# USER'S E-READINESS FOR E-HEALTH AND TRADITIONAL HEALTHCARE: A CASE OF DERA ISMAIL KHAN, KHYBER PAKHTUNKHWA, PAKISTAN

**Qamar Afaq Qureshi [a], Allah Nawaz [a], Samiullah [b], Muhammad Asim Yasin [b*], Rafaqet Ali [b], Mazhar Abbas [b], Muhammad Imran Khan [b]**

[a] *Department of Public Administration (DPA), Institute of Political & Administrative Sciences (IPAS), Gomal University, Dera Ismail Khan, Khyber Pakhtunkhwa, PAKISTAN*

[b] *Department of Management Sciences, COMSATS University Islamabad, Vehari Campus, Multan Road, Vehari, PAKISTAN*

**A B S T R A C T**

By February 2019, thirty million citizens will get Health-Card across Pakistan, which is the best example of E-Health systems becoming popular in Pakistan, said the Minister for National Health Services. However, User E-Readiness (UER) for E-Health (EH) is founded on users' digital literacy and acceptance of digital health services. It also depends on the user perceptions about the problems and prospects of EH. It is assumed that UER determines the success of the EH system in the country and simultaneously reduces the dependence on the traditional healthcare services (THC). Becoming a practical user needs some time to know and use digital gadgets and thereby access online services. This study measures the UER, knowledge, and practices of EH and their current relationship with THC. The Study confirms that UER is significantly and positively related to EH. The study also reveals that there is a significant and negative association between UER and THC meaning that as UER increases, the negative variation happens in THC. Further, demographic impacts of gender are critical with statistics showing that Males are scoring higher on UER and EH, but Females give a higher score on THC. There is a need to increase UER so that EH could be utilized at maximum thereby helping the government in her inability to provide physical healthcare facilities everywhere across the country.

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## 1. INTRODUCTION

Current E-Governments, their economies and health services indicate the development of the state, therefore, there is no exception from adopting information & communication technologies (ICTs) in every sector including the departure from 'Health' to 'E-Health (EH)'. The developed states have reached a level of digital health services however developing countries like Pakistan have to do

a lot in this regard (Shaikh & Hatcher, 2007). Good governance is characterized by responsiveness to the needs of citizens therefore, civic-state engagement is indispensable (Qureshi *et al*., 2013c). Furthermore, the Millennium Development Goals (MDGs) and performance-based release of funding by global funding agencies are forcing to make better use of information (Ahmad *et al*., 2016b; Khan, 2018).

EH has the power of supporting traditional health services in extending the healthcare facilities to serve at broader levels (Akram & Khan, 2007). EH provides multiple benefits like access to information for making informed healthcare decisions, well-controlled clinical processes, and high quality and value-added health services. EH plays a catalyst role in healthcare as well as an enabler for states to share health resources beyond international borders to provide quality without expensive duplication (Qureshi *et al.,* 2013a; Nawaz, 2017).

EH is a platform, which is expected to provide help on both preventive (to maintain health) and curative (to treat diseases) issues, however, all this depends on the availability of resources and more importantly the digital competencies of the users (doctors and patients) to make better to best use of all the types of services available on the health portal.

The ICTs have transformed almost all the dimensions of human life therefore public health management cannot ignore it because there are a diversity of roles, which ICTs can play in solving healthcare issues (Shaikh & Hatcher, 2005; Khan, 2007). At the global level, public health facilities and services have already taken a new form of digital system where patients and healthcare services and delivery has improved many times better than before (Qureshi *et al.*, 2013c). EH is the new name for traditional Healthcare which works both online and offline using online processes, health portals, and physician web pages thereby expanding the reach of patients to public health facilities and services (Ahmad *et al*., 2016c; Khaliq & Ahmad, 2018).

A huge amount of money has been spent on computerizing healthcare facilities and services in the advanced and rich countries on EH, while developing and poor states have a long way to go (Shaikh & Hatcher, 2005). Such big investments get justification on the basis of problems with traditional health system like maintaining patient records, which is time-consuming and results in the increased costs of service delivery (Ali *et al*., 2012; Qureshi *et al*, 2013c). The traditional health systems are commonly prone to information-related problems like inaccuracy, incompleteness, and irrelevance to physician's tasks therefore useless for decision making (Ahmad *et al*., 2016). All countries know and believe in the powers of EH systems, however, it is not an off the shelf purchase rather need a lot of resources, professionalism and training of users (Ahmad *et al*., 2016c; Khan, 2018).

## 1.1  USER E-READINESS (UER)

E-Health Readiness refers to the readiness of government, bureaucracy, doctors, health management and on the top, patients or users of the E-Health system (Ejaz *et al*., 2011). UER is the ability of the patients/citizens to use the internet for locating and using online health services though EH websites. On the part of the government, policies are formulated to digitize the health facilities and services with access through online sources for the citizens to log on the web pages containing the guidelines for healthcare facilities and delivery systems (Qureshi *et al*., 2013b). Organizational readiness refers to the ability of health system like hospitals, clinics, and doctors to keep web sites updated and interactive so that patients have the access 24/7 (Nawaz, 2017).

Thus EH readiness has to occur all at the individual (user), institutional (hospital and clinics) and government levels (policies and resources) simultaneously otherwise the effectiveness and resourcefulness of new digital systems will underplay and give poor results (Shaikh & Hatcher, 2005; Shaikh & Hatcher, 2007). In the case of developing countries like Pakistan, the issues of bringing individual users, organizational systems and government on one page is further challenging due to the lack of resources, poorly performing organizations and indifference of the individual users to take interest in new technologies for healthcare services (Ejaz *et al*., 2011; Qureshi *et al.,* 2013b). There are people with positive and negative attitudes towards internet and its use, therefore, there is need to develop a plan to motivate all types of users by telling them about the benefits they can get from E-Health system and the easiness of using these new digital systems (Ahmad, *et al.,* 2016b).

The internet sources are accessible through computers as well as smartphones and do not need technical and professional expertise on the part of users. They are very simple gadgets which can be learned to use in a very short time span (Shaikh & Hatcher, 2007). There is need to prepare the users for getting ready to capitalize on these systems so what is required is to tell them the benefits they will earn by logging on the internet and health-related web sites for resolving their health problems (Ejaz, *et al*., 2011). There is a diversity of perceptions about the internet among the users. Those who like this technology believe in its benefits and contribution to the human life, however, there are prospected users who don't like internet due to their negative belief regarding the role of the internet in the life of citizens (Ali *et al*., 2012). Both types of users have to be motivated through distinct strategies and forums to convey the real message about the positive aspects of internet and its use for different aspects of life particularly, EH (Ahmad *et al*., 2016a). As a tool for providing healthcare services, the EH is very useful and supportive for the developing countries because it is impossible for such states to provide health facilities physically to every corner of the country (Ahmad, *et al*., 2016). Digital systems can reach beyond the boundaries of any geographical system (Khan, 2018).

## 1.2 E-HEALTH (EH)

Some two/three decades ago, the digital systems, both hardware and software, were expensive enough to be afforded by the advanced or rich countries therefore only the first and second world could afford it and started benefiting from computers for different sectors of life including healthcare (Shaikh & Hatcher, 2005). However, now the situation has terribly changed with a sharp decline in the price tags of digital gadgets and their accessories. The installations of these systems have now become so cheap that the latest technologies are available to both developing and developed stares (Azhar *et al.,* 2009). In the success of digital health system, the digital literacy of doctors is critical and must because the provision of online health services requires a certain level of using software tools which have been commanded by the doctors (Ejaz *et al*., 2011). All the stakeholder constituting E-Health systems need to be given opportunities to participate in the development of health information systems so that they can understand the system as well as share their concerns with development team (Ahmad *et al*., 2016a).

In Pakistan, 75% of the population lives in rural areas where the conditions of roads and transport are reportedly poor and it is difficult to reach health services when required. Likewise, professional physicians and surgeons are not willing to work in far-flung areas of the country because of the lack of facilities and resources (Ali *et al*., 2012). In this kind of ground realities, the importance of EH is further increased rather indispensable to be implemented at every possible cost and get on the road to

have a healthy nation. EH systems can provide health services on the doorsteps of the patients as and when required (Ansari *et al*., 2012; Ahmad *et al*., 2016c). Further, new systems reduce the role of humans in the system to a great extent, therefore, reduction of human errors also speeds up the delivery of healthcare information, and recipes (Khan, 2018).

Fortunately, the majority of Pakistan cities has been given telecommunications facilities thereby linking more than 2000 cities with 531,787 broadband connections. Likewise, 400 cities have been placed on Fiber Optic connections, which takes local and national EH systems on international information highway. Obviously, Pakistan has shifted from traditional healthcare to digital health services, although partially (Shaikh & Hatcher, 2005; Ahmed & Shaikh, 2008). Larger dependence on E-Health gradually increasing with increase in the computer literacy of the users who have long been hooked on the traditional physical health facilities and services (Qureshi *et al*., 2013a). Many medical schools and hospitals have adopted digital working systems in teaching medical specialization as well as delivering this knowledge and expertise to the patients (Ahmad et al., 2016b). E-health systems in Pakistan are providing services including telehealth-education, telemedicine, health-informatics, and telematics depending on the performance of following areas: administration, education and training, quality improvement and the recovering of the efficiency of healthcare facilities and services (Khaliq & Ahmad, 2018).

## 1.3 TRADITIONAL HEALTHCARE

Most of the developing countries like Pakistan still have traditional healthcare systems for most of the citizens (Ahmed & Shaikh, 2008). However, this system is not serving the whole community of citizens because a huge part of the country is either not having any healthcare facilities or whatever is available is poor to serve all patients and all diseases or emergencies (Ejaz *et al*., 2011; Qureshi et al., 2013a). People have to travel long distances to get even basic health services, which obviously discourages many to stay away from medical checkup and treatment (Ahmad et al., 2016a). The areas with some kind of traditional healthcare services have a diversity of problems starting from the corruption of the administration, to lack of doctors, clinics, medicine, and patients-doctor ratio in a particular area (Nawaz, 2017; Khan, 2018).

In Pakistan, traditional healthcare facilities and services have been corrupted by many self-seekers and corrupt elements of the society such as fake/mafia doctors, hospitals, clinics, and medicine (Ahmed & Shaikh, 2008). Hundreds of fake doctors have opened their hospitals and clinics where they provide fake services and medicine and thereby rob the citizens/patients due to their illiteracy and lack of proper and original health facilities around (Azhar *et al*., 2009). Likewise, so-called peers and Hakeem are also taking advantages of poor traditional healthcare facilities and services (Ejaz *et al*., 2011; Ahmad *et al*., 2016). The citizens, when in health trouble, become the easy victims of these manipulators due to the availability of traditional health systems (Ahmad *et al*., 2016a). Online healthcare will also reduce the chances of fake medical facilities and medicine due to the access to the standard websites of the original stakeholders (Khaliq & Ahmad, 2018).

## 2. MATERIALS AND METHODS

### 2.1 PHILOSOPHY AND APPROACH

Positivism has been used as the source of research-related beliefs and guideline to conduct the current study. Under this philosophy, what can be tested is proposed to be accepted as knowledge; standard observable concepts/terminologies should be used to record and communicate knowledge,

and the scientific method is the set of tools to collect and analyze data. The theoretical framework was extracted from the literature and then used as a guide to conduct a field study using a structured questionnaire (5-point scale) based on the literature review.

## 2.2 TOOLS & TECHNIQUES

For the collection and analysis of both qualitative and quantitative data, distinct tools were used. Qualitative data was collected through a literature survey using 'thematic-analysis' as the procedure both for collection and analysis. Primary themes were collected from literature, classified into organizing themes as per research variables and finally linked into a global-theme in the form of theoretical framework. Quantitative data from the questionnaire were analyzed using SPSS®22 to apply techniques of correlation, regression, and tests of significance.

## 2.3 RELIABILITY AND VALIDITY

Cronbach's alpha is used as a lower bound estimate of the reliability of the data. All the computed reliability coefficient scores in Table 1 are far greater than the required critical score for Alpha $\geq 0.7$. Thus, all results show that data is reliable.

**Table 1**: Reliability Statistics on Instruments

|   | Variables & Questionnaire | Items | Alpha Score |
|---|---|---|---|
| 1 | User E-Readiness | 8 | 0.955 |
| 2 | E-Health | 8 | 0.827 |
| 3 | Traditional Healthcare | 8 | 0.924 |
| 4 | Questionnaire | 24 | 0.700 |

It is always important to test the validity of the data. The study employed the KMO Test, Bartlett's Test, and Factor Loadings. The results in Table 2 show that all computed scores of KMO test, Bartlett's tests, and Factor Loadings are within the required thresholds. It shows the validity of indicators on UER. Table 3, the results show that all computed scores of KMO test, Bartlett's tests, and Factor Loadings are within the required thresholds that ensures the validity of data on EH.

**Table 2**: Validity Indicators on UER.

| KMO (Kaiser-Meyer-Olkin) and Bartlett's Test | | | Matrix | |
|---|---|---|---|---|
| Sampling Adequacy. | | 0.904 | Qs | Score |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1944.034 | UER1 | 0.982 |
| | df | 28 | UER2 | 0.808 |
| | Sig. | <0.001 | UER3 | 0.811 |
| | | | UER4 | 0.847 |
| | **Required** | **Computed** | UER5 | 0.851 |
| KMO test | = or >0.7 | 0.904 | UER6 | 0.809 |
| Bartlett's Test | = or <0.05 | <0.001 | UER7 | 0.891 |
| Factor Loadings | = or >0.4 | | UER8 | 0.979 |

**Table 3**: Validity Statistics on EH.

| KMO (Kaiser-Meyer-Olkin) and Bartlett's Test | | | Matrix | |
|---|---|---|---|---|
| Measure of Sampling Adequacy. | | .750 | Qs | Score |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 686.829 | EH1 | 0.939 |
| | df | 28 | EH2 | 0.865 |
| | Sig. | <0.001 | EH3 | 0.713 |
| | | | EH4 | 0.467 |
| | Required | Computed | EH5 | 0.422 |
| KMO test | = or >0.7 | 0.750 | EH6 | 0.518 |
| Bartlett's Test | = or <0.05 | <0.001 | EH7 | 0.657 |
| Factor Loadings | = or >0.4 | | EH8 | 0.753 |

The results from Table 4 show that all computed scores of KMO test, Bartlett's tests, and Factor Loadings are within the required thresholds that ensures the validity of data on Traditional healthcare.

**Table 4**: Validity Data on Traditional Healthcare

| KMO (Kaiser-Meyer-Olkin) and Bartlett's Test | | | Matrix | |
|---|---|---|---|---|
| Sampling Adequacy. | | 0.887 | Qs | Score |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1159.996 | THC1 | 0.973 |
| | df | 28 | THC2 | 0.603 |
| | Sig. | <0.001 | THC3 | 0.738 |
| | | | THC4 | 0.722 |
| | Required | Computed | THC5 | 0.789 |
| KMO test | = or >0.7 | 0.887 | THC6 | 0.906 |
| Bartlett's Test | = or <0.05 | <0.001 | THC7 | 0.910 |
| Factor Loadings | = or >0.4 | | THC8 | 0.828 |

# 3. RESULTS

## 3.1 DESCRIPTIVE STATISTICS

From descriptive statistics of Table 5, the interesting results show the higher mean score on UER, Lower on EH, while Least on THC. It's the descriptive indicator of the shift from THC to EH in terms of patients/public attention.

**Table 5**: descriptive statistics

| | N | Minimum | Maximum | Mean | SD |
|---|---|---|---|---|---|
| UER | 166 | 2.00 | 5.00 | 3.59 | 0.80 |
| EH | 166 | 2.22 | 4.11 | 3.06 | 0.43 |
| THC | 166 | 1.00 | 4.00 | 2.74 | 0.82 |

## 3.2 TESTING OF HYPOTHESES

Total of four hypotheses is tested.

### 3.2.1 ASSOCIATIONS

H#1: There are significant associations of UER with EH and THC

Results of the correlation show that UER is significantly associated with both EH and THC with powerful R and p-values. Both positive and negative links are also strongly supported by the statistics. Therefore hypothesis#1 is accepted.

**Table 6**: Test for correlations (n=166)

| | | UER | EH |
|---|---|---|---|
| EH | Pearson Correlation | 0.742** | 1 |
| | Sig. (2-tailed) | <0.001 | |
| THC | Pearson Correlation | -0.654** | -0.442** |
| | Sig. (2-tailed) | <0.001 | <0.001 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | |

### 3.2.2 PREDICTION (POSITIVE)

H#2: UER significantly positively predicts EH

**Table 7**: Prediction test, a: Predictors (Constant) (UER); b: Dependent Variable (EH)

| Model Summary | | | | | | |
|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | F | Sig. |
| 1 | 0.742a | 0.550 | 0.547 | 0.287 | 200.543 | <0.001b |
| Coefficients | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 1.643 | 0.103 | | 16.001 | <0.001 |
| | UER | 0.395 | 0.028 | 0.742 | 14.161 | <0.001 |

The results show that 55% (R2 = 0.550) of change in EH is because of UER with significant (p-value = 0.001) results. The prediction is also in a positive manner that as UER increases, the positive variation happens in E-Health. Therefore Hypothesis#2 is substantiated and accepted as true.

### 3.2.3 PREDICTION (NEGATIVE)

H#3: UER significant negatively explains THC

There is a negative prediction of THC by the UER. Table 8 results are significant with R2 of 0.428 or 43% negative variation (Beta-weight = -0.667) in THC due to positive increase in UER. The hypothesis#3 is therefore accepted as true and substantiated.

**Table 8**: Prediction test, a: Predictors: (Constant) (UER); b: Dependent Variable (THC).

| Model Summary | | | | | | |
|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | F | Sig. |
| 1 | 0.654a | 0.428 | 0.425 | 0.618 | 122.777 | <0.001b |
| Coefficients | | | | | | |
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 5.140 | 0.222 | | 23.204 | <0.001 |
| | UER | -0.667 | 0.060 | -0.654 | -11.080 | <0.001 |

### 3.2.4 DEMOGRAPHIC IMPACTS

H#4: Males and Females have significant mean differences in all three variables.

Table 9, Males scores are higher on UER and EH, while Females have greater scores on THC. All the results are significant therefore Hypothesis #4 is substantiated.

**Table 9**: Gender Statistics and Independent Samples Test on UER, EH, and THC.

| Group Statistics | | | | | |
|---|---|---|---|---|---|
| | Gender | N | Mean | SD | Std. Error of the Mean |
| UER | Male | 78 | 4.07 | 0.52 | 0.059 |
| | Female | 88 | 3.17 | 0.76 | 0.081 |
| EH | Male | 78 | 3.28 | 0.37 | 0.042 |
| | Female | 88 | 2.87 | 0.38 | 0.041 |
| THC | Male | 78 | 2.44 | 0.65 | 0.073 |
| | Female | 88 | 3.01 | 0.86 | 0.092 |
| Independent Samples Test | | | | | |
| | | F | Sig. | t | Df | Sig.(2-tailed) |
| UER | Equal variances assumed | 18.201 | 0.001 | 8.838 | 164 | <0.001 |
| | Equal variances not assumed | | | 9.035 | 154.4 | <0.001 |
| EH | Equal variances assumed | 0.047 | 0.829 | 6.994 | 164 | <0.001 |
| | Equal variances not assumed | | | 7.008 | 162.8 | <0.001 |
| THC | Equal variances assumed | 8.252 | 0.005 | -4.775 | 164 | <0.001 |
| | Equal variances not assumed | | | -4.857 | 159.9 | <0.001 |

## 4. DISCUSSION

It is encouraging that the level of UER increases support for EH and at the same time, reduces the use of THC. It also shows that online healthcare services are getting momentum in Pakistan at least at the level of educated citizens (Zakeer et al., 2016). The field data gives significant results about the positive impact of users' digital literacy or digital readiness of the educated people for digital health opportunities. Likewise, digitally ready users also significantly indicate their negative link with old and poor healthcare facilities and services. It is therefore proved that in Pakistan if users have a higher level of digital literacy (Nawaz, 2017), their acceptance and access to E-Health services is simultaneously increased. Further, the use of THC is also discouraged with increases in UER.

## 5. CONCLUSION

EH is indispensable for Pakistan because the state is helpless in providing traditional physical healthcare services in every corner of the country. The empirical results from the current study are supportive of these issues of inability to establish physical health services infrastructure in every corner of the country and the provision of healthcare to every citizen. Results show that EH can be the instant solution of all health-related issues. It is promising that as the users are becoming digitally competent to use online healthcare, they are more turning to online health services and avoiding traditional healthcare. The study confirms that UER is significantly and positively related to EH. The study also reveals that there is a significant and negative association between UER and THC meaning that as UER increases, the negative variation happens in THC. Further, demographic impacts of gender are critical with statistics showing that Males are scoring higher on UER and EH, but Females give a higher score on THC.

However, research tells that the success of EH programs is squarely anchored on the UER. If users are not well aware of the information and communication technologies and the social media tools to access and use online healthcare services, the success of EH systems is doomed. The government has to devise and implement digital policies for increasing digital literacy of citizens as well as provide state of the art EH facilities online. There is a need for educating and training citizens in accessing digital health services through public advertisements, awareness programs, seminars, TV-shows, and every other public access media.

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**Dr. Qamar Afaq Qureshi** is an Assistant Professor at Dept. of Public Administration, Gomal University, D.I. Khan, Khyber Pakhtunkhwa, Pakistan. He got his MPA & MPhil Degrees from DPA, GU and PhD from the Department of Management Sciences, Hazara University, Hazara. His research is focused on E-Health and HRM.

**Dr. Allah Nawaz** is Professor at Dept. of Public Administration, Gomal University, D.I. Khan, Khyber Paktunkhwa, Pakistan. His research is in the field of Computer-based Information Systems and HRM.

**Samiullah** is a Lecturer at Department of Management Sciences, COMSATS University Islamabad, Vehari Campus. He earned his M Phil in Public Policy from National Defence University, Islamabad, Pakistan.

**Dr. Muhammad Asim Yasin** is an Assistant Professor at Department of Management Sciences, COMSATS University Islamabad, Vehari Campus. He holds a Ph.D. in Agricultural Economics from University of Agriculture, Faisalabad, Pakistan.

**Dr. Rafaqet Ali** is an Assistant Professor at COMSATS University Islamabad, Vehari Campus, Pakistan. He holds a Ph.D. in Economics from Gomal University, Pakistan.

**Dr. Mazhar Abbas** is an Assistant Professor at Department of Management Sciences, COMSATS University Islamabad, Vehari Campus, Pakistan. He got a Ph.D. in Management Sciences from University Utara Malaysia.

**Dr. Muhammad Imran Khan** is an Assistant Professor at Department of Management Sciences, COMSATS University Islamabad, Vehari Campus. He holds a Ph.D. in Marketing from Qurtuba University Peshawar. His researches are Marketing, E marketing, Social media, Advertising, Consumer behavior and marketing research.