

Study and Overview on the Assessment of the Current States and Opportunities of Telemedicine in BD

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Abstract—This paper has examined the present conditions of Telemedicine services in Bangladesh and found the vital parameters that should be addressed to make this service useful for the rural people of Bangladesh. There are about 75% people live in rural areas where the healthcare facilities are very poor in Bangladesh. Telemedicine is an appropriate tool to serve the huge rural people of Bangladesh. We have conducted a survey through questionnaires on the expert doctors, village or local doctors, pharmacy owners and patients from different areas of Bangladesh. The survey was conducted on 500 targeted people of Bangladesh. From the survey we have found that 94.80% expert doctors, 74% local doctors, 91.42% patients and 80.32% pharmacy owners of Bangladesh want to introduce telemedicine services for the huge number of rural people of our country. This research also proposes the telemedicine operating cost in the range of 201-300 taka for the rural people of Bangladesh. Authors believe that the survey results can play an important role to implement a standard Telemedicine model for the people of Bangladesh.

Keywords—telemedicine; R; diagnosis; plot; crp; dab; csv; dicot; times

I. INTRODUCTION

Telemedicine can have a vital role in improving health care delivery for patients in underserved areas where distance or travel challenges present barriers to specialty medical care. Doctor shortage, poor access to care, and rural urban disparities for specialty medical care need to be addressed to improve the health care of persons in underserved, rural areas. Telemedicine is a useful tool used to give health care from a distance place. Telemedicine in the developing world offers solutions to health care for people in rural areas, reduce costs, and improve health care quality. Telemedicine service was started in Bangladesh in mid to late 90 [1]. In Bangladesh, first telemedicine link was recognized by Swinfen Charitable in 1999 [2]. Telemedicine consultations reduce cost; reduce transportation issues and the time [3, 4, 5]. As most of the people live in rural areas of Bangladesh, they have to travel to city for getting proper medical care where most of the expert doctors are available. The aim of telemedicine is to provide expert-based health care to understaffed remote sites and to provide advanced emergency care through modern telecommunication and information technologies [6].

The telemedicine link in Bangladesh, between the Center for the Rehabilitation of the Paralyzed (CRP) in Dhaka and medical consultants abroad in 1999 was established by the Swinfen Charitable Trust, UK. This telemedicine system was low cost store and forward based which used a digital

camera to capture still images, which were then transmitted by email. After establishment of the project, in the first 12 months, 27 telemedicine referrals were made. Initial email replies were received at the CRP within a day of referral in 70% of cases and within three days in 100%, which shows that store-and-forward Telemedicine can be both fast and reliable. Telemedicine consultation was complete within three days in 14 cases (52%) and within three weeks in 24 cases (89%). This telemedicine model is used as a reference model for further development of telemedicine projects in the developing world [2].

Telemedicine between Diabetic Association of Bangladesh (DAB) and Grameen Telecom (GTC) was a real-time tele medical consulting project. In this project full-duplex video transmission technology was used. It was expected that 20 patients per day would be served by the telemedicine pilot project DAB, GTC. The success rate of this project was not satisfactory because of poor market promotion and other issues. It was found from the project that the picture quality was not at a satisfactory level, the performance of the cameras was not satisfactory. The picture would split for reasons such as rough weather. On rare occasions, the picture would fade or a shadow would be seen. The fiber drop rate was frequent. Although the voice transmission system was full duplex, voice transmission system was often interrupted. Although this system was less expensive than coming to Dhaka for treatment, the fee of 600 Taka and the visit to the Telemedicine center were not fully understood

by most patients. The number of patients was not at a satisfactory level. It took only 1.5 – 2 hours to go from Faridpur to Dhaka. The patients may have found it more convenient to come to Dhaka and physically meet with the doctor of their choice [7].

Bangladesh University of Engineering & Technology (BUET) and comfort nursing home started store and forward based telemedicine project with the financial collaboration from European Union (EU). This project was e-mail based. Due to different reasons the project is not functional [1].

We have described some of the Telemedicine projects in Bangladesh and showed why they have failed to meet the demand of the people. In order to know the present scenario of Telemedicine in Bangladesh, we have conducted a survey on the shareholders of it. The organizations of this paper are as follows: Section 2 shows the review of literature about the related recent development activities and finds the present & past telemedicine projects of different countries in the world. Section 3 is the Materials and Methods describes the process of how we have conducted the survey. Section 4 is the results of the survey which shows the different outcomes of the processed data. Section 5 is the discussion section which briefly describes the survey results. Section 6 is the conclusion section which concludes the research work. Section 7 and 8 is the acknowledgement and reference section.

II. REVIEW OF LITERATURE

In order to carry out this research, at first related articles, proceedings, magazines, books and onsite observations are made to know the present status of Telemedicine in Bangladesh. From different sources, it was found that Telemedicine is still a developing and implementable area in the health sector of Bangladesh. After the inauguration of Telemedicine projects in 1999, it is still in a project based implemented by different organizations of Bangladesh. The survey of e-health shows that if traveling cost of a patient to visit a medical specialist is higher than the cost of providing e-consultation, then e-health might be an economic viable solution [8]. It is also found from two papers that Telemedicine provides a potential method for solving health care [9, 10]. Quality of medical care in rural areas can be improved by using telemedicine in the delivery of specialty medical care for the patients [11, 12]. Teleconsultant's characteristics can affect diagnosis and treatment in telemedicine [13]. The telemedicine based feedback from the prospective consultant was well received by patients [14]. We have found relevant research from the review of the literature and adopted our research methodology to continue our targeted research. In this section, we will briefly discuss some of the successful Telemedicine systems all around the world: Researchers E.J Gomezemail et al proposed telemedicine system designed to complement the

daily care and intensive management of diabetic patients through telemonitoring and telecare services [15]. This system comprises a patient unit (PU) used by patients in their day-to-day activities and a Medical Workstation used by physicians and nurses at hospitals. The evaluation of this system consisted in a six month cross over pilot study.

Chen Z. et al has said, online telemedicine system works like a vehicle for the patients who are willing to visit a doctor but unfortunately unable to visit in time. Researchers want to develop a web based telemedicine system where patients can live communicate with the doctor at home. They have also developed a digital payment system with encryption and decryption. They have extended their system with the Picture and Archive Communication Systems (PACS) [16].

Chan, K.W et al presents a new method for obtaining blood pressure readings noninvasively with telemedicine application. Through the pulse transit time technique, the systolic, diastolic, and mean blood pressures can be predicted using the time interval between the electrocardiogram (ECG) and photoplethysmography (PPG). The data can then be relayed to the Internet for analysis and viewing. The wireless application protocol (WAP) is used for displaying the information on portable wireless devices. The subjects' cardiovascular condition can thus be obtained for monitoring or pre-diagnosis purposes [17].

Grameenphone launched Telemedicine Pilot initiative is to provide healthcare services to the poor people who do not have access to modern medical services. The objective of this project is to enhance the quality of life of vulnerable and underserved community of peri-urban/urban slum and rural Bangladesh. An innovative device has been developed, named DICOT (Digital Imaging & Communication on Telemedicine) which is supported by software, named TIMES (Telemedicine Information Management & Education System). Grameenphone is implementing Tele Dermatology project at four of their Community Information Centers (CIC). These local hubs for Internet and mobile services are now host to remote, real-time patient consultations with specialized doctors. They are able to consult with a physician live with the help of Digital Imaging and Communication in Telemedicine (DICOT) as well as Telemedicine Information, Management and Education System (TIMES). The digitalized system will also provide both printed and online prescriptions and maintains a database of each consultation for future reference. Telemedicine services at CICs (4 in pilot phase) have shown an increase in accessibility and affordability of specialized consultations for the rural underprivileged community.

Table-1 depicts the health information and advice services offered by different mobile operators in Bangladesh [18].

TABLE I. HEALTH INFORMATION AND ADVICE SERVICES THROUGH MOBILE OPERATORS

Type of the service	Operator	Service line	Duration (h)
Healthline services	Grameenphone	789	24
Healthline services	Banglalink	789	24
Tele health services	Airtel	10600	24
Blood bank services	Banglalink	8008	24

III. MATERIALS AND METHODS

This paper is based on the survey questionnaires with a view to gather information about the present Telemedicine conditions of Bangladesh. In order to carry out this research, a survey questionnaire was developed to collect primary data from different areas of Bangladesh focusing on the feasibility of implementing a suitable model of Telemedicine in Bangladesh. The questions were developed based on the discussions with patients, doctors, pharmacy owner and different management peoples of government and non government organization. The question for expert

doctors contain 14 questions which are finalized considering their participation, expectations, roles and financial matters on Telemedicine for data collection. Similarly 13, 12 and 16 different questions were prepared to collect data from local or village doctor, patients and pharmacy owners in each set. So a total of 55 different questions were finalized for four stakeholders to collect data after justification and 500 copies of questions were prepared. The questionnaires were sent to the targeted people and finally 414 sets were collected from different respondents. The scenario of data collection is summarized in the following table:

TABLE II. OVERVIEW OF SURVEY DATA COLLECTION

Targeted Person	Questions	Collected Questions	Received Percentage
Expert Doctor	100	77	77%
Local Doctor	100	75	75%
Patient	150	140	93.33%
Pharmacy owner	150	122	81%

From the summary of the table, we can see that the questionnaires acceptance rate for Expert Doctors, Village or Local Doctors, Patients and Pharmacy owners are 77%, 75%, 93.33%, and 81%. The average acceptance rate of the questionnaires are 81.58%. The data were inputted and processed through Excel. After that, the processed data were converted to Comma Separated Values (CSV) file which is suitable for the input of statistical software R. R is an extremely versatile open source programming language for statistics and data science. R is an integrated suite of software facilities for data manipulation, calculation and graphical display. In order to meet the goals, we have prepared cross tables from the available generated table of the collected data. These cross tables are processed through the software R with different plot functions and we found the results of our research from R outputs. The primary hypothesis of our survey are the to find out the fees for

Telemedicine, necessities of Telemedicine, doctors opinion on Telemedicine, status of doctors for poor people, income percentages of different shareholders. The pattern of the questions is structured where some questions are selective and others are open ended. After processing the answers of the questions, we have got the selected answer of our hypothesis. The findings from the survey will be discussed sequentially in the results sections.

IV. RESULTS

The data was processed through the statistical software R and this section shows the survey results. Figure 1 is the cross result of the survey on four different types of respondents of telemedicine for the familiarity of it in Bangladesh. From the figure, we can see that highest percentage is the expert doctors, followed by local or village doctors, patients and finally pharmacy owners. Our next

result was on starting opinion of telemedicine. From figure 2 we see that the highest opinion was given by the patients of our country. Most of the patients think that telemedicine will be a health solution for them.



Fig. 1. Familiarity of telemedicine in Bangladesh

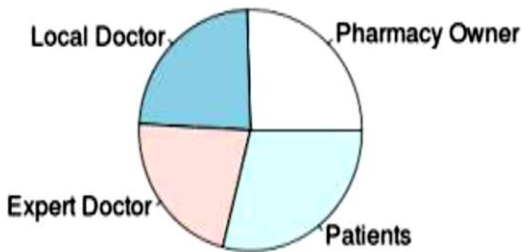


Fig. 2. Percentage of telemedicine starting opinion in Bangladesh

The data were collected for the local or village doctors from the remote villages of south and north side of Targeted Person Questions Collected Questions Received Percentage Expert Doctor 100 77 77% Local Doctor 100 75 75% Patient 150 140 93.33% Pharmacy owner 150 122 81%

Bangladesh. The data were collected for the availability of the data collected people. The results are shown through the different charts which can significantly answers the different questions that will be helpful for the implementation of standard Telemedicine services in Bangladesh from the point of view of local or village doctor. The final results for local or village doctors are sequentially shown in the below figures from the output of statistical software R:



Fig. 3. Reasons for visiting local doctor

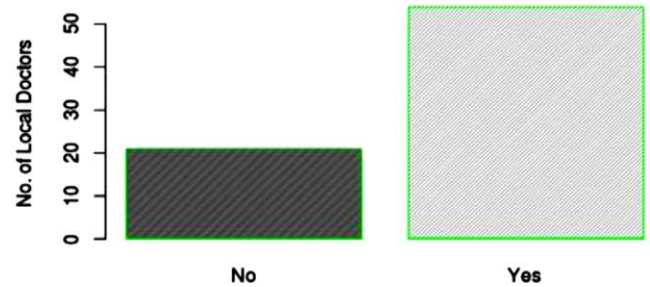


Fig. 4. Consultation status of local doctor

From the above figure 3 the survey finds out the different reasons of patients for visiting local doctors. The four reasons are indicated by four variables A, B, C and D. The meaning of the variables are A=Patients come to consult only about diseases, B= Patients come to consult about disease, medicine and treatment, C= Patients come to consult for expert doctor and D= Patients come only for the treatment. The response of variable B is the highest from the figure. Figure 4 shows the status of local doctors for the treatment of patients with the expert doctor. Survey shows that 72% of local doctors accept the suggestions of expert doctors for the treatment of their patients.

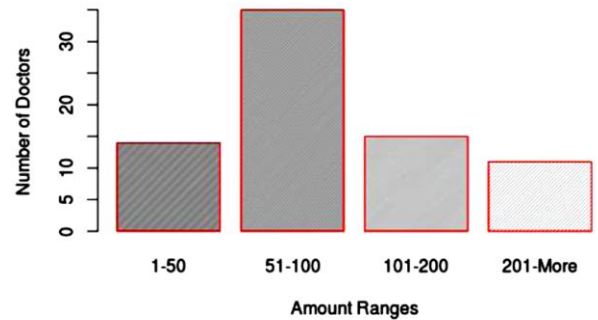


Fig. 5. Expected telemedicine fees of local doctor

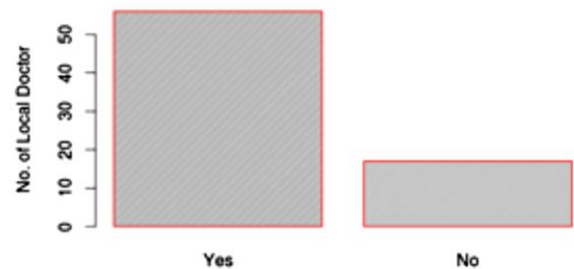


Fig. 6. Opinion on the implementation status of telemedicine

Figure 5 depicts the expected fees of Telemedicine from the local doctor's perspectives and most of the doctors expect that their consultation fees ranges 51-100 is acceptable. Figure 6 shows the result whether the Telemedicine implementation is accepted by local doctors or not. Survey results conclude that about 74% local doctors are in the

favor of implementation of Telemedicine which will be a beneficiary system for the rural people.



Fig. 7. Status of telemedicine services in Bangladesh

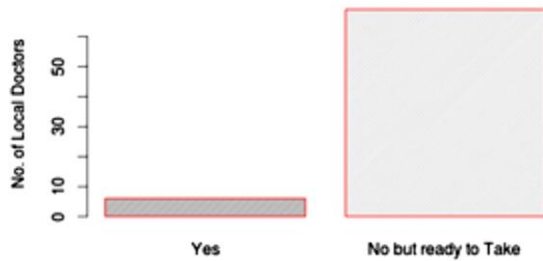


Fig. 8. Training status on telemedicine

Figure 7 find out the present condition of Telemedicine in rural areas. Among 75 local doctors 63 doctors told that there are no Telemedicine services in their locality at present. Figure 8 is the result of the status of the training on Telemedicine. From the figure we can see that the trained personal on Telemedicine is very limited in contrast to the non-trained doctors but they (92%) are ready to take the required training for the functioning of the Telemedicine.

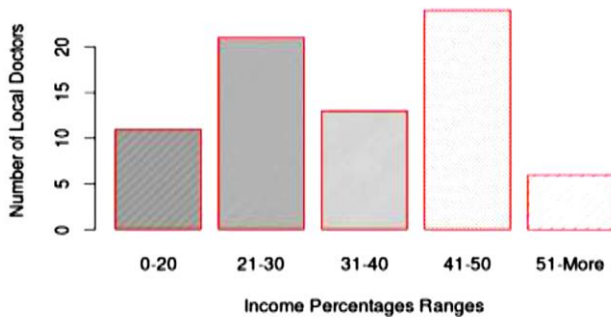


Fig. 9. Expected income percentage of local doctor

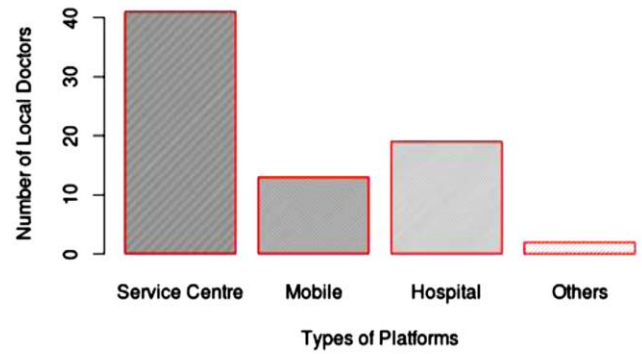


Fig. 10. Telemedicine service platform selection

The Figure 9 shows the expected income percentages of local doctors from the total revenues of Telemedicine system. From our survey, it was found that most of the doctors expect that their percentages should be in the ranges 41-50 and second highest group of local doctor's desire their percentage should be in the range 21-30. The figure 10 depicts the selections of the platform from the local doctors. From the analysis it is the most desirable that service center based (physically equipped local pharmacy in their locality) Telemedicine is best suited from their point of view.

Secondly, in order to collect data from the patients four special hospitals are selected in Dhaka city where most of the patients generally come from the remote areas of Bangladesh. The hospitals are Dhaka Medical College Hospital, Bangabandhu Sheikh Mujib Medical College Hospital, Shohid Sourawardhi Hospital and National Heart Foundation, Dhaka, Bangladesh. The rest of the data were collected from the rural areas of South and North side of our country, Bangladesh. The data collected from the patients are inputted into the system where there are 12 different questions were answered. Patients are the fundamental components of the Telemedicine. So their thinking, expectation and services are analyzed properly for the effective introduction of Telemedicine. The survey results on patients are sequentially shown in the below figures from the output of statistical software R:

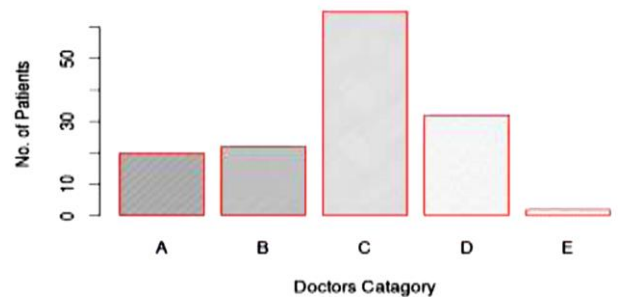


Fig. 11. Distribution of doctor in patient's area

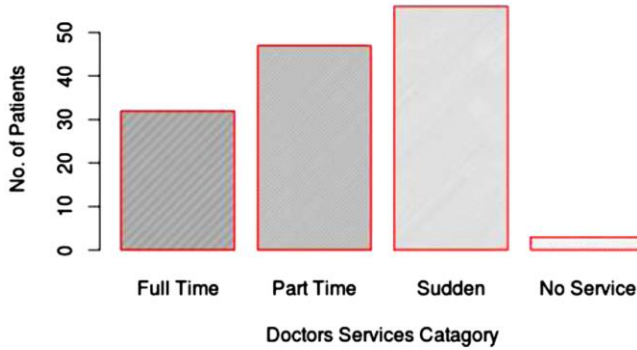


Fig. 12. Doctor's category for patient's in rural areas

In the figure 11 we have declared five variable A, B, C, D and E for the doctors serving in the patient's area. The meaning of the variables are A= Doctors with the degrees of MBBS or more, B= Doctors with Diploma degree, C=Local doctors, D=Community Clinic doctors and E=No doctors receptively. We have found that highest 65 patients (46%) gave their opinion on the local doctors which means that they got health services from them. Figure also demonstrates that there are limited expert doctors for patient in rural areas. Figure 12 depicts the results of the doctors servicing types for patients. Most of the patients give their opinion that the services of doctors are on call based. Full time doctors are very rare in rural areas for patients. It is also found from the survey that there are some areas where no doctors are available.

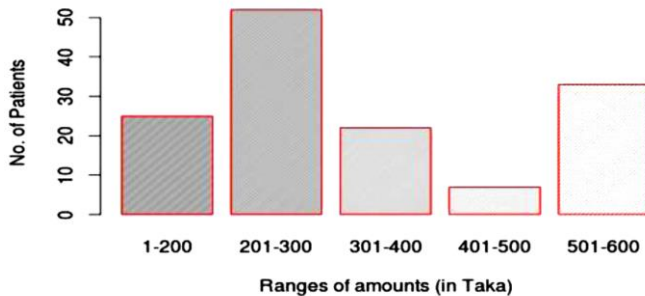


Fig. 13. Approximate cost of patient's to get treatment from urban areas

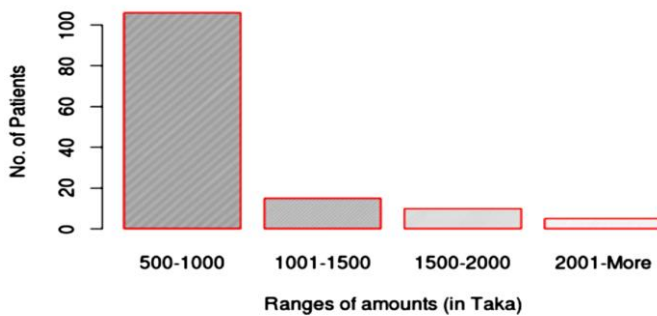


Fig. 14. Approximate cost needed to get treatment from urban areas

Figure 13 is the summary of the costs for patients to get treatment from the urban areas for their health care services. 106 patients (75.71%) told that the average cost is in the ranges 500-1000 Taka to get treatment from city. Patients can avail the cost of the Telemedicine is shown the above figure 14. Patient can afford the fees of 201-300 taka range(52% Patients) is the first category and 501-600 Taka is the second highest category (38% Patients) for them to get this service without going to the urban areas for their healthcare.

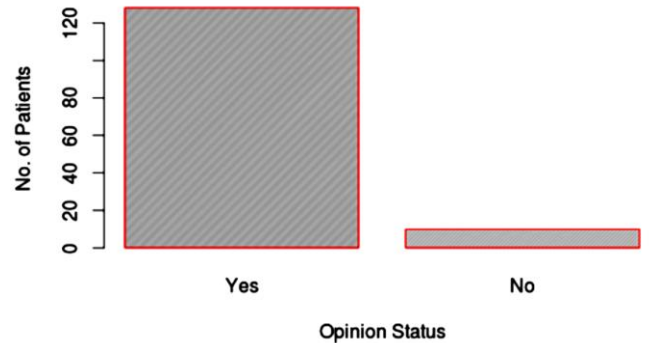


Fig. 15. Opinion of patient to start telemedicine

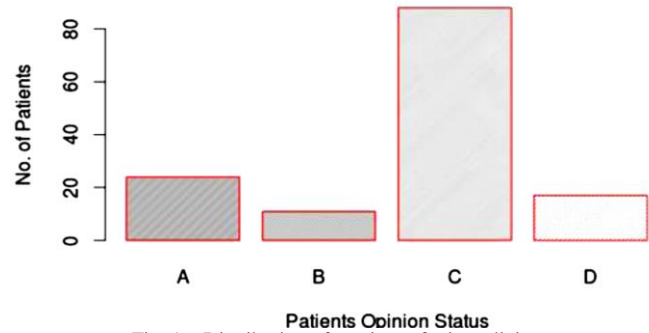


Fig. 16. Distribution of services of telemedicine

Figure 15 shows the survey results on patients for their acceptance of Telemedicine. The acceptance of telemedicine among patients is 91.42% (128 patients). Figure 16 is the distribution of services of telemedicine for patients. We have used four variables named A, B, C and D for the services. The variables are initialized as A =Consultation services, B= To know the state of the disease quickly, C= To get advice from expert doctors and D= To get primary treatment. From the survey, we found that most of the patients want to get advice from expert doctors from the telemedicine system. About all the rural and urban people uses pharmacy for the purchase of medicine prescribed by doctors. Pharmacy is the service point for the patients in Bangladesh. Doctors give treatment for patients from some pharmacy. So pharmacy can be used as a service point of Telemedicine center. In order to know the status of pharmacy owner's status, we have made this survey on pharmacy. There were 16 different questions for pharmacy. The results on pharmacy are sequentially shown in the below figures:

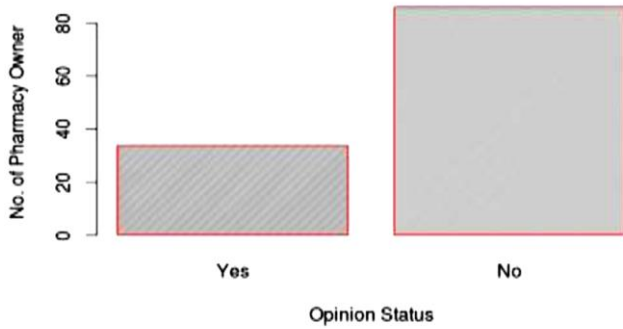


Fig. 17. Status of doctors availability in pharmacy

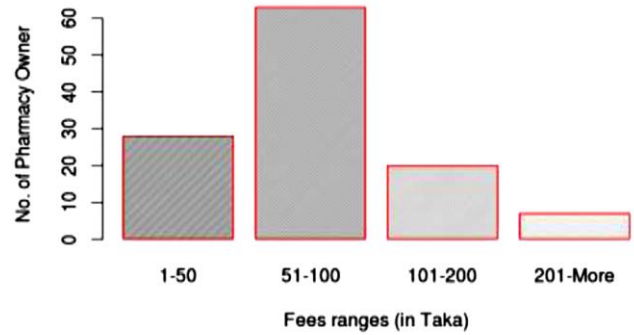


Fig. 20. Proposed fees of telemedicine for pharmacy

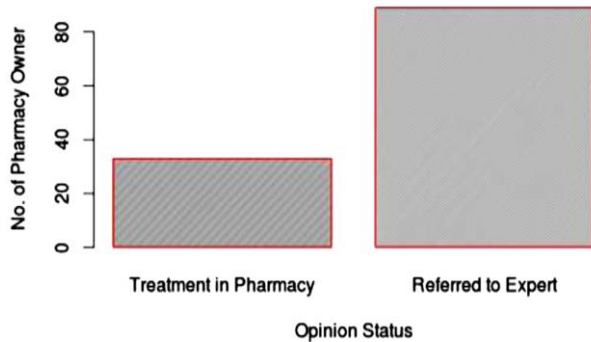


Fig. 18. Policy of treatment in pharmacy

Figure 19 shows the results of the data collection areas for pharmacy owners. From the figure, we can find that there are four types of areas where data were collected for the survey and union level areas are the highest frequency. Among four areas union level data are 47.54%, which shows the majority of the opinions come from rural areas and they accept Telemedicine. From figure 20 we can find the proposed fees for pharmacy owner's ranges four categories and maximum range is 51-100 taka as the fees for the pharmacy owners as they will give the infrastructure support for the Telemedicine.

Figure 17 is the survey result on the availability of doctors in pharmacy in rural areas. 86 pharmacy owners (70%) told that there are no doctors in pharmacy for the treatment of patients in rural areas. Figure 18 is the status of treatment in pharmacy. From the result, it was found that 72% pharmacy owner told that for the serious patients, the doctors who are serving in the pharmacy referred to the expert doctors for proper treatment. We can conclude from this survey that there are limited doctors in rural areas and Telemedicine can be introduced for the rural people as the local doctors are referring the patients to the urban areas.

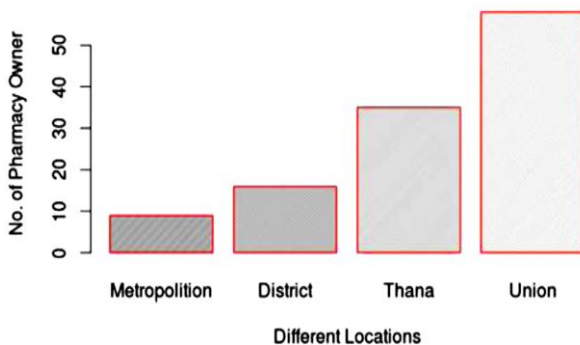


Fig. 19. Data collection status in of pharmacy

Finally, in order to collect the expert doctor's data we have selected the Medical colleges as most of the doctors are faculty members and they are always involved in the research. There were 14 different questions were designed to know their expectations on Telemedicine. Expert doctors are the key elements of the proposed Telemedicine system as their participation, advices and skills are the vital component of the system. The survey results on expert doctors are sequentially shown in the below figures:

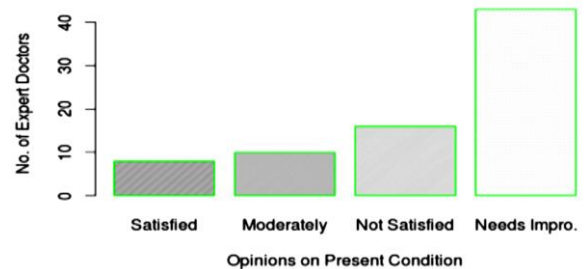


Fig. 21. Expert doctors opinion on present telemedicine

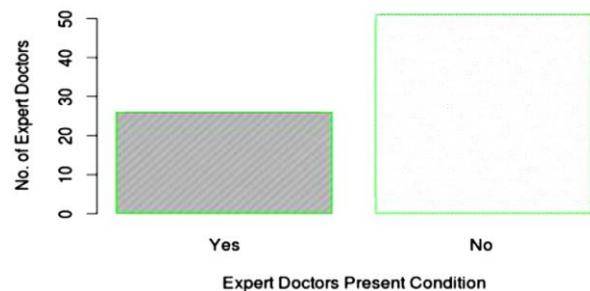


Fig. 22. Expert doctor's involvement status in telemedicine

Figure 21 is the results of the opinion of expert doctors on the present Telemedicine in Bangladesh. From the figure, most of the expert doctors (55.84%) told that the present status should be upgraded. Figure 22 is the survey results on the involvement of Telemedicine. At present only 33.76% expert doctors are partially involved with Telemedicine and 66.23% doctors are not involved in this process. 94.80% expert doctors want to give Telemedicine services for the huge number of rural people of our country.

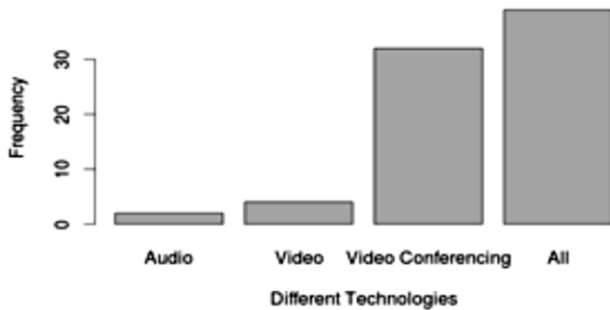


Fig. 23. Opinion of expert doctors on the facilities of telemedicine

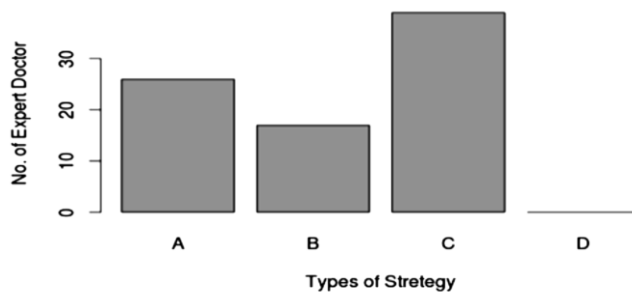


Fig. 24. Expert doctors treatment strategy in telemedicine

Figure 23 is the result of different types of facilities that should be involved in Telemedicine from the expert doctor's point of view. It was seen from the figure that, most of the doctors choose audio, video and video-conferencing facilities all together into the Telemedicine process for their easy consultation. Figure 24 depicts the patient's treatment strategies of expert doctors. Four variables have been used in the figure named A, B, C and D. The variable denotes A= Patient will be in front of the doctor, B= Knowing patients condition through mobile, C= Knowing condition through video conferencing for distance patients and D= All other cases. Expert doctors give their highest opinion (50.64%) on video-conferencing.

V. DISCUSSIONS

The survey on telemedicine of Bangladesh was conducted through questionnaires and the findings are given in the results sections. We have used the features of statistical software R for analyzing data. The overall acceptance rates of the survey questionnaires are more than 81%. It was found from our survey that village doctors have shown their interest to give health care services through Telemedicine

with the payment of 51-100 taka. Pharmacy owner's also agreed on the amount 51-100 taka for their Telemedicine infrastructure support. Most of the patients have said that they want Telemedicine services in the range of 201-300 taka. We can conclude that the expected fees for Telemedicine should be made in the range of patients. 300 Taka is the proposed fees of Telemedicine where expert doctors will get 150 taka, 75 taka for village doctors and 75 taka for pharmacy owners per patient.

The government telemedicine projects that are currently running in different medical colleges, specialized, district and upazilla hospitals in Bangladesh are mainly video conferencing based. Central consultation schedule is maintained among the service provider and receiver hospitals. Expert doctors are providing medical advices to the rural patients through local doctors. Private Telemedicine projects are using store and forward method for the treatment of their patient. But in both cases, there is no storage for the patient health data that can be used in future. The expected income should be distributed among the shareholders according to our survey will be 20% for pharmacy owners, 40% of village doctors and 60% for expert doctors. Survey found that Telemedicine services will be an additional source of income for its shareholders. Survey showed that patients cost about in general 500-1000 taka for their treatment from urban areas for one time visit. They have to travel to a distance place, they need time to go there and sometimes their physical conditions are not good. Considering this, patients want Telemedicine with the payment of maximum 300 taka.

At present, doctors (66.23%) in hospitals are not connected with the Telemedicine system. But about 94.80% doctors want to introduce Telemedicine services in Bangladesh and they want be connected to the system. Our goal is to introduce a new Telemedicine model which can be deployable through the pharmacy of our local villages with the necessary hardware units. Doctors and patients will be connected through the system and get the consultation. The patient's data will be transmitted through the system with a suitable standard protocol which can be easily readable and measured. Patients will make the payment locally and the payment will be distributed using the payment protocol. The rate of using Telemedicine services in Bangladesh is increasing significantly. Government of Bangladesh has a plan and started to cover all Upazilla level hospitals under Telemedicine service. At present, 78 Government hospitals are offering Telemedicine services. Rural peoples are now getting health services from the expert doctors of different specialized hospitals. Overall health situation is now improving through the use of Telemedicine in Bangladesh.

VI. CONCLUSION

This paper presents the current status of Telemedicine services of Bangladesh through primary survey data. Survey shows that expert doctors, local doctors, pharmacy owners and patients want to introduce Telemedicine services in Bangladesh. From the result section, we have seen that the patients (91.42%) want to introduce this service in their areas for their treatment. They also want to get the services within their financial capabilities. Survey proposed the telemedicine operating cost for Bangladesh. Local doctors normally referred their patients to expert doctors for the complex cases. They (74%) are agreed to implement the Telemedicine service. Local doctors can be able to increase their personal skills for patient management through Telemedicine. Expert doctors want to incorporate audio, video and videoconferencing facilities with the Telemedicine service. Authors believe that the findings of the survey will assist the researchers or developers for the further development of Telemedicine services in Bangladesh.

REFERENCES

- [1] Ahsannun Nessa, MA. Ameen, Sana Ullah, Kyung Kwa, "Applicability of telemedicine in Bangladesh: current status and future prospects", *The International Arab Journal of Information Technology*, Vol.7, Issue.2, pp.138-145, 2010.
- [2] MF. Roberts, V. Patterson, P. Swinfen, R. Swinfen, D. Vassallo, F. Hoque, "An evaluation of the First year experience with a low cost Telemedicine link in Bangladesh", *Computer Journal of Telemedicine and Telecare*, Vol.7, Issue.3, pp.125-138, 2001.
- [3] J.B. Hamill, H.M. Kim, J.C. Lowery, E.G. Wilkins, "Accuracy of a web based system for monitoring choronic wound", *Telemedicine Journal and Ehealth*, Vol. 9, Issue.2, pp.129-140, 2003.
- [4] J.De Neve, J. Chao, M.K. Dobke, A. Renkielska, D. Bhavsar, "Telemedicine for problematic wound management:enhancing communication between long term care skilled nursing and home caregivers and a surgical wound specialist", *Wounds*, Vol.18, Issue.9, pp.256-261, 2006.
- [5] A. Gosman, JDe Neve, M.K Dobke, D. Bhavsar, BDe Neve, "Streamlining the management of patients with problematic wounds:must a multidisciplinary team formulate all patients management plans?", *Wounds*, Vol.19, Issue.12, pp.340-344, 2007.
- [6] JC. Lin, "Applying Telecommunication Technology to Health Care Delivery", *IEEE Engineering Med Biol Mag*, Vol. 18, Issue. 4, pp.28-31, 1999.
- [7] M. Istiak, K. Shahriar, "Telemedicine services at the diabetic association of Bangladesh with technical collaboration of Grameen Telecom", In *Prospect and Problem of Mobile and Land Phones*, Bangladesh, pp.266-268, 2002.
- [8] S. Jahan, M. Mozammel, H. Chowdhury, "Assessment of present health status in Bangladesh and the applicability of e-health services: a survey of patients expectation toward e-health", *World Journal of Computer Application and Technology*, Vol. 2, Issue. 6, pp.121-124, 2014.
- [9] R.M. Schapira, T. Raza, M. Joshi, Z. Agha, "Pulmonary telemedicine-a model to access the sub specialist services in undeserved rural areas", *International Journal of Medical Informatics*, Vol.78, Issue.1, pp.53-59, 2009.
- [10] K.A. Johnson-Throop, N. Aoki, K. Dunn, J.P. Turley, "Methods in telemedicine evaluation", *Telemedicine Journal and E-health*, Vol.9, Issue.4, pp.393-401, 2003.
- [11] T. Tesekoura, A. Tsilimigaki, S. Manaka, "Eighteen months experience with remote diagnosis, management and education in cogential heart disease", *Journal of Telemedicine and Telecare*, Vol. 7, Issue.4, pp.239-243, 2001.
- [12] T.T. Kallio, J. Aalto, M.J. Kiuru, T.A Paakkala, M. Rajamaki, "Effect of teleradiology on the diagnosis treatment and prognosis of patients in a primary care center", *Journal of Telemedicine and Telecare*, Vol.8, Issue.1, pp.25-31, 2001.
- [13] CA. Irwin, AB. Bynum, "Evaluation of the effects of consultation characteristics on telemedicine diagnosis and treatment", *International Journal of Telemedicine and Applications*, Vol. 2011, Issue. 3, pp.1-19, 2011.
- [14] DA. Ponrani, "Decision Models for Record Linkage Using OCCT-One Class Clustering Tree", *International Journal of Computer Sciences and Engineering*, Vol.2, Issue.11, pp.27-30, 2014.
- [15] M. Dey, S.S. Rautaray, "Disease Predication of Cardio- Vascular Diseases Diabetes and Malignancy in Lungs Based on Data Mining Classification Techniques", *International Journal of Computer Sciences and Engineering*, Vol.2, Issue.4, pp.82-98, 2014.
- [16] X. Yu, Z. Chen, D. Feng, "Telemedicine system over the Internet", *Pan Sydney workshop on Visualization*, Vol.2, Issue.1, pp.113-118, 2006.
- [17] KW Chan, K. Hung, YT. Zhang, "Noninvasive and cuff less measurements of blood pressure for Telemedicine", *Proceedings of 23rd Annual International conference on Engineering in Medicine and Biology Society*, NY, pp.3592-3593, 2001.
- [18] M.Maidul Islam, "Problems and prospects of the information services based on the mobile phone in Bangladesh", *International Journal of Library and Information Science*, Vol.3, Issue.6, pp.104-114, 2012.