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Providing mHealth Solutions in the Rural Communities of Bangladesh during the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic is affecting worldwide; likewise, other least developed and developing countries, Bangladesh needs to tackle the issue while it is experiencing the scarcity of health professionals for a large population. As Bangladesh is the world's 8th largest populated country with the poverty rate of 29.5 per cent, where 63.37 per cent of the total population live in rural areas, it is always a challenge for the Government of Bangladesh (GoB) to provide healthcare services to the rural individuals and communities. Due to the existing healthcare divide between the urban and rural areas, the GoB is focusing on mHelath to ensure the provision of the healthcare services remotely for all. During the COVID-19 pandemic, the GoB implemented mHealth solutions for tracking, identifying the hot spots, vaccine registration, and improving remote health services efficiently. Therefore, the prime objective of the study is to identify how mHealth could be a better solution for the inclusion of rural people to healthcare services during a pandemic. This study follows the exploratory research design and a desk review to investigate the prospects and challenges of mHealth in rural areas in Bangladesh. For the desk review, secondary sources- both academic and grey literatures are analyzed. The findings show that mHealth can ensure better access to health information and services, affordable for poor people and requires no interaction between doctor and patients which is mandatory to restrict the spread of infection and transmission of the virus. However, inadequate human resources, lack of relevant knowledge and digital competency among rural people, limited access of rural women to internet and mobile phones, less involvement of vulnerable groups, and absence of proper guidelines on mHealth operation are creating impediments to effective application of mHealth in rural areas during pandemic. To scaling up mHealth recruitment and training of health professionals, encouraging rural people to use digital platforms for health services, women's' greater access to

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mobile and internet, and enhancing rural communities' readiness for mHealth initiatives are the areas where the GoB can intervene to strengthen the health facilities in Bangladesh.

Keywords: mHealth, COVID-19, Rural Community, Healthcare Divide, Digital Competency

Introduction

The provision of healthcare services in developing countries with limited resources is lagging due to limited resources available. Being a heavily populated country with a double burden of communicable and non-communicable diseases, Bangladesh possesses a substantial health care burden to meet. There is a number of obstacles in the health sector that needs to be addressed, such as inadequate human resources and discrepancy of availability of healthcare facilities between urban and rural areas (Ahmed et al., 2014a). Majority of the country's total population (63.6 per cent) lives in rural areas, therefore the city-centric healthcare system is a major obstacle for the rural communities to have access to modern healthcare facilities (Imdad and Saif, 2021; Ovi, 2020). These challenges are intensifying due to the pandemic, population growth, and higher poverty rate in rural areas. An expansion of healthcare services through innovative approaches is mandatory for addressing those concerns (Ahmed et al., 2014). As an innovative approach, the application of eHealth (Digital Health) and mHealth (Mobile Health) is a significant step towards ensuring healthcare services for the good health and well-being of people (Afrin and Arifuzzaman, 2020, p.908). The recent data shows that in Bangladesh most households have mobile phone (Bangladesh Bureau of Statistics, 2019) and the number of mobile phone user is 163 million (Bangladesh Telecommunication Regulatory Commission, 2020). Therefore, in Bangladesh, emphasis has been given to mHealth as a prospective solution to overcome the limited access to healthcare services both in cities and rural areas (Alam, 2018, p.112).

After the emergence of Coronavirus illness (COVID-19) in 2020, the effectiveness of mHealth became increasingly apparent. Initially discovered in Wuhan, China, in December 2019, COVID-19 quickly spread around the world and was declared a pandemic by the World Health Organization (WHO) in March 2020 due to its rapid spread and high death rates in many countries (Rahman et al., 2020b). This pandemic has shown numerous shortcomings in public healthcare readiness, both in developed and developing countries (Rahman et al., 2020a). Currently, there are possibilities for enhancing health systems through digital innovations, for instance, telemedicine and mHealth interventions. Notwithstanding, mHealth is seen as a possible strategic tool by the WHO as it has the capacity to change the nature of healthcare service delivery globally. Consequently, use of smart phone applications in the health services delivery in rural areas is increasing (icddr, b, 2020). The reason for it is

that such solutions might promote an increased access to adequate, effective, and cheap health services in low- and middle-income households from rural areas (Ahmed et al., 2014a, p. 7). The mHealth initiatives have received widespread praise from the media and general public as they were tackling the emergency health issues of the rural communities during the global pandemic (Ahmed, 2021). Therefore, in the rural communities of Bangladesh, mHealth might significantly contribute to the pandemic response (Mahmood et al., 2020). This study argues that with the rapid growth of mobile phone and internet users an emphasis on existing mHealth attempts could be a better solution for the inclusion of rural people in healthcare services during pandemic. However, insufficient human resources, lack of relevant skills and knowledge about digital platforms, health divide are the barriers to providing services through mHealth that require immediate solutions.

Statement of the Problem

The COVID-19 pandemic turned out to be a great challenge for many countries, including those with an advanced healthcare system, such as the United States, the United Kingdom, Italy and Spain. The healthcare systems of the South Asia region are of no exception from the developed countries in pandemic management. The challenges already faced by the healthcare sector in Bangladesh and its huge and extremely dense population of 164.7 million made the provision of healthcare services especially difficult during the pandemic (Al-Zaman, 2020; Ovi, 2020). Another notable fact is that 21.8 per cent of people in Bangladesh live below the poverty line (Al-Zaman, 2020), thus ensuring proper and inclusive healthcare services it is a big challenge for the Government of Bangladesh (GoB). Additionally, the budget allocated in the fiscal year 2020-2021 for the health sector is only 5.14 percent of the total budget and it is less than 1 per cent of total GDP (Hossain and Ahmed, 2020). The lower budget for health sector is an age-old problem in Bangladesh and poor communities residing in rural areas suffer much as they do not have sufficient money to afford treatment. The nation's health sector is suffering from poor management, inadequate resources (human and technology) and corruption (ibid.). The JKG Health Care scam, Regent Hospital scam, excess expenditure on website development and software purchase constitutes the recent evidence of funds mismanagement and corruption in health sector of Bangladesh (Al-Zaman, 2020). Therefore, it is crucial to address the existing issues and problems of health sector that became intense in the pandemic and affecting people physically, mentally and economically. The outlined problems highlight the need for intensive research that would investigate the present rural healthcare system and provide effective solutions for strengthening healthcare services, by outlining the potential of mHealth provision in rural Bangladesh in pandemic.

The choice of the rural communities of Bangladesh is justified by the fact that they constitute a significant part of the population (The World Bank, 2019a) and were affected the most by the pandemic. In addition, a significant part of the country's most vulnerable population (including but not limited to elderly, low-income, lower-educated) which is more likely to be affected by COVID-19 resides in rural areas. Bangladesh healthcare sector is facing human resources shortages in occupations such as doctor, nurse, medical technologist and limited access to technology and equipment in rural areas. With the major constraints of limited qualified healthcare staff, there has been an increased interest in Information Communication Technology (ICTs), notably using mobile phones (mHealth) (The Global Economy, 2017) and, since the beginning of the pandemic, the mHealth platform has been playing a crucial role to disseminate healthcare-related information among people from all walks of life. For an inclusive and successful adoption of mHealth solutions, healthcare services strengthening policies development should address the challenges arising in the remote rural areas. As the new variants of COVID-19 are still emerging in various parts of the world, new waves of pandemic might put in danger the areas which remained resilient before (Mallapaty, 2021). Thus, researching the ways in which mHealth can contribute to health services during pandemic and the way of its improvement is crucial. Overall, the findings of this study will be beneficial for the health policy makers, development partners, local and international NGOs, and academics.

Objective of the Study

The prime objective of this study is to explore how mHealth interventions provide necessary healthcare facilities to rural communities during COVID-19 pandemic in Bangladesh. The specific objectives of the study are:

- To identify the present scenario of mHealth initiatives in Bangladesh during pandemic
- To investigate the prevailing challenges that create obstacles to rural people to access mHealth services
- To find out the probable solutions to scale up mHealth for effective and affordable healthcare for rural communities during pandemic.

Methodology

This study is exploratory in order to gain an understanding of the present rural healthcare system of Bangladesh and to get ideas and new insights (Aminuzzaman, 2011, p. 41) about mHealth in ensuring health related services during pandemic to rural communities efficiently. This research adopted the desk review that allowed researchers to gather data from secondary sources. The secondary sources include academic and grey literature, for instance, government publications, reports, and databases, reports from international organizations, newspaper articles, and blog posts of websites. The study follows qualitative method to analyze the data gathered from secondary sources. Thematic analysis is conducted here to

identify the potentialities and challenges of mHealth initiatives in rural communities of Bangladesh during the pandemic.

mHealth

mHealth=Mobile (Smart) Phone + Healthcare Services Delivery

Figure 1: mHealth; Adopted from Alam, 2018, p.112

This section provides a definition of mHealth, a brief overview of its benefits for patients and healthcare professionals with the focus on remote areas in developing countries and potential obstacles in such an environment. To begin, Robert Istepanian was the first to coin the term mHealth, which refers to the use of new mobile communications and network technologies in the healthcare field. mHealth is widely recognized as an acronym for mobile health, which encompasses health and medical prevention and treatment supported by technologies through patients' involvement and empowerment (Tucker, 2015). mHealth is an umbrella term for approaches that include using mobile technologies such as phones, tablet, wireless technologies, and personal digital assistants (PDAs) for providing health related services and information (World Health Organization, 2011, p. 6; Alam,2018, p.112). There is a growing body of evidence of mHealth improving the quality of healthcare services including those in remote or/and disadvantaged areas. A wide range of opportunities provided by mHealth was outlined in the comprehensive report prepared by UN (United Nation) Foundation in collaboration with the Vodafone Foundation (Vital Wave Consulting, 2009). The report emphasized the use of mHealth for remote data collection and monitoring as well as for disease tracking and professional training (ibid.).

The benefits of mHealth include the provision of a person-centered approach (Fernandez-Luque, 2021), lower costs of medical services, higher time and cost-efficiency due to the remote nature of services, ensuring the stable flow of relevant information and services provision in remote areas and an improved access to skilled medical workforce (Kahn et al., 2010; Kumar and Arya, 2015; Mendiola et al., 2015). However, the digital nature of mHealth limits its opportunities of reaching the most disadvantaged groups due to the socio economical factors. For example, according to the World Bank, only 92.2 per cent of the population in Bangladesh had access to electricity in 2019, which is a necessary condition for mHealth. (The World Bank, 2019b)

One of the main benefits of mHealth is improved access to qualified medical professionals which is achieved in two ways. Firstly, local doctors and nurses in the remote areas are provided with more training opportunities online as they do not need to travel and leave their workspaces (Slovensky et al., 2017). Secondly, rural patients can access trained doctors from their local hospitals via online calls and thus receive

qualified treatment without the need to travel (Peprah et al., 2020).

To continue, mHealth technologies ensure a continuous flow of reliable health information. These benefits both the medical practitioners and general public, for example, allows one to check the symptoms in a reliable source, and medical professionals as they receive access to the latest updates, guidelines, and professional development resources and can track the patients' data efficiently (Vital Wave Consulting, 2009).

Another advantage of mHealth is its person-centered approach. A holistic approach in healthcare is a humanistic approach that focuses on the individual needs of the patient and addresses multiple factors impacting his/her wellbeing, such as physical, emotional, and social factors (Jasemi et al., 2017). While adopting a holistic paradigm is proved to benefit patients and medical professionals (Davis et al., 2005), there is a significant lack of holistic approach in developing countries healthcare systems (Nandyal and Gada, 2018). Fernandez-Luque, 2021) argues that the use of mHealth technologies improves communication with patients. What is more, a study conducted by McCance et al., (2020) shows mHealth efficiency in measuring person-centered KPIs (Key Performance Indicators), which are an important indicator for participatory healthcare services evaluation.

mHealth in Bangladesh

This section briefly covers the present structure of the rural healthcare system, development, and the current state of the mHealth in Bangladesh. The present structure of the rural health system in Bangladesh consists of 482 Upazila Health Complexes (including 50 and 30 beds), 75 secondary primary service hospitals in the districts and 15 specialized hospitals. Moreover, for providing primary, child and maternal healthcare there are more than 1500 community and satellite clinics (Directorate General of Health Services, 2020a; Imdaad and Saif, 2021). However, these hospitals and clinics have insufficient capacity compared to the number of patients. The available number of beds in both public and private hospitals could not satisfy the minimum requirement suggested by the WHO, which is three beds per thousand patients (Imdad and Saif, 2021). In addition, the doctor-patient ratio, number of nurses and staff are also lower than recommended by WHO (table:1).

Table:1 Ratio and Number of Health Professionals	
Registered doctors	86,800
Doctor-patient's ratio	5.26: 10000
Registered nurses	56,733
Nurse-patient's ratio	3.06: 10000
Doctor-patient's ratio in rural area	1.1: 10000
Doctor-patient's ratio in urban area	18.2: 10000

Source: *Alam, 2019; Joarder et al., 2018, p. 847)*

Meeting the health service demand in such resource constraint environment is a challenging task for countries like Bangladesh during any crisis. The study of Blaya et al., shows that the application of mHealth can be effective in all aspects of health service provision in a limited-resource setting (Blaya et al., 2010). Population-wide access to mobile devices is a crucial prerequisite for the mHealth projects expansion. With about 99% of mobile network coverage in Bangladesh in 2017, mobile device accessibility has remarkably increased in the last two decades (The Global Economy, 2017). Due to having high access to mobile devices, Bangladesh has become an ideal country for scaling up mHealth provision. The growth of mobile devices coverage catalyzed the process of rolling mHealth projects widely (Khatun et al., 2017). For integrating mHealth with health services to ensure better service delivery, both public and private entities came forward. The Management Information System (MIS) division of the Directorate General of Health Services (DGHS) is responsible for the countrywide implementation of the innovative approach of mHealth. The Ministry of Health and Family Welfare (MoHFW) is coordinating the approach by guiding the concerned division and trying to form a regulatory framework for appropriate functioning of mHealth approach at the same time (Ahmed et al., 2014a). In Bangladesh, the services included in mHealth platform include medical information, triage, consultation, diagnosis, referral, treatment, and counselling (Alam, 2018, p.114). mHealth initiative in Bangladesh has also prioritized to the betterment of maternal, newborn and child health (MNCH) (Hemandez, 2019, p. 18). During this pandemic, mHealth provides an opportunity for rural people to get medical advice from their households (Directorate General of Health Services, 2020b).

mHealth Services for Rural Communities during COVID-19 Pandemic

This section is focused on the benefits of mHealth solutions in rural Bangladesh during the COVID-19 pandemic. The specifications of digital health approaches in the context of Bangladesh are discussed and illustrated with relevant examples retrieved from secondary sources. The main purposes of mHealth are to ensure cost effective, inclusive, and affordable (Rahman et al., 2020) during pandemic.

Access to Information

One of the prominent advantages of mHealth during pandemic is providing access to information for all. Al-Zaman (2020) listed weak public health communication as one of the main reasons for inadequate COVID-19 pandemic response by Bangladesh healthcare system. The lack of relevant information and overreliance on personalized internet-based sources led to the spread of rumors and misinformation that worsened the adverse impacts of the pandemic (Al-Zaman, 2020). While the government policies of internet censorship might cause fear in the community (ibid.) mHealth provides an efficient solution to the issue. By allowing low-cost, fast, and secure communication between patients and medical professionals mHealth

promotes a continuous flow of reliable information about the virus, preventive measures, and treatment that can reach remote areas. mHealth provides the relevant information to both healthcare professionals in remote areas and the public (Rahman et al., 2020).

The national web portal for COVID -19 updates information of infected cases, recovery cases, death cases, quarantined cases, and isolated case. It also provides the guidelines to follow, emergency numbers, safety tips, video messages from professionals (Islam and Islam, 2020). National Call Center 333-1, National Health Window-16263, IEDCR-10665, COVID-19 Tele-Health 09666777222 and Mother Tele-Health-09666888888 for instance, are operating nationwide (Ahmed, 2021). The mobile phone operators also participated in awareness building through sending awareness and preventive messages, for instance, Grameen Phone started charge free call service to *3332 where people can get information related to COVID-19 (ibid.). These services made it easier and convenient for rural communities-both the health service providers and receivers to extract information and increase awareness regarding the COVID-19 through using mobile phones.

Affordable and Accessible

Apart from the health benefits, mHealth solutions provide financial benefits as it is a cheaper alternative to appointments. As the income fell significantly in rural areas during the pandemic to the extent some households had to reduce food consumption (Malek et al., 2021), many patients were unable to afford an in-person doctor visit due to travel costs. From the medical professionals' perspective, mHealth allowed to lessen the pressure on healthcare due to its time efficiency. Doctors were also able to provide the treatment without being exposed to infection (Galle et al., 2021; Khan et al., 2021). To make mHealth accessible to people there are mobile phones in the rural local health centers (District and Upazila level) and the numbers are available on the websites of District Hospital and Upazila Health Complexes and publicized for local people; they can access health services whilst at home. In rural areas telemedicine services (telehealth, telemedicine, and video consultation) are now available through various digital platforms (Chowdhury et al., 2020). The 'Surokkha' app for instance, is dedicated for vaccine registration and this platform is managing the COVID-19 vaccination program of Bangladesh. People can register for vaccination and get information on their mobile as SMS of vaccine center and time to get it. This endeavor allows people to download their vaccine certificate after completion of doses at a minimum cost (Molla, 2021;https://surokkha.gov.bd/). Furthermore, the development of digital health solutions is aligned with the government guidelines issued in July 2020, which are used by healthcare professionals and public (Rahman, et al., 2020).

Reducing Healthcare Divide during Pandemic

An unequal distribution of trained medical professionals and equipment creates the healthcare divide between rural and urban areas (Andaleeb et al., 2007). mHealth has emerged as a potential aid for effective and inclusive healthcare delivery. Health-interventions and communicating platforms based on mobile electronic devices (MEDs) can effectively address the gap in universal access to healthcare (Ahmed et al., 2014b). Connecting trained doctors located in urban regions to rural patients and medical professionals would reduce the inequality in healthcare services provision. However, it is crucial to ensure the availability and affordability of mHealth infrastructure in rural areas to avoid further exacerbating of the rural-urban divide in a digital paradigm (Makri, 2019). For instance, travelling to Upazila Health Complexes during COVID become more challenging for doctors, nurses, lab assistants and patients were also reluctant to go to hospital due to fear of getting infected (Razu et al., 2021). Therefore, mHealth has the potential to transform Bangladesh healthcare system, reducing existing inequalities and lowering barriers to inclusive healthcare access (Rahman et al., 2020).

Involvement of Private Sectors

Private sectors, non-governmental organizations (NGOs), development partners, and mobile operators are engaged with the mHealth platform. For instance, BRAC, Sajida Foundation and D.Net are providing digital health services. Additionally, mHealth projects like m Care, MAMA Bangladesh, Aponjon mHealth service, Manoshi Innovation are providing digital services in the areas of neonatal health, maternal and child health, and the creation of virtual databases. Mobile operators' initiatives such as Grameenphone's '789Health-lineServices'are trying to reach the rural people with health queries and solutions (Alam, 2018, p. 118).

In addition, to strengthen the skill of health professionals 'Advanced COVID-19 Clinical Management Certification Course' is recently introduced by the Directorate General of Health Services (DGHS), MoHFW, Bangladesh in collaboration with Health and Education for All (HAEFA), Project HOPE and Center for Human Rights & Humanitarian Studies of Brown University, USA. USAID and Save the Children's Ma Moni MNCSP: COVID-19 Response Project in Bangladesh. The prime objective of the course is to providing telemedicine for patients, management of patients' nutrition, mental health, and vaccination. The output of the course is that the patients can be managed at home by health professionals working in Upazila Health Complexes, District Hospitals, Tertiary and Medical College Hospitals, Private and Corporate Hospitals, and Outpatient Departments (OPD) (Directorate General of Health Services, 2021).

Maintaining Social Distance and Rules

To begin with, using the internet or mobile services allowed patients of rural areas to stay at home and adhere to lockdown and social distancing rules to

stay safe from the highly transmissible disease (World Health Organization, 2021), infection and follow the rules imposed by the government and thus avoid legal issues. It was especially important for vulnerable patients, such as elderly and immunocompromised individuals who were at greater risk from getting COVID-19 disease (Khan et al., 2021).

Challenges of mHealth Services during COVID-19 Pandemic

Despite initiatives under taken by the GoB, the mHealth system is currently facing several challenges, such as- readiness of rural people to use digital platform, woman's access to mobile and internet-based healthcare services, and in adequate health professionals at district, Upazila and Union levels, and inclusion of vulnerable people.

Lack of Readiness of Rural People to Use mHealth

A large number of rural people are not acquainted with mobile and digital technology, moreover, inadequate health literacy is limiting their access to mHealth services, such as record keeping, updating health information. They even hesitate and deny to have the COVID-19 vaccine due to their superstitions, unawareness and lack of knowledge about how to register for vaccination (Abedin et al., 2021)

The readiness of rural people to access mHealth system is a crucial factor for initiatives implementation. A study conducted by Alam showed that a large number of people from rural areas are still unaware of the services available at the mHelath platform (Alam, 2018, p.114). Language barrier creates issues with following the instructions through mobile phone. The instructions of them Health apps are in both English and Bengali language, which makes it inaccessible for many rural people who are illiterate. For instance, some initiatives, such as chatbots (eGeneration Corona Bot, CORONA Info Bot) that were spreading the information about COVID-19 from trusted sources such as the WHO supported both English and Bengali languages (Islam and Islam, 2020). Overall, difficulty in updating information, following instructions, and tracking records in mHealth apps tend to lower engagement of rural people with mHealth services (Hemandez, 2019, p. 19).

Technological Incompetency

Access to mobile phones and technological competency are prime requirements to access mHealth in rural areas. The study of Khatun et al., opined that, though rural communities have access to mobile phones, lack of technological knowledge creates barrier for the access of rural communities to mHealth services (Khatun et al., 2015). Research conducted on women's access to mobile phones shows that 21% of women globally are less likely to own a cell phone (Rowntree and Shanahan, 2020). This reality impacts women in various countries, including those in rural Bangladesh, who are often unable to access mHealth services due to not having a mobile phone or internet access

(Khatun, et al., 2017, p. 6). Therefore, the lack of mobile phones affordability is limiting access to mHealth services for rural woman. Lower literacy rate, unwillingness of women to use phone in many rural areas prevent them from using the digital health services. To access applications, for instance, 'Live Corona Test', 'CMED Agent' applications, 'Surokkha' (for COVID-19 vaccine registration) people need a smart phone with internet connection (Directorate General of Health Services, 2020c).

Insufficient Number of Health Professionals in Rural Areas

According to the WHO, Bangladesh is experiencing a significant shortage of health professionals (Alam, 2019; Joarder, et al., 2018), and the lack of training among existing workforce. In 2021, there were 5.8 doctors per 10000 population in Bangladesh compared to 6.8 in Myanmar, 9.8 in Pakistan (Ajadi and Drury, 2021). This issue is more significant in rural areas (Joarder et al., 2018). Since the start of the pandemic, the country has been experiencing a scarcity of health professionals, what is one of the challenges that the government needs to address and take immediate action. To combat the pandemic, GoB declared to recruit 2000 doctors and 4000 nurses in 2020, the recruitment process is ongoing (Dhaka Tribune, 2020). However, the number of doctors, nurses, medical technologists are not sufficient to serve the large population residing at rural areas.

mHealth and Vulnerable People

Speaking about the limitations of mHealth it is important to consider the vulnerable population as well. A significant public healthcare problem solved by mHealth is its inclusivity. mHealth, makes it accessible for the most vulnerable population, such as women, children, and elderly. However, during COVID-19, rural woman who are poor, has limited opportunity to work are now in worse situation. Their unpaid labor for households' chores increased and the gender-based violence is raising in lockdowns that made them more vulnerable (United Nations, 2020). The most vulnerable groups: female, less educated people and poorer people used those services the least Although, the majority of Bangladesh population (90.3%) own electronic devices, only 7.2% used them to access health services or receive health information (Ahmed et al., 2020). Therefore, it is a challenge for the government to ensure inclusion of vulnerable group, specifically woman and children in mHealth services.

Absence of Standard Operational Guidelines form Health System

Standard guidelines on how mHealth will operate are not well defined in the national health strategies and policies, for instance, eHealth standard guideline is still in a draft format. However, the enforcement of the draft eHealth guidelines and interoperability framework of standard operational guidelines form Health services for both government and private organizations is an area that needs further interventions to strengthen health

services through the mHealth system (Ahmed, etal.,2014b, p.6).

Overall, mHelath initiatives are limited by several obstacles. The success of mHealth is tied to other factors such as access to cellular networks and electricity, sufficient level of digital and general literacy and the availability of mobile devices (Peprah, et al., 2020).

Recommendations

As health and well-being is one of the basic needs of people and the COVID-19 pandemic has revealed the weaknesses of health system of Bangladesh, government have to emphasis on mHealth initiatives for tackling the existing challenges. Otherwise, the people specially the rural communities will be more affected as they have less access to healthcare services and their socio-economic conditions became worse due to the country wide lockdown.

Firstly, to increase the number of health professional's allocation and advice on utilization of funds for recruitment and training of health professionals have to be prioritized. As the health professional are suffering from excessive workload and mental pressure throughout the crisis period initiative for special incentives to doctors, nurses working in rural areas can motivate them to stay at stations and provide better services both in person and using mHealth platform. Secondly, to enhance readiness of rural community for accessing mHealth, digital literacy programs is needed. It will guide and motivate rural people to use mobile apps and retrieve health related information from websites. Furthermore, for inclusion of rural woman, children and other vulnerable groups, specific interventions have to be taken. For instance, awareness building campaigns among woman to use mHealth platform for personal hygiene measures, maternal health and childcare, information about protection from COVID-19 will increase women's access to mHealth services. Consequently, women's health-related awareness and knowledge about safety precautions to COVID-19 and any pandemic will help them to ensure the safety of their family members. Thirdly, collaboration with private entities and development partners for preparation and execution of standard operational guidelines for mHealth initiatives, building data security and protection strategies, provision for collaboration in private sectors and NGOs on mHealth projects (Ajadi, 2020, p.27) for pandemic management will strengthen Bangladesh's health sector.

Conclusion and Future Research

In Bangladesh, mHealth is one of the significant initiatives taken by the GoB aimed to ensure health services for all. mHealth has a potential to reduce the doctor-patient ratio gap which currently cannot meet the minimum requirement set by the WHO.As the modern health facilities are mainly city centric, the rural communities are facing problem to get health care facilities at Upazila Health Complexes and satellite clinics. During the

COVID-19 pandemic, government is facing challenges to provide primary healthcare services in both urban and rural areas. Though government has recruited new health professionals, the insufficient number of medical professionals is still a barrier to providing services even through mHealth. Language barrier, the lack of digital literacy and awareness on existing mHealth platforms among rural people, especially women's limited usage of health-related mobile apps, rural people's unwillingness to get vaccinated are the significant impediments to scaling up mHealth during pandemic. In addition, the lack of comprehensive guidance hampers the interventions development in both rural and urban areas. Formulation of operational guidelines, recruitment, and training of health professional, enhancing readiness of community are the areas where government can intervene to strengthen the health services in Bangladesh through mHealth and tackle the pandemic in an effective way. Overall, there is a scope for further research based on primary data from the people located in rural areas focusing on how mHealth contributes in their better access to healthcare facilities, how the challenges revealed in COVID-19 pandemic can be tackled in order to provide sufficient access to mHealth for rural areas in Bangladesh.

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