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Research Article

Telemedicine and E-Health User Readiness in Public Sector of Pakistan

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ABSTRACT:

Background: Electronic health records save lot of time, cost effective and help the health professionals to provide health services to the patients living in remote areas and also made quick and quality decisions on time. During pandemic importance of electronic health records (EHRs) has been significantly increased.

Aim: Purpose of this study was to identify the impact of e-health readiness on user readiness and project implementation and user readiness.

Material and Methods: The nature of this current study is quantitative. Survey approach was used. Primary data was collected. The nature of the data was cross-sectional i.e. data collected at one time. Questionnaires were adopted from past studies and there were total seven constructs and each construct was measured on five item scales. All items were measures on seven point Likert scale. Total 245 sample size was selected using convenience sampling technique and completed questionnaires were analyzed in the SPSS. Different statistical tests were applied such as frequencies, percentage, mean, standard deviation, and correlation and regression analysis.

Findings: There is positive and significant relationship between predictors and criterion variables. Moreover significant impact was found on e-readiness but insignificant effect on project implementation was recorded.

Conclusions: It is concluded that e-health and telemedicine is crucial for better health services delivery and to improve the quality of health services. Government of Pakistan should give attention on use of EHRs. Implementation of E-health brings not only several benefits for government, health professionals and healthcare organizations but it brings user and patient satisfaction as well.

KEYWORDS
E-Health, Telemedicine, User Readiness, Project Implementation, Hospitals, Electronic Health Records.

1 | INTRODUCTION

E-health is getting attention all over the World. E-health is user friendly well integrated and an easy to use computer application of hospital information system or health information system.[1] E-health has several benefits it saves cost, time and ensures safety and protection of patients' and hospital data.[2] Health services are better promoted by E-health and it helps in preventing several diseases. Healthcare organizations can use this health information technology (HIT) and improve the long and short term services. In Pakistan limited evidence is available about use of HIT and E-health in public and private sector healthcare organizations.[3] Electronic health (E-health) is mainly used to make better and quality decision making, keep patients record, electronic health records (EHRs), admitting patients and keeping their record, sharing information, as a mean of communication.[4] Through e-health information could be shared with health professionals and communities and societies could take preventive measured from different communicable and non-communicable disease.[5] E-health is used to share information, hospital appointments and visits; distance learning through internet has mainly influenced the quality of public health services.[6] Another usefulness of e-health is telemedicine or Telematics. Telemedicine are used to provide treatment to those patients who are far away in villages and country sides. Through sue of telemedicine professionals can also get health education and training as well.[7] Telematics is used to carry out health activities in far areas through use of information technology applications. Health professionals can control diseases through use of telemedicine, raise awareness about communicable and non-communicable diseases among people and can promote health services.[8] Information regarding health in developing economies is not properly communicated. Scars and sparse websites and information on those websites are available but that information is not well arranged.[9] E-health and telemedicine in developing economies could improve quality, performance, and help organizations to obtain sustainability through efficient use of resources. Fig2. Information technology applications are need for healthcare institutions and healthcare professionals for developed and developing economies.[10] Majority of people in Pakistan lives in villages.[11] Availability of health professionals in remote areas is very limited therefore patients tried their best to reach metropolitan cities at their own to get correct diagnosis and treatment on time.[12] Telemedicine could help the professionals and patients to have such quality services in remote areas. At the preliminary stage use of E-health and telemedicine may face challenges but with passage of time it would open doors for more advanced and timely treatment.[13] Hospital administration is taking keen interest to hire those health professionals who possess knowledge and awareness to use e-health. Hospitals are also making progress by acquiring latest IT applications for collecting data and information. E-health is also beneficial in education, training, of professionals, managerial levels, enhancing quality and obtaining efficiency and effectiveness. As discussed above majority of Pakistan's population is living in remote and far flung areas and among those people most of them never health facility in their whole life. Majority of the healthcare facilities in remote areas are not well equipped. In these areas telemedicine and Telematics use of e-health can play important and significant role.[14] Pakistan's health professionals have to accept the challenge of adopting e-health system and have to show flexibility to bring change in health sector. Importance and significance of E-health cannot be ignored in Pakistan as it is the need of the time. In 1990s steps were taken by the government of Pakistan to establish e-health in Pakistan but due to unorganized data made this task complex for hospital administration to evaluate the usefulness of information system. In this regard Ministry of Health (MoH) has made tremendous efforts to support implementation of e-health system to improve quality of health services but these efforts of adopting IT applications brought no results.[15]

Private and public sector health organizations are providing services to more than 220 million people in Pakistan and there is immense need to develop and implement national health management information system to collect, record, the data and process the data into meaningful health information which could consist of input, process and output dimensiosn.[16, 17] As declared by World Health Organization (WHO) (2020) about pandemic has urged the need of digital transformation. COVID-19 Pandemic has made the health system more complex and this complexity is continuously increasing. Therefore there is need for immediate digital transformation to ensure the continuity if the patient primaries care as well as secondary and tertiary care.[18] Getting appointment and first contact with medical expert is one the main issue in the pandemic. In this difficult times Telematics, telemedicine through useof cell

phone applications has solve this issue to a great extent. This pandemic has raised the need, importance and significance of Telematics, telemedicine and e-health.[19]The current study would investigate the use of e-health by health professionals, their knowledge practices with reference to e-health system. It is essential assess the readiness of professionals before implementation of e-health system and telemedicine. Factor like e-policies of government, administration support, user participation, technologies and training are the predictors of project implementation and user readiness to identify the e-readiness of hospitals in Pakistan. Moreover, demographic variables are also included in the research framework Figure 1.

1.1 | Research Questions

RQ1: Is there any significant impact of predictors upon e-readiness or user readiness?
RQ2: Does predictors significantly influence project implementation?

1.2 | Research Objectives

- To investigate the influence of predictors on e-readiness.
- To identify the effect of predictors on project implementation.

1.3 | Research Hypotheses

Due to start of pandemic major shift has been observed in health sector especially adaptation of health technologies. Digitalization of health data using EHRs and providing health services to remote areas patients has been increased using telemedicine and E-health. Before implementing EHRs there is need to investigate the readiness of primary healthcare centers and hospitals all over the country. The health professionals are motivated, trained and flexible to adopt change or not.[20]On the other side government has provided enough financial support, technical and administration support or not are such important questions which need to be answered first. For this purpose government e-policies, top management support, training, participation and technologies could play important role in predicting user-readiness and project implementation success.[21]

H_1: There is significant influence of predictors on e-readiness.
H_2: There is significant effect of predictors on project implementation.

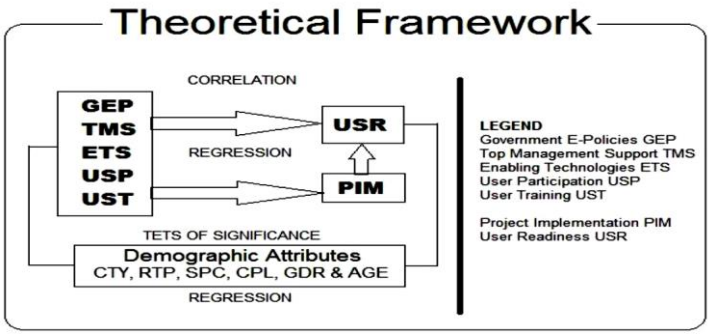

FIGURE 1: Theoretical Framework

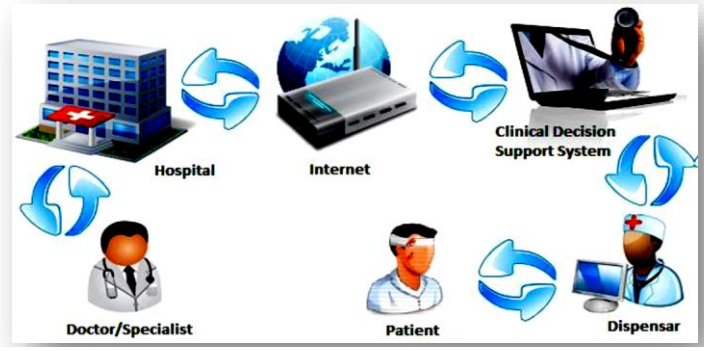

FIGURE 2: E-Health System

2 | MATERIAL AND METHODS

2.1 | Population and Sampling

The population of the existing study included all medical experts, dental and specialists from Peshawar, Abbottabad and DIK city a southern city of KPK state Pakistan. Total 4217 is the population of this study. Convenience sampling technique was used to select the sample size. Below formula was used to select the sample size. Total 245 samples were calculated using this formula. Where z=1.96, SD=0.056, E=0.0068 and N=4217.

$$n = [\frac{SD2}{\frac{E2}{Z2} + \frac{SD2}{N}}]$$

2.2 | Measures

All scales were adopted form past studies. Government e-policies have five items, support from top management/administration also measured with five items, e-health technologies 5 items user participation, project implementation and user readiness also measured with five items for each constructs. Seven likert scales was used 1-7.

2.3 | Data Collection and Analysis Techniques

Prior to data collection respondents were asked for informed consent and they were made assured that they can withdraw from the survey any time and their identity would be kept confidential and it would not affect reputation of any individual and institution. After explaining the aim of the study questionnaires were handed over to respondents. Total 300 questionnaires were distributed and 245 complete questionnaires were received and used in the analysis. Correlation and regression were used to test the hypotheses.

$$USR = \beta o + \beta 1GEP1 + \beta 2TMS2 + \beta 3ETS3 + \beta 4USP4 + \beta 5UST5 + \varepsilon$$
$$PIM = \beta o + \beta 1GEP1 + \beta 2TMS2 + \beta 3ETS3 + \beta 4USP4 + \beta 5UST5 + \varepsilon$$

3 | RESULTS

Table 1 has presented the demographic characteristics of the respondents who have participated in the survey. Majority of the respondents belong to Peshawar 116(47.34%) followed by DIK 69(28.16%). Moreover respondents were asked about their area of expertise it was found that most of the respondents were medical experts 115 (46.93%) likewise majority of the respondents were male 143(58.36%) followed by female participants

102(41.63%). Further analysis of results revealed that majority of the respondents belong to age group of 41-50 years 95(38.77%) followed by 31-40 years of age group 86 (35.10%) while only 64 respondents belong to 51-60 years of age group 26.12%.

TABLE 1 Demographic Information of the Respondents

Variables	n	%
DIK	69	28.16
Peshawar	116	47.34
Abbottabad	60	24.48
Dental	81	33.06
Medical Experts	115	46.93
Specialists	49	20
Female	102	41.63
Male	143	58.36
31-40	86	35.10
41-50	95	38.77
51-60	64	26.12

Mean and standard deviations are presented in table 2 along with Intercorrelations. Highest average score is recorded for enabling technologies M=4.88, S.D=2.43, on the contrary lowest score is recorded for project implementation M=3.21, S.D=1.02 respectively. Further we found positive relationship between GEP, USR and PIM (0.440**, 0.145, p<0.05); TMS and USR (0.420**, p<0.05); ETS, USR and PIM (0.669**, 0.433**, p<0.01); USP, USR and PIM (0.330, 0.146, p<0.05); UST, USR and PIM (0.562**, 0.184**, p<0.01) USR and PIM (0.464**, p<0.05) while insignificant relationship between TMS and PIM (-0.077, p>0.05). Hence we found support for out hypotheses 1. Further analysis of regression results are presented in table 3. All predictor significantly predicted e-readiness or user readiness all relationships are significant goodness of fit F=16.23, R^2= 0.881 explained 88.1% variance upon user readiness Table 3 While insignificant effect is found by predictors on project implementation except top management support (-0.330**, p<0.01) F=33.803, R^2=0.385 explained 38.5% variance upon project implementation. Table 3

TABLE 2 Mean Standard Deviation and Intercorrelations

Constructs	Mean	S.D	USR	PIM
GEP	4.01	1.22	0.440**	0.145*
TMS	4.07	1.38	0.420**	-0.077
ETS	4.88	2.43	0.669**	0.433**
USP	3.89	1.26	0.330**	0.146*
UST	3.53	1.08	0.562**	0.184**
USR	3.61	1.10	1	0.464**
PIM	3.21	1.02		1

TABLE 3 Regression Analyses

Model 1 (Criterion)	Predictor	R^2	F	β	p	Support
E-readiness/ User Readiness	Constant	0.881	16.23		0.000	Yes
	GEP			0.130	0.000	
	TMS			0.084	0.000	
	ETS			0.086	0.000	
	USP			0.083	0.000	
	UST			0.071	0.000	
Model 2(Criterion)	Predictor	R^2	F	β	p	Support
Project Implementation	Constant	0.385	33.803		0.000	No
	GEP			-0.073	0.272	
	TMS			-0.330	0.000	
	ETS			-0.024	0.889	
	USP			-0.008	0.898	

	UST	-0.113	0.119

4 | DISCUSSION

Purpose of this study was to determine the influence of government e-policies, top management support, enabling technologies, user participation and training on user readiness and project implementation. There was significant relationship found between predictors and criterions while significant impact of predictors on user readiness was reported but insignificant impact of predictors on project implementation is recorded. The findings of this study are in line with findings of past studies.[1-5, 18]In this study it was found that digital transformation to improve quality of health care to remote medical care where patients have limited or no access to medical and health facilities is crucial. Due to increasing issues in health and complexity raised due to pandemic government of Pakistan should take benefits from this finings and take steps to successfully implement e-health or Telematics in Pakistan to support those seventy percent population who are living in villages and need immediate care. Government of Pakistan could overcome several problems, challenges and difficulties by implementing e-health. For instance government has to provide sufficient financial resources to Ministry of Health (MoH) Pakistan. Training sessions and purchase of hardware and software needs sufficient budget in addition installing software and hardware needs experts and professionals. Start of Corona virus brings lot of challenges. The health sector is one of those sectors which face a major shift in form of digital technologies. This shift has brought many advantages such as burden on health professionals has been reduced, sharing of information is timely and communication process has become so easy. The findings of this study are in line with past studies of Dronet al[20] also found significant relationship among EHRs and user readiness and project implementation. Further these findings are aligned with study of Kesaraet al[21] and Nordo et al.[22]. and Kruse et al[23] and Yehualashet et al[24]From the above discussion and in light of past studies H_1 is accepted while H_2 is not substantiated.

5 | CONCLUSION

It is concluded that Pakistan is consisted of half developed and half poor population. More than half population has not received basic health facilities. There is need to implement e-health and telemedicine in Pakistan. It will help hospitals to reduce cost, save time and correct diagnosis and treatment will be given to patients. It would also help professionals to make quick decisions. It is essential for government to not only initiate e-health but successfully implement it all over the Pakistan. Government policies, administration support, participation in training are the most important factors which play significant role in investigating e-readiness. Provision of sufficient financial funds, training for professional i.e. end user, purchase and installation of software and hardware need experts and professional. All these need budget and support from top management. It has been concluded that project implementation requires immediate attention of MoH Pakistan. For successful project implementation it is essential that government of Pakistan aligned its MoH management structure, provide administration and financial support, knowledge to end user, set values and goals, and technical support to all healthcare organizations (HCOs) in Pakistan.

6 | POLICY IMPLICATIONS

All HCOs, MoH, Doctors, Nurses, policy makers in MoH, government of Pakistan (GOP) scholars, researchers and health practitioners could take benefits from the EHRs, E-health and Telemedicine. MoH should evaluate which factor is more important in initiating E-health in Pakistan. Quality of health services could be enhanced through telemedicine, quality of decision making, can also be improved. It can help to save time, cost and efforts. Ministry of Health (MoH), NDMA, and hospitals should show flexibility to adopt change. It would not only improve the quality of health services but also improvise the performance of health professionals, quick and better decision making and save the precious lives of patients.

7 | LIMITATIONS AND FUTURE DIRECTIONS

This study is conducted in only state of Pakistan so one must be take care when generalizing the findings. In this study single method is used therefore it is recommended to use mix method or qualitative method to have new insights of the e-health. Financial support could be added in the model to investigate in future studies.

Conflict of Interest: Author declare there is no competing interest

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