered by instructors from top universities (e.g. MIT and Harvard) like the ones on Coursera or Edx. Although these courses are online, they are largely based on traditional classroom learning and thus heavily rely on video lectures followed by interactive quizzes or self-tests and provide students with the space to socially collaborate with others taking the course. Because they are data intensive, these courses are only fully available to users with high and stable bandwidth and more powerful devices like smartphones, tablets or laptop/desktop computers, which are often unavailable and unaffordable for people in Lower and Middle Income Countries, especially the poor and people in remote areas (Hori *et al.* 2016). Only 4% of people in Bangladesh aged between 15 to 65 owns a laptop or desktop (LIRNEasia 2018), and tablets account for just 1% of all web traffic in Bangladesh (We are Social 2018). The tools necessary to have a decent MOOC experience are not available for most people in Bangladesh. Coursera and other MOOC platforms have improved their MOOC completion rates—especially in Lower and Middle Income Countries countries—by creating a mobile App version of their platforms that can run on smartphones (Cheney 2017). Yet Basic and feature phones still dominate in Bangladesh. Smartphone penetration in Bangladesh is just 18%²¹ putting people in Bangladesh at a disadvantage regarding their ability to access and complete MOOCs.

Currently, most OERs are in predominately English (Ally and Samaka 2013; Liyanagunawardena and Aboshady 2017). Similarly, most MOOCs are delivered in English. English is not widely spoken in Bangladesh. Bangladesh received a 'low proficiency' score and ranks 63rd out of 88 countries ranked by English First (2018). The poor and most marginalised are even less likely to speak English. This was one of the factors that led Grameen Phone and Agami Education Foundation to begin translating and localising Khan Academy—A MOOC-like website/online platform—for a Bangali audience. However, a glance at the Bangla version of the platform shows that the process has been slow. Only a fraction of the subjects covered in the English version of Khan Academy are available. At the time of writing, it only included two overarching subjects: Mathematics and computing compared to the English version's seven.²²

Northrop (2018) argues that Although a UNESCO report suggests that mobile phone use promotes literacy in itself (West, Chew and UNESCO 2014), research suggests that mobile

²¹ This figure was arrived at by multiplying the percentage of people who own mobile phones (74%) by the percentage of mobile phone owners that own smartphones (24%)

²² <https://bn.khanacademy.org/>

technology is not a silver bullet solution or a supplement for educational recourses but rather a tool that can help achieve educational outcomes if combined effectively with the availability of other tools in schools such as physical and logistical infrastructure, appropriate content (in the right language and knowledge level), teachers with the skills necessary to make use of digital tools, and interactive child-centered learning methods (Northrop 2018). As Toyama (2015b) argues ‘technology’s primary effect is to amplify human forces, so in education, technologies amplify whatever pedagogical capacity is already there’. The ability for technology to amplify human forces positively will be challenging places marred by poor attendance (by students and teachers), unreliable electricity, high teacher turnover rates, and low budgets (Northrop 2018). Northrop (2018) argues that although mLearning has the potential to provide marginalized youth and women in Lower and Middle Income countries with materials that are necessary but insufficient to learn to read and write, physical books and textbooks are likely to remain necessary—but insufficient—supplements in places where mobile penetration is low.

People who are physically impaired or disabled may find it difficult to engage within mainstream mobile education unless they are designed to include assistive technologies (e.g. accelerometers, voice recognition, dictation tech, text to speech, etc.) (Asabere 2013). More work is needed to understand how inclusive online education initiatives are of people living with disabilities globally and in the Bangali context.

Online Education Affordability

Even if content on an E-Learning platform is free, users are likely to incur costs to access the platform in the first place. Online education requires access to devices and access to the Internet, thus affordability can be a key barrier to acquiring the pre-requisites for participation. Even when users have access to devices and can afford data, they may choose not to use digital technology for educational if it requires them to pay. Hussin et al. (2012) found that university students in Malaysia were welcoming of the idea of using mLearning, but did not want to incur personal data fees in doing so.

Although it is free to audit many MOOCs. Most MOOC platforms are for-profit and charge fees for certifications. Moreover, although some platforms claim to provide financial Aid for those in need²³, it is unclear to what extent they are provided to people in Lower and Middle Income Countries and to what degree people in Lower and Middle Income Countries—and the poor—are aware of and apply for it. Although MOOCs are in theory free to audit, wealthier people enrol and complete MOOCs at higher rates than less wealthy people even in the same country (Kizilcec, Saltarelli, Reich and Cohen 2017). Thus, poorer people, especially those living in Lower and Middle Income Countries are being left behind from potential credential gains from MOOCs.

Although online learning is often presented as a cheaper alternative to traditional education, setting up an online learning system that includes a platform, a program, digital content, trained personnel, etc. from scratch can be very expensive. Online learning only becomes cost effective once the system is built when students can be added at marginal costs (Burns 2019). Moreover, Khan *et al.* (2012) argue that a lack of time of overburdened teachers is a major hindrance to the

²³ <https://learner.coursera.help/hc/en-us/articles/209819033-Apply-for-Financial-Aid-or-a-Scholarship>

introduction of ICTs in the classroom because they are often not provided with sufficient time to learn how to use ICT hardware or software or plan for its introduction.

Outside of the for-profit MOOC platforms, funding for mobile and digital technologies in schools tends to be short-term, sporadic and dependent on funds donated by private corporations or donor agencies. Northrop (2018: pg. 9) finds that although these funds provide the necessary seed funding for pilot projects, 'after the pilot phase ends, resources are usually not available to sustain the project.'

Online Education Awareness

Building an online education platform or app will not lead to any learning if users are unaware of it. As mentioned in the beginning of this section, Bangladesh Open University (BOU) has recently tried to distribute its learning materials via mobile memory cards and introduced apps and webpages for its learners. However, a survey found that 2/3rds of students and over 80% of tutors had never heard of the resources despite having favourable views on the use of mobile phones for educational purposes (Islam and Numan 2016).

Moreover, awareness of copyright and licensing requirements for using OER materials is a barrier to adoption for many instructors that are aware of OER and acts as a barrier for Scholars from the global south to share their resources with others as OER. Instructors who were aware of and agree with the 'Open movement' were most likely to embrace OER and use it in their teaching (de Oliveira Neto *et al.* 2017).

This review was unable to uncover any literature looking into the awareness of online education by the general population in Lower and Middle Income Countries and Bangladesh. However, the author was constrained in time. This topic requires further research.

Online Education Ability

Although some online education programs target illiterate users, most of them require users to read and write. Meanwhile many MOOCs are comparable to top tier university undergraduate and graduate courses in terms of difficulty. Thus, it is not surprising that the highly educated enrol and complete MOOCs at higher rates than people without formal education in the same country (Kizilcec *et al.* 2017).

Along with the ability to read and write, digital literacy is necessary to take advantage of online learning opportunities. Due to differing levels of digital literacy, online learning can give tech savvy learners an advantage over those that are not comfortable using digital technology. Moreover, a switch to mobile learning could add an extra burden to non tech savvy students and instructors who would be forced to both learn how to use digital technology and learn the material on the platform simultaneously (Asabere 2013). Hillier (2018: pg. 110) argues that 'Individual remote and unconnected learners face a chicken and egg problem for engagement with contemporary e-learning offerings. Without connectivity, remote learners have no way of engaging with now common ICT intensified learning materials that are intended to teach them how to engage in an ICT intensive world'. The chicken and egg problem is also apparent in the training of teachers since it is increasingly proposed that teachers leverage MOOCs to acquire digital skills to integrate ICTs into their classrooms (Hillier 2018; Laurillard 2014).

Moreover, online learning requires learners to learn in a new ways in which they go at their own pace, practice self-discipline, read and collaborate in forums, and are forced to be proactive. This mode of learning places 'Do It Yourself' (DIY) demands on learners that are not common in traditional classrooms (Burns 2019). It is not safe to assume that someone will embrace online learning environments just because they are digitally savvy and can read and write. Online learning requires time-management, self-regulation, and self-direction skills in addition to digital skills like reading and writing online, and an understanding of 'Netiquette' or online manners (Burns 2019). Even digitally savvy users may require training to adapt from traditional to online learning.

As mentioned earlier, the majority of MOOCs are in English making them inaccessible for non-English speakers to. Even if students have some level of English, non-fluent English speakers may be less able to participate in the forums that accompany the courses (Liyanagunawardena *et al.* 2013). English is not widely spoken in Bangladesh. Bangladesh received a 'low proficiency' score and ranks 63rd out of 88 countries ranked by English First (2018). Moreover, the poor and most marginalized are less likely to speak English.

A Lack of teacher ICT skills often holds them back from incorporating OER in the classroom (Ally and Samaka 2013). For example, Mtebe and Raisamo (2014) found that many higher education instructors in Tanzania who were aware of OER lacked the skills and knowledge to access and make use of it. Research suggests that at least an intermediate level of digital literacy is necessary for teachers to adopt OER. de Oliveira Neto *et al.* (2017) found that instructors with only basic digital literacy were significantly less likely to incorporate OER materials into their teaching than those with intermediate and advanced digital expertise across 9 countries in South America, Sub-Saharan Africa, and South and South East Asia.

Online Education Agency

Along with relying on technologies that may be inaccessible to the poorest and most marginalized and people living in remote areas, MOOCs also suffer from a lack of relevant content for Lower and Middle Income Country contexts (Hillier 2018). The majority of OER materials are created in Western countries and thus their application may not be relevant in other contexts. In a study of Higher Education teachers in Tanzania, Mtebe and Raisamo (2014) found that most teachers had trouble finding OER content relevant to their context. Similarly, although universities in the Global south are increasingly developing MOOCs, most MOOCs are still created in developed countries. 'In order for online education to realize its full potential in the Lower and Middle Income Countries, there must be a shift away from the narrative that the Global North is the teacher and the Global South is the student' (Cheney 2017).

Online education and education delivered through technology more broadly (E.g. television and radio) has a history of being technocentric (Pouezevara 2015). Although mLearning can be feasible for those with mobile phones from a purely technological standpoint, pedagogical approaches that are appropriate for learning on mobile phones have lagged behind. Although 'culture affects how individuals think, act and behave in the e-learning environment, ... e-learning systems [tend to] lack cultural features' as well as features that take into account diversity among students (Chukwuere 2018 pg. 11). Pouezevara (2015) argues that m-learning may be at odds with cultural norms in some context around learning as a communal, collaborative or collective endeavour rather than something that happens individually or with values regarding information sources (e.g. elders as key sources of knowledge). Studies already show that dropout rates for online learning courses are very high (between 40 to 60%) (Burns 2019). Studies suggest that

one of the greatest predictors of drop-out rates is whether students feel they receive enough support from their instructors and course mates.

‘Few if any reforms can succeed without accommodating their impact and imprint on student learning needs and styles, teaching, school culture and climate, and administrative practices. Thus, it has long been considered inadvisable to simply implement an exciting technology in a classroom without helping teachers understand how to maximize its use, teaching students about its capabilities, adapting materials to the local context, and engaging families and communities. Yet that has been the trend for nearly 20 years, as millions of computers, laptops, and tablet programs have been left at schools’ doorsteps.’ (Northrop 2018: pg. 2).

Acumen+—a MOOC platform that focuses on tackling poverty—makes sure to source its case studies from a range of cultural contexts so that students taking their courses are more likely to relate to them. Moreover, Acumen+’s MOOCs are project based rather than lecture-based giving students the space to adopt what they learn to their own contexts (Cheney 2017).

Unfortunately, much of the thinking about online education has thought of it a top down endeavour where learning content is produced far away from users by teachers that have no exposure to the students they are reaching. For example, a well cited paper by Ally and Samaka (2013) argued that

“a lesson on mathematics can be developed and validated by experts at one educational organization and placed on the Internet for everyone to access rather than having millions of teachers around the world developing the same lesson. Having many teachers developing the same lesson topic is a misuse of human resources and a waste of teachers’ time.’

Designers of mobile learning initiatives that cross cultural boundaries need to take special care to accommodate cultural differences between themselves and and learners (Farley and Song 2015). Similar to mHealth initiatives, online education initiatives should be designed *with* users rather than *for* them.

Self-esteem has been shown to affect MOOC usage and engagement in MOOC discussion forums. Kizilcec *et al.* (2017 pg. 251) found that citizens from LDCs seeking to learn using MOOCs ‘may suffer from the cognitive burden of wrestling with feeling unwelcome while trying to learn and, therefore, underperform. This can be exacerbated by social identity threat, which is the fear of being seen as less capable because of one’s group’ even though the environment has little social interaction.

Men are much more likely to use their mobile phones for reading than women (West *et al.* 2014). Beyond this finding, this report did not uncover further evidence of a gender bias in Online. However, it is likely to exist, especially in Bangladesh. Further research is needed.

7. Recommendations

Build offline channels to go along with the online: The Barriers to digital services in Bangladesh are acute and the poorest and most marginalized are most affected by them. Services that are only available digitally threaten to leave these groups further behind. DFID

funded programmes have already shown that building multiple channels including both online and offline channels improves inclusion of interventions (Feedback Mechanisms 2016).

Remember, digital access is not binary: Approaching digital access as binary does policy-makers a disservice as it blinds them from what happens after access—how mobile phones and the Internet are actually used. This report uncovered that digital inequalities in Bangladesh are not well represented by neat divisions between users and non-users. Getting people connected is only part of the battle. Once connected, people may continue to face barriers that hinder them from making greater use of digital technologies or to use specific digital services.

There is no one-size fits all solution to tackling barriers to digital services. This report has shown that although there is significant overlap between barriers in all digital services, each type of digital service also has its own unique barriers. Thus, it is important to also analyse barriers for specific services rather than just connectivity. Doing so would improve the capacity of development actors to design for inclusion.

Human development becomes more important but may come before rather than after technology for those excluded. Report after report and study after study find that the same groups at risk of being left behind more generally (the poorest, women, the less educated, ethnic minorities, people with disabilities) have most to gain from the opportunities offered by digital services but also are the least likely to be able to access and thus gain from them (Hernandez and Roberts 2018; ITU 2017; UNDP 2016; United Nations 2018; World Bank 2016, 2019). The very nature of them being poor or marginalized makes people more likely to face the barriers uncovered in this report and remain excluded from the gains of an increasingly digital world. Thus, it becomes increasingly important that human development is prioritised over digital development rather than simply seeking to improve human development through digital services

Building the agency of the most marginalized will be required to ensure no one is left behind by the spread of digital services. Agency was found to be a significant barrier to digital technology access and to digital service access, especially for women and girls. Along with human development, improving the reach of digital services and minimizing the risk that the most marginalized may be left behind will require development actors to seek to empower those most at risk of being left behind alongside efforts to remove barriers to digital adoption.

Areas of further research:

This report did not find much data on disability and barriers to digital services. The researcher was unable to find any literature that covered how disability affects barriers to digital services in Bangladesh. This could well be because the research was small scale (just 11 days). Further work is needed to uncover how people living with disabilities experience barriers to digital service

exclusion. Ideally, future work in this areas should unpack how people living with different types of disabilities may experience barriers to exclusion differently.

The Rhoningya crisis has relocated over 900,000 refugees in Bangladesh since 2017.²⁴ The barriers faced by refugees are likely to be different from the general population due to displacement as well as coming from contexts with different cultures and socio-economic structures and being more likely to live in remote camps. More research is needed to understand the unique barriers faced by Refugees.

This report was unable to identify literature on how different groups of people (e.g. gender) experience barriers to online education differently beyond findings that are directly linked to how groups experience barriers to connectivity more generally. More work is needed in this area as the other sections of the report illustrate that different groups are likely to experience barriers different, especially by gender. This report was limited in scope and budget and it may be the case that the literature already exists but was not identified by the author.

The barriers uncovered in this report are meant to be illustrative but not exhaustive. This report was limited to 11 days of secondary research and thus may have missed some key barriers. Primary ethnographic research would improve the chances of uncovering barriers further.

Extrapolability of findings to different contexts

This report was written for Bangladesh, but many of the findings are likely to resonate with other Lower and Middle Income Countries. The findings from this report could therefore be used as a guide development actors in other places in uncover barriers to digital services. However, barriers to access and their severity are likely to differ from countries to countries, and even within countries. When extrapolating these findings to other contexts, it is advisable to verify whether these barriers are also present in the given context as well as how prevalent or significant these barriers are in the given context as this is likely to differ from place to place. Moreover, development professionals working in Bangladesh are encouraged to further contextualize these findings since there are likely to be differences within the country too (e.g. between urban and rural areas, between refugee camps and the rest of the country, and between different social groups). For example, this report uncovered that although lack of identification does not seem to be a significant barrier to obtaining a sim card in Bangladesh in general, this barrier seems to be felt more strongly by some users at high risk of being left behind. Non-mobile money users and adolescent girls (likely a lot of overlap here) cite lacking necessary identification as a significant barrier for mobile money adoption.

²⁴ <https://data2.unhcr.org/en/documents/download/69422>

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