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Perceptions, Preferences and Experiences of Telemedicine among Users of Information and Communication Technology in Saudi Arabia

Fares Alshammari[1], Sehar-un-Nisa Hassan[2]
Associate. Professor., Dept. of Health Informatics, University of Hail (UOH), Hail, KSA.
Assistant Professor, Dept. of Public Health, University of Hail (UOH), Hail, KSA.

Abstract

Background: Healthcare organizations and ministry of health in Saudi Arabia are ambitious about expanding telemedicine services as it promises to offer better access to healthcare services at a reduced cost. However, there is need to obtain users' perceptive to identify and address any personal, social and cultural factors which limit its acceptance and usability in order to maximize its potential outcomes.
Objectives: This study aims at assessing perceptions, preferences and experiences of telemedicine among people from various rural and urban regions of Saudi Arabia.
Methods: A cross-sectional study, obtained data through pre-designed survey questionnaire, distributed through various means of social media including Twitter, WhatsApp and Telegram. The online application tool used for data collection has additional feature of completing descriptive analysis on data.
Results: A total of (N=781) participants including males and females from urban and rural regions of Saudi Arabia completed the online survey. Although a large proportion of the respondents (70%) subjectively acknowledged potential benefits of telemedicine and showed interest in using this technique for healthcare. However (52%) of them have actually never used Seha an (e-health) application by Ministry of Health. Around, (51%) reported to never use a phone to seek medical advice. Significant variation of responses across gender, age, region, nationality, and employment status were observed in relation to perceptions, preferences and experiences of telemedicine. A large proportion of participants were reluctant to use telemedicine primarily for two reasons i.e. lack of trust on this technique (29%) and being unable to know the doctor at personal level (30%). Around, (28%) reported lack of awareness about any benefits of telemedicine. While, almost (30%) reported that they would never prefer to consult any doctor through telemedicine.
Conclusion: At present, general public in Saudi Arabia have limited knowledge and experiences with telemedicine. There is a need to be obtain general public trust in telemedicine in Saudi Arabia through provision of greater knowledge and understanding of the potential advantages of telehealth. Adapting the delivery of telemedicine services to local Saudi cultural and social values where focus is on building close relationship with the provider may help in gaining trust and more acceptance for telemedicine. Future studies should focus on assessing the perceptions and specific outcomes of telemedicine interventions with specific populations such as old age health problems and children with special needs to facilitate patients with mobility constraints.

Keywords: E-health; Informatics; Knowledge; Perceptions; Saudi Arabia; Telemedicine; Telehealth

[1]Fares Alshammari, Ph.D., Associate. Prof., Dept. of Health Informatics, University of Hail (UOH), Hail, KSA, Email: Dr.alhammzani@gmail.com

1. Introduction

In the past decade, a substantial amount of medical literature from the Middle East countries focuses on various aspects of embracing information and communication technologies to cater the ever-rising healthcare needs of the population [1]. According to the recent statistics [2], the average doctor to patient is 2.8 per 1,000 population in Kingdom of Saudi Arabia, which is somewhat satisfactory in the present circumstances. However, the demand for healthcare services is expected to increase every year due to rise in population which is expected to reach 45.2 million by 2050. Also, there is a high incidence of non-communicable diseases in this region [3]. Most of the medical staff including nurses, paramedical staff and specialists such as obstetrics, gynecologist, radiologist, and cardiologist are largely recruited from countries in South, East Asia and Asia Pacific. According to figures, reported by media agencies Saudi Arabia may need to recruit 3,700 up to 10,000 doctors to meet demands of the upcoming decade [4].

Previous studies from the western countries [5,6] have suggested that the use of information technology and telemedicine can offer promising solutions to improve access to healthcare at a reduced cost. E-health programs further contribute in decreasing healthcare burden through prevention of disease and injuries [7]. A large amount of digital data if used for research with adequate consideration of ethical and legal boundaries [8], can ultimately facilitate in designing better interventions and enhance the prospects of good quality healthcare services for all. However, it has also been emphasized [9] that a more comprehensive approach is needed to align information technology for healthcare with evidence-based management and more research is required to fill the existing gaps in evidence-based management in fields of health informatics, health information, and health-care knowledge management. One size fit for all formula cannot be implemented in this context.

1.1 Telemedicine Programs and Services in Saudi Arabia:

The Ministry of Health, in Saudi Arabia, has taken several initiatives to increase the use of communication and information technologies for the provision of healthcare in all regions of Saudi Arabia. The first national project for telemedicine under the title of Saudi Telemedicine Network (STN) was introduced in 2011 and later in 2013, a collaborative project between MOH, Canada Health Infoway and Ontario Telemedicine Network was initiated to devise a roadmap for

the adoption and implementation of telemedicine services in KSA [10]. Last year in March 2018, the Ministry of Health (MoH) decided to expand its telemedicine services through delivery of Seha – App [11]. This online application aims at provision of medical consultations through video conferencing to citizens in Saudi Arabia. Smartphones users can seek medical specialized consultations through this audio-video communication every day during working hours and on weekends in limited hours. The medical specialist uses the information obtained from patients for rapid diagnosis, and treatment. The MoH in Saudi Arabia has great hopes from launching a new App. This program is part of five-year action plan by government of Saudi Arabia to expand healthcare services and patient care in remote areas with reduced medical errors and to enhance delivery of e-health services as per international benchmarks.

1.2 Barriers in Adoption of Telemedicine:

Previous research from other developed and developing countries [12, 13] have identified several key factors, which influence implementation and sustainability of telemedicine. These include but not limited to the, (a) absence of policy framework for telemedicine, (b) poor knowledge and technical skills of staff and (c) healthcare providers resistance to change. In light of previous literature, [14, 15] it is perceived that personal, social and cultural barriers can also be a major force in determining popularity and usability of telemedicine services across different societies. A recent study from Saudi Arabia assessed the perceptions of decision-makers of healthcare organization to identify some the barriers in expanding and implementing telemedicine services [16]. Their findings supported that variation in social, economic and cultural context of courtiers is associated with nature of challenges and barrier, thus three major factors including (a) lack of adequate sustainable financial support, (b) gaps in adhering with visions of healthcare organizations and (c) issues related to reimbursement for telemedicine services. Thus, to devise appropriate interventions and to address the barriers and challenges, it is vital to obtain data about users' perspective, current knowledge and experiences of people related to ICT and telemedicine. Availability of adequate and correct data from those, who are current users of information technology, may help to estimate the current needs of the users of telemedicine services in Saudi Arabia and identify the specific factors, which act as barriers in its acceptance, usability and expansion.

The current study aims at evaluating the current knowledge, preferences, perceptions and experiences of telemedicine among active users of information and communication technology by obtaining online data from people living in various regions of Saudi Arabia. People who are already on social media are more likely to be active users of telemedicine in the near future. The findings of study will contribute in the formulation of right policies and targeted programs in light of contextual considerations, which are certainly needed for e-health adoption, implementation, dissemination and sustainability in this part of the world.

2. Material and Methods

2.1 Research Design and settings:

This research employed a cross-sectional survey research design. Social media tools were used to recruit participants for study and online application was used to collect data for this research.

2.2 Sampling:

The potential participants for this research were people from different urban and rural regions of Kingdom of Saudi Arabia. These participants were active users of information and communication technology. A total of (N=781) participants including (12%) males and (88%) were females. They were living in both urban and semi-urban (88%) and (12%) were from rural regions of Saudi Arabia. Fifty percent of the participants were from Hail and rest were from other regions of Saudi Arabia. The details of geographic location of participants who completed this online survey is presented in Table 1. Overall, 94% were Saudi nationals who represented diverse age groups including adolescents (5%); young adults (37%); middle age (42%) and older age (15%). Around, 24% had high school education and 70% college level. A total of 39% were unemployed; 27% had jobs and 34% were students.

Table 1: Geographical location of the participants (N=781)

Location	n (%)	Location	n (%)
Hail	395(50%)	**Madinah**	26 (3.3%)
Riyadh	83 (11%)	**Makkah/Jeddah**	54 (7%)
Damam	16 (2%)	**Tabuk**	6 (.8)
Qaseem	28 (3%)	**Abha**	4 (.5%)
Aljouf	35 (5%)	**Al Kharj**	33 (4.2%)
Villages in outskirts of Hail	89 (12%)	**Hafr-e-batan**	11 (1.4%)

2.3 Data Collection

A survey questionnaire was distributed through various mediums of social media including Twitter, WhatsApp and Telegram during the months of November and December 2018. An online application was used to collect data for this research.

2.4 Questionnaire

Keeping in view the objectives for this research, ten items with multiple choices were formulated which assessed current knowledge, preferences, perceptions and experiences of participants about telemedicine. For multiple-choice items, a blank space was also provided, in case, if participants wanted to report anything other than given choices. The items on this survey form were developed after review of previous studies on telemedicine [17, 18] and good practices in development of survey questionnaires [19]. A pilot testing of tool was completed to ensure any issues related to wording and comprehension of items.

2.5. Data Analysis

The online application tool developed by undergraduate students of health informatics to collect data for this research has additional feature of completing descriptive analysis on data. Keeping in view the objectives of the survey, frequency and percentages were computed to report participants' knowledge, preferences, perceptions and experiences of telemedicine.

2.6 Ethical Considerations

Keeping in view the ethical considerations of research, the questionnaire included a covering letter, which requests for voluntary participation and provided details related to objectives, expected outcomes of research, procedures to maintain anonymity of data and confidentiality of the participants. The research proposal was reviewed and approved by ethical review committee in college of public health and health informatics in University of Hail.

3. FINDINGS

Findings of study provides useful insights about participant's experiences, perceptions and preferences of using information technology for healthcare.

3.1 Experience of using information and communication technology for seeking healthcare:

Table 2 show findings related to participants' experience of using mobile phone and Seha application for seeking medical care with comparison across gender, age, nationality, region and employment status. Findings depicts that relatively larger proportion of males use mobile phones for seeking healthcare as compared to females. Age was also significantly associated with this variable. Participants in the middle age groups were less likely to use mobile phones for healthcare as compared to younger and older adults. There were non-significant differences across nationality. There was significant difference across urban/semi-urban regions vs rural region. Almost all participants from rural regions have never used mobile phone to seek medical care. There was also significant association of employment status with use of mobile phone for medical care. Relatively higher percentage of employed participants were using mobile phone for healthcare than unemployed respondents and students. Use of Seha application for seeking medical care was associated with age, nationality, region and employment status of the participants.

Table 2: Association of demographic variables with experience of using information and communication technology for healthcare (N=781)

	Use Mobile Phone seeking healthcare				Use of Seha Application by Ministry of Health					
	YES 383 (49%)		NO 398 (51%)		YES 145 (18%)		NO 410 (52%)		Never heard about it 226 (28%)	
Demographic variables	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Gender	χ^2 = 5.27; p=.02				χ^2 = 1.64; p=.43					
Males (n=93)	56	60%	37	40%	17	18%	54	58%	22	24%
Females (n=688)	327	47.5%	361	52.5%	128	18%	356	51%	204	30%
Age	χ^2 =76.3; p<.001				χ^2 = 116; p<.001					
Less than 18 years (n=40)	10	25%	30	75%	7	17%	14	35%	19	48%
18-24 years (n=293)	184	63%	109	37%	27	9.2%	145	49%	121	41%
25-30 years(n=158)	69	44%	89	56%	15	9.5%	93	59%	50	31%
31-40 years (n=172)	46	27%	126	73%	48	28%	93	54%	31	18%
Above than 40 years (n=118)	74	63%	44	37%	48	40%	65	55%	5	4%
Nationality	χ^2 =.582; p=.44				χ^2 = 13.0; p=.001					
Saudi (n=739)	360	49%	379	51%	133	18%	382	52%	224	30%
Non-Saudi (n=42)	21	50%	21	50%	12	28%	28	67%	2	5%
Region	χ^2=97.8 ; p<.001				χ^2=92.1; p<.001					
Urban and Semi-Urban(n=691)	383	55%	308	45%	145	21%	320	46%	226	33%
Rural (n=90)	0	0%	90	100%	0	0%	0	0%	90	100%
Employment status	χ^2 =11.1; p=.004				χ^2 =743.3; p<.001					
Employed (n=216)	126	58%	90	42%	145	67%	0	0%	71	33%
Student (n=268)	116	47%	156	39%	0	0%	268	100%	0	0%
Unemployed n=297)	141	43%	152	56%	0	0%	142	48%	155	52%

3.2 Preferences and perceptions of participants about using information and communication technology for seeking healthcare:

Table 3 shows findings related to preferences of participants about using information and communication technology for seeking healthcare. Findings suggest that there is variation in the

preferences of health seeking behavior of participants across age, nationality, region and employment status. Gender was not significantly associated with preferences.

Table 3: Association of demographic variables with preferences for seeking medical care at the time of first presentation of symptoms (N=781)

	Look for symptoms and causes of disease on websites 322 (41%)		Public Hospitals 204 (26%)		Private Hospitals 181 (23%)		Pharmacy 74 (9.5%)	
Demographic variables	***n***	***%***	***n***	***%***	***n***	***%***	***n***	***%***
Gender		**χ^2 = 1.92; p=.589**						
Males (n=93)	38	41%	28	30%	17	18%	10	**11%**
Females (n=688)	284	41%	176	27%	164	24%	64	**9%**
Age		**χ^2 =62.3; p<.001**						
Less than 18 years (n=40)	7	17%	24	60%	5	12%	4	**10%**
18-24 years (n=293)	120	41%	88	30%	66	23%	19	**7%**
25-30 years(n=158)	65	41%	27	17%	54	34%	12	**8%**
31-40 years (n=172)	79	45%	35	20%	28	16%	30	**17%**
Above than 40 years (n=118)	51	48%	30	25%	28	23%	9	**8%**
Nationality		**χ^2 =9.75; p=.021**						
Saudi (n=739)	310	42%	195	26%	163	22%	71	**10%**
Non-Saudi (n=42)	12	28%	9	22%	18	43%	3	**7%**
Region		**χ^2=637.1; p<.001**						
Urban & Semi- Urban (n=691)	322	46%	204	30%	165	23%	0	**0%**
Rural (n=90)	0	0%	0	0%	16	17%	74	**83%**
Employment status		**χ^2 =1050.1; p<.001**						
Employed (n=216)	216	100%	0	0%	0	0%	0	**0%**
Student (n=268)	0	0%	13	5%	181	68%	74	**28%**
Unemployed (n=297)	**106**	**36%**	**191**	**64%**	**0**	**0%**	**0**	**0%**

Findings showed that 83% of participants in rural communities preferred Pharmacy and 17% preferred public hospital. Participant from remote areas/rural areas did not prefer to search on websites to obtain information related to medical conditions although these participants are active users of social media because they participated in this online survey, which was distributed through various social media channels.

Table 4 Perceptions of respondents about telemedicine (N=781)

Items	Frequency (*n*)	Percentage (*%*)
Do you think telemedicine is beneficial way of seeking healthcare?		
Yes	550	70%
No	73	9.3 %

Do not Know	158	20.2%
Are you ready to try telemedicine to get a diagnosis and follow up on your health condition?		
Yes	644	85%
No	43	5.5%
Do not Know	74	9.5%
In your view what advantages telemedicine can offer you?		
Save from travelling to health center	91	11%
Can access medical care any time	213	27%
Multiple benefits (save time, save travel, easy access, emergency care, follow up for disease, regular medical consultation)	458	59%
Do not know any	19	3%
What hesitate you in seeking medical care		
No able to know the doctor personally	237	29%
Lack of privacy of health data	75	10%
Do not trust telemedicine for medical care	239	30%
No hesitation	268	33%

Findings from Fig 1 and Fig 2 show that participants have specific preferences for choosing means of communication to seek telemedicine. Video call was the most preferred method for communicating with healthcare professional. Majority of the participants preferred to seek consultation for dermatology or internal medicine problems through telemedicine.

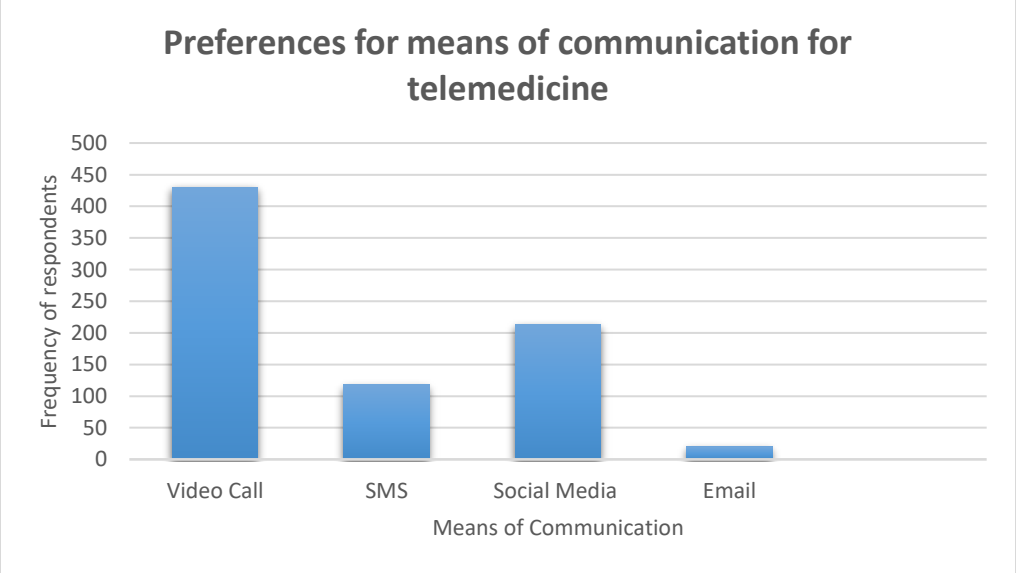

Fig 2. Preferences for means of communication with healthcare provider if required

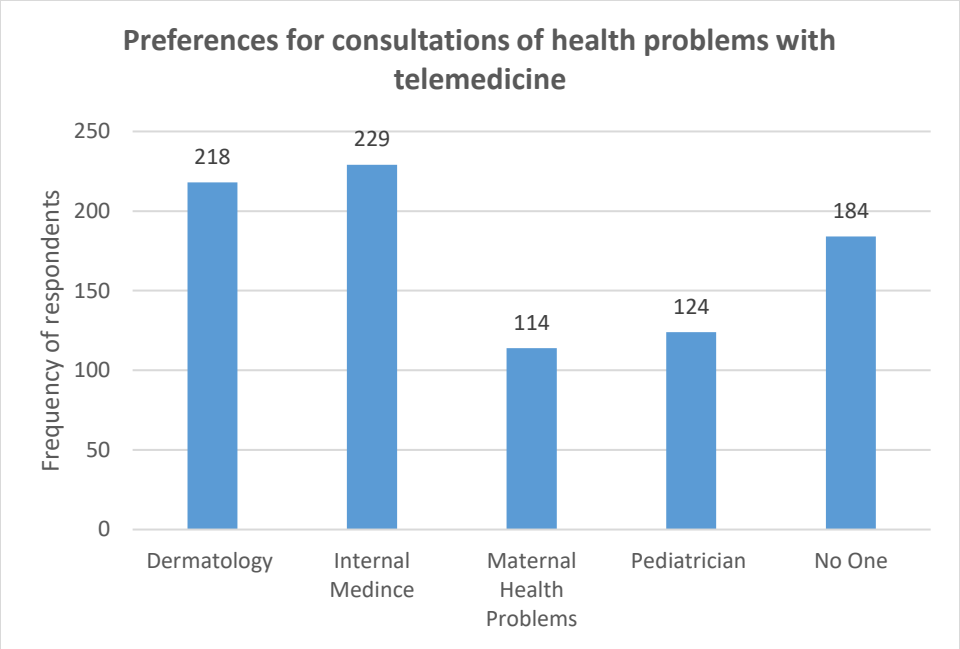

Fig 3. Preferences for consultation of health issues with telemedicine

Findings also showed that 70% of participants consider telemedicine as a beneficial way of seeking healthcare and 80% of them were ready to try telemedicine to get a diagnosis and follow up with health conditions. 59% acknowledged multiple benefits of telemedicine however, 30% do not trust telemedicine services, 29% were reluctant because they not able to see doctor personally and 10% had concerns about ensuring privacy of their data.

4. Discussion

This study being the first online survey which collected data from various regions of the country from common public who are the current or prospective users of these services provided insight about knowledge, perceptions and preferences of these individuals and has significant implications to expand telehealth services as per preferences of the users.

Findings suggests significant differences across demographic variables including gender, age, region and employment status. Some of these findings align with previous literature from high-income countries where a study from rural community of Queensland, Australia [15] showed that less proportion of participants from rural community are aware of telemedicine services and therefore less likely to use it. Current findings stressed the need for taking

appropriate action to make people aware of the availability of telemedicine services particularly to obtain the proposed benefits of telecommunication in rural communities.

Findings depict that more participants in younger age group and student status were aware of Seha application which provides telemedicine services in Saudi Arabia. However, they were currently not using it as revealed from participants' responses, which is possibly because they may not need it due to good health conditions in this age. However, more significant finding was related to lack of awareness of this application in rural regions. Though this telemedicine application is supposed to be more useful for participants in rural regions, however, majority of participants from rural regions have actually never even heard about this application. This finding further strengthens the need for education and awareness programs for rural communities to achieve likely benefits and outcomes of telemedicine services offered by Ministry of Health in Saudi Arabia.

Findings showed variation exists across age, nationality, region and employment status in terms of preferences of health seeking behavior of the participants. Participants from rural communities still prefer traditional approaches in seeking medical care and these findings align with previous research [20] which although have used qualitative data, however, suggest that variation exists between racial and ethnic groups and regional differences exists in terms of people's preferences for seeking medical care. Current findings demonstrated that video call was the most preferred method for communicating with healthcare professional and providers also prefer this method as indicated in one previous study from Saudi Arabia [16] which has investigated the perceptions of professionals or people who had some experience of telehealth consultation.

Participants from rural communities still prefer traditional approaches in seeking medical care as demonstrated by responses of participants on this study and majority of them did not report exploration of online resources to obtain information related to medical conditions. There is need for more research to understand underlying reasons for this non-engagement at consumer level. The findings of present study are useful in terms of understanding consumer's preferences for modes of communication and specialties thus focusing on these issues might lead to acceptance for telemedicine services at wider level. Findings from this region [16] showed that quality of basic facilities and infrastructure to implement telemedicine are also few of barriers, particularly in context of rural settings. Current findings need to be interpreted in light of

findings from previous research [16] from Saudi Arabia which suggested some specific challenges in the implementation of telemedicine including consumer acceptance for telemedicine in private sector which is also linked with the economic feasibility and the commercial viability of telemedicine.

5. Strengths and Limitation of the Study

This study provided useful insight about the broader community knowledge, perceptions and preferences of telehealth in rural and urban regions of Saudi Arabia by obtaining data from large number of participants who were active users of internet and social media tools. However, there are some limitations of studies, for instance the sample was recruited through social media and was completed online. Current findings thus primarily inform us about preferences and attitudes of young females living in urban and semi-urban regions of Saudi Arabia. Some of the inherent issues of self-report measures such as reporting biases should be considered while interpreting the findings of this survey. Data was obtained on close-ended questions though provide accuracy in terms of quantitative estimation, however, limited information about variables is sought through quantitative research designs. A qualitative research if employed can provide data about specific concerns of prospective users of telemedicine services as well as their suggestions to address specific challenges in acceptance and improving standards of telehealth care keeping in view local cultural and social context.

6. Conclusion

Findings suggest that despite of some apprehensions, participants largely hold favorable attitude towards telemedicine service. This acceptance can facilitate in large-scale deployments of telemedicine services, which would contribute significantly to the advancement of healthcare in semi-urban and rural areas in Saudi Arabia. Some fears of participants about its effectiveness in terms of doctor-patient relationship at personal level and privacy of data do exist. Ministry of Health in Saudi Arabia is committed to expand telehealth services, however, appropriate steps should be taken to ensure provision of quality and maintaining good standard of care to gain consumer's trust on this service which is though widely accepted for its practical benefits such as saving the patients from travelling to healthcare centers.

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