



## The Use of ICT and Effectiveness of Digitalized Health Services in Bangladesh

Tanzim Nahian Ahmed\*

Department of Public Welfare and Health, Moglabazar Union Sub Center, Islamabad, Bangladesh

### Abstract

E-health defined as the practice of Information and Communications Technologies (ICT) in support of health and health-related fields. Over the previous decade, the rapid development in Information and Communication Technology (ICT) has experienced tremendous revolution in health sector in many countries. Recent evidence recommends that e-Health is the blessing of ICT and is undoubtedly the most noticeable service that has a clear effect on the expansion of healthcare sector in developing countries. There is rising enthusiasm amongst experts of global health for the possibilities opened up by the speedy spread of electronic coverage. This comprises substantially increasing access to health-related information and instructions and to skilled medical consultations. This study will help to identify more about the existing status of e-Health and m-health in the public sectors, as well as the practical and managerial challenges facing e-Health and m-health projects in Bangladesh. The results of this study will help policymakers to create effective choices regarding e-Health services.

### Introduction

E-health defined as the practice of Information and Communications Technologies (ICT) in support of health and health-related fields. Over the previous decade, the rapid development in Information and Communication Technology (ICT) has experienced tremendous revolution in health sector in many countries. Recent evidence recommends that e-Health is the blessing of ICT and is undoubtedly the most noticeable service that has a clear effect on the expansion of healthcare sector in developing countries. There is rising enthusiasm amongst experts of global health for the possibilities opened up by the speedy spread of electronic coverage. This comprises substantially increasing access to health-related information and instructions and to skilled medical consultations [1]. More recently, e-health is being given special emphasis due to the Digital Bangladesh campaign of the current government, which gives extraordinary preference to delivery of health services to citizens through ICT. The Ministry of Health and Family Welfare has taken numerous steps to improve e-health services as part of the present government's promise to form digital Bangladesh. The use of information and communication technology to healthcare, mainly e-health, is quickly progressing in Bangladesh. Both the public and private sectors have contributed to the advancement of the e-health arrangement throughout the country. The existing status of e-Health in Bangladesh, however, has not been assessed. E-health is therefore seen as one crucial tool to increase access to healthcare for poor people in rural parts. According to a study carried out by the World Health Organization (WHO), e-health tools, among them Electronic Health Record (EHR) methods, are seen as very or extremely beneficial for 70% of the non-OECD countries (World Health Organization, 2016). Unfortunately, there is no effective study on e-Health and m-Health in various country as well as Bangladesh. Most previous studies have only give attention on the application of e-Health in Bangladesh like m-health, tele-medicine, electronic patient record etc. Most of the previous study has not examined the opportunities and challenges of e-Health and m-Health in Bangladesh. This study will help to identify more about the existing status of e-Health and m-Health in the public sectors, as well as the practical and managerial challenges facing e-Health and m-Health projects in Bangladesh. The results of this study will help policymakers to create effective choices regarding e-Health services.

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#### \*Correspondence:

Tanzim Nahian Ahmed, Department of Public Welfare and Health,, Moglabazar Union Sub Center, Islamabad, Bangladesh, Tel: 01738984800;

E-mail: tanjim278@gmail.com

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### Objectives of the Study

The major objective of this study is to analyze the effectiveness of e-health system in Bangladesh.

- To fulfill the broad objective, there are some specific objectives.

- To know about the current health services provided through e- Technologies.
- To identify the opportunities provided by e-health system.
- To scrutinize the challenges faced by e-health system and suggest some proposition to make it effective.

## Literature Review

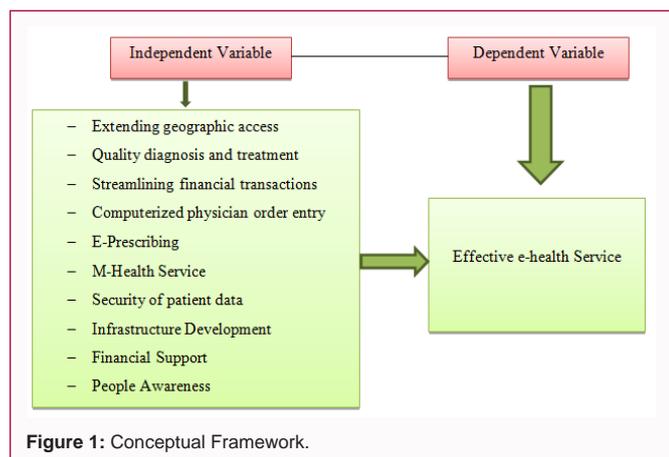
Literature review is a text of a scholarly paper, which includes the current knowledge including substantive outcomes, as well as theoretical and methodological influences to a specific topic. Literature reviews are secondary sources, and do not report fresh or new experimental work. Here, I have reviewed some outstanding works of various scholars regarding e-health system. Ahmed et al. [2] defined the background of health and health structures in Bangladesh. The high prevalence of mobile phone obtains ability increases strong opportunities in terms of health care delivery, which may bring welfares on the assumption that a variety of other conditions are in place. This study also provides a full picture of e-health initiatives. The MoHFW has given responsibility for implementing the health component of Digital Bangladesh to the Director General of Management Information Systems, in the Directorate General of Health Services (DGHS). It is applying an ambitious strategy for integrating ICTs into the government health system. NGOs are also involved in the e-health initiatives. Khatun et al. [3] thought that using Information and Communication Technologies (ICT) is a key scheme to meet the demand for health services in the 21<sup>st</sup> century. ICT health service can confirm efficiency and effectiveness in the health management method. The study discovers that the existing ICT health services do not meet the demand of the people. Old-style and inadequate equipment is one of the main problems. The study also shows some other challenges, including inexperienced manpower, inadequacy of ICT infrastructure, and a lack of monetary support from the government. Hossain et al. [4] revealed that, 40% of the respondents have knowledge of using ICT in healthcare while 21% have their own knowledge of using any of the existing m-health or e-health systems. People's age, profession and purchasing power have very strong impact on their acceptance of e-Health Services while their gender, level of education, access to cell phone and past e-health knowledge have very minor or weaker impact. This finding clearly illustrates that, a large number of our rural consumers are still uninformed about the recent uses of ICT in healthcare including remote discussion with doctors, getting virtual prescriptions and emergency medical alert systems etc. Hoque et al. [5] said that the public and private sectors have contributed to the improvement of the e-health arrangement throughout the country. In this study, they discovered the current status of e-Health in the public and private regions, as well as the technical and professional challenges facing e-Health developments in Bangladesh. The findings of the study exposed that e-Health in Bangladesh remains somewhat challenging, the problems could be overcome. Based on the current situation and challenges of e-Health, the scope of some fields needs further development. The e-health initiative in Bangladesh began in 1998 when the Ministry of Health & Family Welfare (MOHFW) started the Health & Population Sector Programs (HPSP) to increase efficiency of program implementation. Khan SZ et al. [6] is to explore physicians' hopes and fears for implementing Electronic Health Record (EHR) systems in Bangladeshi hospitals. There are big expectations from the Bangladeshi government that the practice of EHR systems will contribute to upgraded health care delivery

management, guarantee quality of care, increase the capacity of the health care delivery system and create health care more available in hard-to-reach areas. According to this study, there is a lack of human and ICT assets in this hospital. This hospital has serious problems such as huge patient load, unhealthy sanitary environments, and unsatisfactory number of patient beds needing urgent consideration. Most interviewees appeared to expect EHR systems to be time saving, suitable, well-organized and productive. Duan et al. [7] revealed that e-health systems are widely used in current world. This paper presents a multi-step ranking based recommendation system, which aided increase the usability of the medical information structure. Although it does not have much theory, it contributes in a valid and practical form to a vital application field in e-health. It may be used in clinical decision support, nursing education and clinical quality control, which can be a complement to current exercise guidelines in professional medical organizations. Yu W et al. [8] deals with the efficiency of healthcare-related actions and the associated costs. The major attention of healthcare organizations is to streamline operations and delivery improved services to their patients. Wireless mobile computing technology has the potential to provide the wanted benefits and should be a serious part of today's healthcare information system. In this paper, a method is offered to enhance the functions of physicians and medical staff in healthcare by using up-to-date wireless mobile technology, Radio Frequency Identification (RFID) tools, and multimedia streaming. The paper comprises a case study of the growth of such a system in the context of healthcare in the United States. The World Health Organization (WHO) (2016) published the e-health country profiles of the countries that contributed in the WHO's third worldwide survey on e-health. It has a special focus-the use of e-health in support of widespread health treatment. E-Health plays an important part in developing universal health coverage in a variety of ways. For instance, it helps to provide services to remote populations and underserved people through m-health. And through the strategic practice of ICT, it increases the operations and economic efficiency of health care systems. The survey covers two categories of questions. The first category is named e-health foundation actions, which form an enabling atmosphere for the use of ICT for health. These include helpful e-health policy, legal and moral frameworks; satisfactory funding from many sources; infrastructure development; and increasing the capacity of the health work force through training. The second category of questions are linked to a country's e-health applications, which were surveyed in 2009 and include telemedicine (the delivery of health care services using ICT where distance is a obstacle to care); m-health (the use of mobile phones in supplying health care services); and e-Learning (use of ICT for learning).

## Research Methodology

### Research type

The study is explanatory and descriptive. Explanatory research is to see the cause-effect relationship. Here the relationship between e-health system and its effectiveness will be seen. Descriptive research describes characteristics of a population being study. In this study, mixed research approaches have been followed which contains both qualitative and quantitative method. This research is qualitative in nature because the study is descriptive and listens to the informers and builds a picture on their ideas. Quantitative research is an inevitable part of social research especially in this research. Such data are only available in numerical form hence quantitative analysis instruments have been used.



**Research design**

Survey design has been followed here with in-depth interview. Survey tends to use easy to read data sources that can be analyzed as needed in research. This is why survey design has been used in this study.

**Sources of data**

This paper is based on the review of primary data and secondary data. Both primary and secondary sources of data have been used here. Primary data in this study has been collected through in-depth interview (face to face) and observation techniques of data collection by using a semi-structured questionnaire (combination of both open and close ended questions). Secondary data has been collected from different relevant publications, e-books, journal articles, report and some information has also been collected from internet browsing.

**Area of the study**

The study areas are three Union sub-centers (Moglabazar Union Sub Center, Islamabad (Khadimpara) Union Sub center and Noorpur (Lalabazar) Union Sub Center) at Sylhet Sadar in Sylhet district. These sub-centers are chosen randomly from the Sylhet district.

**Population, sample and sampling**

All the officials, staff who serve and the people who receive services from those three union sub centers have been recognized as population of the study. Sampling is a representative part of the population. In this study, data has been collected from 100 respondents; among them there are the official staffs (10) and the people (90) who received services from those three union sub centers. Officials and staffs sample were chosen by using purposive sampling techniques. Service receivers sample are considered by using snow ball sampling and it was selected on the basis of November, 2019 service receiver.

**Conceptual framework**

In this paper, a conceptual framework is formed on the basis of the study of relevant literature and according to research title, research objectives, and research questions. This framework has shown the interrelationship between dependent variable and independent variable. In my study independent variable are extending geographic access, quality diagnosis and treatment, data management, streamlining financial transactions, mitigating fraud and abuse, computerized physician order entry, e-prescribing, and m-health, security of patient data, cyber medicine, and e-mental health (Figure 1).

**Table 1: Existing conditions of e-health in Bangladesh.**

Response Category	Yes (Percent)	No (Percent)
Special department for performing e-health activities	0	100
Adequate number of e-health officials	30	70
Organize e-health related training	60	40
Infrastructure development	100	0
Government service improving e-health service	40	60
Local leader influences e-health officials' activity	60	40
Computerized skilled official	10	90
Using biometric data to confirm service beneficiary	0	100
Facing challenges to implement e-health	50	50
Program for raising awareness among people	70	30

**Results**

The following findings have been summarized based on the primary data analysis as well as the review of the literature. Getting health services is a fundamental right of all citizens. Health services are considered an essential precondition for the development of human beings. That's why Bangladesh government introduced e-health system so that the people from rural area can easily receive the health service. This study tried to find out the present condition of e-health system based on three union sub-centers at Sylhet and its effectiveness. We have got some initiatives to run the present e-health system. The use of modern equipment (telephone, internet, mobile and telemedicine) in e-health helps patients to get service more promptly. It saves time and costs of the patients, ensures remote services. On the other hand, e-health services are not worked effectively due to a lack of skilled manpower; i.e., many service providers are not sufficiently skilled to use computer. 90% of the official's respondent said that, there are no computerized skilled officials. The numbers of officials are not adequate [9]. The 70% respondents thought that the authority should recruit more manpower. There is no special department inside the organization for running the activities of e-health. Internet service is essential for the effectiveness of e-health but internet services inside the organizations are very poor. Most of the service recipient disagreed that it reduces the gap between doctor and patients. It could not be possible to reduce the gap without proper infrastructure development. When the officials asked to the security of patient data, 90% officials said that patients' data are secured. When the same question asked to the patient, majority said that patient data are not secured. So there are a gap between the official's statement and patient's statement [10]. The study found that e-health services are not given for a 24/7 basis. Insufficient number of medicine are also hampered the health services. Besides, most of the people do not know how to get e-health service because there is no



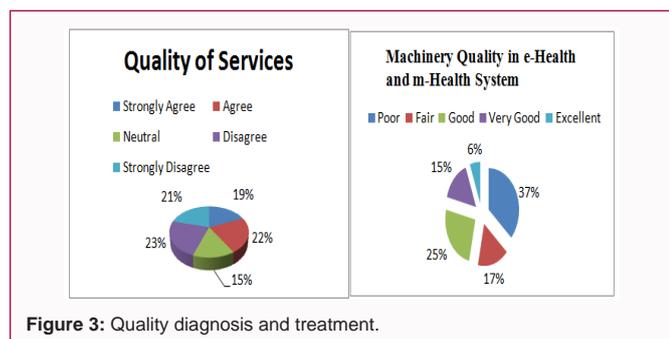


Figure 3: Quality diagnosis and treatment.

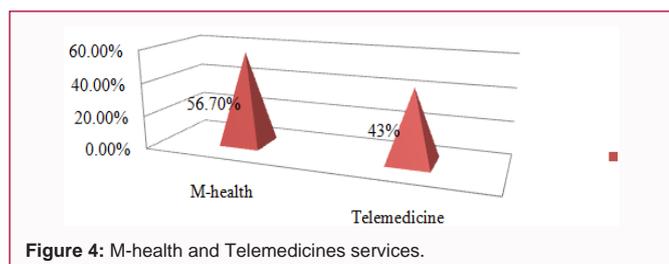


Figure 4: M-health and Telemedicine services.

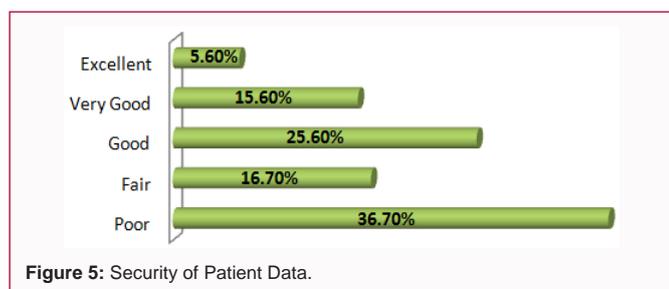


Figure 5: Security of Patient Data.

specific system, no clarifications on how to get e-health service. It is also evident that the supply of e-health equipment by the government does not fulfill the requirements of general patients. Maximum respondents said that e-health facilities should be improved. The quality of present equipment to provide e-health services is very poor. Patients are not getting expected e-health services for the lack of sufficient technical equipment. So, most of the patient are facing problem while they receiving e-health services from their union sub-centers. Most of the respondents said that they were facing problem while receiving services. The study comes to the conclusion that the e-health services is not always clear to the patients, that insufficient equipment and budgetary allocations from the government adversely affect the provision of e-health services, and that there is no effective monitoring system from the central government, which hampers the efficiency of e-health services. The study reveals that even though some e-health services are given in union sub-centers, but these are not enough for ensuring effectiveness of e-health system [11-13]. Both, service providers and recipients think that more awareness of e-services could ensure better e-health services and the system should be ensured by the authorities.

**Discussion**

In this study, data has been collected from 100 respondent (officials (n=10) and people (n=90) who receive services) under three Union sub-centers (Moglabazar) Union Sub Center, Islamabad (Khadimpara) Union Sub-centre and Noorpur (Lalabazar) Union Sub Center) at Sylhet Sadar in Sylhet district. The data has been collected by the help of an interview schedule. The collected data has

been presented and analyzed below:

**Existing conditions of e-health in Bangladesh**

Existing conditions of e-health system in Bangladesh are discussed in the following table. It is based on the data collected from the officials of my study area (Table 1). Source: Data collected from officials of Union Sub-centers under Sylhet Sadar, n=10. The table shows that existing conditions of e-health in Bangladesh are very poor. It should be developed for providing good services to people (Figure 2). Source: Data collected from officials of Union Sub-centers under Sylhet Sadar, n=10. Moreover, internet service can play a vital role for the effectiveness of e-health system. But internet service in these organizations is not good enough to provide efficient service to the people. Officials told that they did not get a good internet service. That’s why they faced many problems while providing service to the patients. 70% said that it’s poor and other 30% officials told that it’s fair. None of them identified it as good.

**Satisfaction level or view of service receiver about e-health system**

E-health comprises a set of different concepts, including health, commerce and technology. It means the application of computer, Internet, mobile phone and other technologies to improve the patients’ health status. The main aim of e-health system is provide effective service to the citizen and achieve citizen trust. The Table 2 discusses the citizen satisfaction level. Source: Data collected from service receivers of Union Sub-centers under Sylhet Sadar, n=90. The Table 2 has shown that people’s view about e-health system is very poor. They have negative view about e-health system. Most of the people believed that they could not get the best services from the e-health organization. Most of the times, it is very poor. So, it can be said that people’s satisfaction level are satisfactory about e-health system and their organization.

**Reason behind the ineffective e-health system in Bangladesh**

**Geographic access:** The purpose is to overcome distance between doctor and patient. It includes what would traditionally be called telemedicine (e.g. videoconferencing with patients in rural areas; help lines; instant messaging with a health practitioner for medical advice). Service receivers reported that this gap could not be reduced

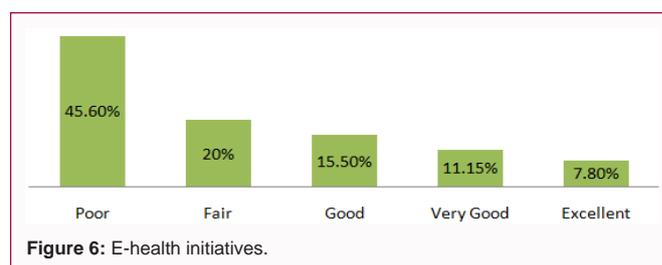


Figure 6: E-health initiatives.



Figure 7: Reasonable Amount of Salary for Officials.

**Table 2:** Satisfaction level or view of service receiver.

Response Category	Strongly Agree (Percent)	Agree (Percent)	Neutral (Percent)	Disagree (Percent)	Strongly Disagree (Percent)
Reduce the gap between doctor and patients	18.9	8.9	25.6	30	16.7
Patient oriented officials	13.3	22.2	4.4	35.6	24.4
Provide safe and effective care	8.9	22.2	21.1	32.2	15.6
Fulfill the demand of common people	12.2	24.4	17.8	16.7	28.9
Meet the global standard of health	10	17.8	20	33.3	18.9
Ethical and professional behavior from doctor	8.9	7.8	27.8	38.9	16.7
Equal treatment for all	5.6	18.9	28.9	21.1	25.6
Adequate number of doctor	0	20	20	26.7	33.3

because of poor infrastructure.

**Quality diagnosis and treatment:** The purpose is to allow a health worker to improve clinical performance during training or in the field through real-time assistance with clinical decision-making and diagnosis. But proper training about e-health related activities are absent. Different types of training are basic training, training on medicine etc. The Figure 3 has also shown that machinery used in e-health system are very poor. If cumulative percentages are being considered then it may be assumed that 53.3% agreed with the statement.

**Streamlining financial transactions:** The purpose is to expedite financial transactions by making it easier for patients to pay for their care and for the physician to receive the payment (e.g. mobile insurance premium payments, vouchers over the phone). But there is no digital payment process in the e-health sector in Bangladesh.

**Mitigating fraud and abuse:** The purpose is to prevent fraud and abuse (e.g. texts and pin codes to detect counterfeit drugs, using biometric data to confirm that a health worker has actually visited a patient). Authority can use biometric process for collecting data to confirm service beneficiary. But it is also absent from e-health in Bangladesh.

**Computerized physician order entry:** It enables the communication of patient data between different healthcare professionals. When officials were asked about computerized physician, they said that there were no computerized skilled officials in their organization.

**M-health/Telemedicine:** It includes the use of mobile devices in collecting aggregate and patient-level health data, providing healthcare information to practitioners, researchers, and patients, real-time monitoring of patient vitals, and direct provision of care. Health officials provide service via mobile phone (Figure 4). Source: Data collected from service receivers of Union Sub-centers under Sylhet Sadar, n=90. Security of patient data: It enhances privacy and security of patient data. The following figure has shown that patient data are not secured in e-health process in Bangladesh (Figure 5). Source: Data collected from service receivers of Union Sub-centers under Sylhet Sadar, n=90.

### Infrastructure development

Source: Data collected from service receivers of Union Sub-centers under Sylhet Sadar, n=90. Most of the respondents (45.6%) told that e-health initiatives are very poor. Only a few e-health facilities are available in union sub-centers. The authorities should introduce other e-health facilities. And it should be developed (Figure 6).

**Financial support:** E-health official did not get the enough financial support from the government. They do not get the reasonable amount of salary. Their salary is very poor (Figure 7). Source: Data collected from officials of Union Sub-centers under Sylhet Sadar, n=10 when the officials were asked about their salary, most of them told that they did not get a reasonable amount of salary. The table has shown that 50% officials are disagreed and 30% are strongly disagreed. The other 10% accepted that they get a good amount of salary but the govt. should increase their salary.

### Conclusion

With the rapid development of e-health in developing countries, there is obviously a burning need for solid proof of its impact to justify and monitor the investment of resources in such methods. Recent evidence proposes that e-Health is the blessing of ICT and is possibly the most noticeable service that has a visible influence on the expansion of healthcare sector in developing countries. More recently, e-Health is being given special emphasis due to the Digital Bangladesh operation of the current government, which gives special preference to delivery of health services to citizens through ICT. The MoHFW has assigned responsibility for implementing the health component of Digital Bangladesh to the Director General of Management Information Systems, in the Directorate General of Health Services (DGHS). It is executing an ambitious policy for adding ICTs into the government health system. NGOs are also involved in the e-health advantages. People are facing many difficulties while getting e-health services. Lack of equipment is one of the problems for achieving the effectiveness of e-health system. The service should be developed otherwise it will flop to attain its objective.

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